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Research Article

Effect of Season on UV Absorbing Property of *Syzygium cumini* L. Leaves

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Abstract

Syzygium cumini Linn. is known to possess a wide range of medicinal properties including UV absorbing property. In the present study we have examined effect of season on UV absorbing property of *S. cumini* L. leaves. *S. cumini* L. leaves were collected in summer, winter, autumn and rainy seasons. Acetone extracts of the leaves were prepared separately. Extracts were used to get absorption spectra by scanning in the wavelength range from 200 nm to 400 nm at 10 nm intervals. Amounts of polyphenols in the leave extracts were also checked to note correlation, if any, between poly phenol content and UV absorbing property of *S. cumini* L. leaves. Results showed that acetone extract of *S. cumini* L. leaves of rainy season had maximum UV absorbing property. Polyphenol content of the leaves was also high during rainy season. Acetone extract of *S. cumini* L. leaves of rainy season may be used as anti-solar agent in preparation of sun screen lotions.

Keywords: *Syzygium cumini* Linn. Leaves; UV Absorbing Property; Seasonal Effect; Polyphenols; Sun Screen lotion

Introduction

Numerous medicinal plants are known possessing UV absorbing property. Few of them are, *Azadirachta indica, Oscimum sanctum, Calotropis gigantea* L*., Aloe vera, Mentha piperita, Lycopersicon esculantum* and *Carica papaya* [1-2].

Syzygium cumini L. (family Myrtaceae) is a tropical fruit tree of great economic importance. It is a large evergreen tree up to 30 m height and a girth of 3.6 m with a bole up to 15 m. 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.has several medicinal properties. Leaf has anti-viral, anti-bacterial, anti-diabetic, anti-allergic, anti-DNA damage and anti-oxidant activities. Seeds exert anti-inflammatory and anti-gastric ulcer activity. Fruit is anti-hyper lipidemic, possessing anti-cancer property. Bark and pulp of the plant are efficacious for diabetes [4].

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

Recently we have noted that acetone extract of *S. cumini* L. leaves possesses UV absorbing property [7]. In the present study effect of season on UV absorbing property of *S. cumini* L. leaf was

investigated. Efforts were also made to estimate number of phenolic compounds in *S. cumini* L. leaves in different seasons as there is a positive correlation between number of phenolic compounds in plant's leaf and its UV absorption property [8].

Methodology

Plant material

S. cumini L. leaves were collected from the medicinal plants garden of the University of North Bengal, Siliguri ($26^0$41'30.9984" N, $88^0$27'4.5756" E, elevation, 410 ft), Dist. Darjeeling, West Bengal, India during Autumn (September – November), Winter (December – February), Summer (March - May) and rainy season (June – August) of 2016 - 2017 at about 9 am. Leaves were authenticated by the experts of the department of Botany of the said university. A voucher specimen (No. 0107/17) was kept in the department of Medical Biotechnology, Sikkim Manipal Institute of Medical Sciences of the Sikkim Manipal University, Gangtok, Sikkim, India for future references.

Figure 1: *S. cumini* L. leaves.

Extraction of the plant leaves

Collected leaves of *S. cumini* L. of different seasons were washed thoroughly. Leaves were then shade dried and separately powdered. The powder (100g) was extracted with 500 ml of acetone 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.

UV ray absorption study

Brown mass (10 mg) obtained from the extraction process 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. Each experiment was done for three times and mean value calculated.

Total phenols content

10 mg of the brown mass obtained in extraction process was dissolved in 100 ml distilled water and total phenols content of the solution was determined by the method of McDonald., *et al*. [9]. Here also each experiment was done for three times and mean value calculated.

Chemicals

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

Statistical Analysis

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% was considered to be statistically significant [10].

Results and Findings

UV absorption spectra of acetone extract of *S. cumini* L. leaves of rainy season is shown in figure 2. The extract absorbed maximum UV ray at 200 nm wave length which was 1.5. UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm wave lengths were found 0.8, 0.6, 0.3 and 0.18 respectively.

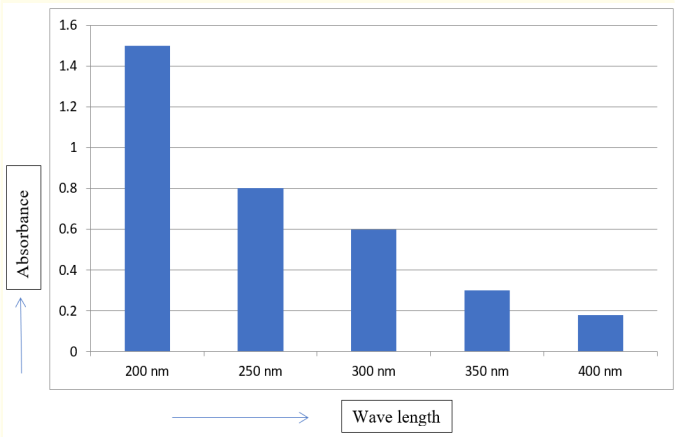

Figure 2: UV radiation absorption by the acetone extract of *S. cumini* L. leaves during rainy season.

Figure 3 shows UV absorption spectra of acetone extract of *S. cumini* L. leaves of winter. At 200 nm wave length the extract ab-

sorbed maximum UV rays. Value was 1.2. At 250 nm, 300 nm, 350 nm and 400 nm wave lengths the same extract of *S. cumini* L. leaves showed absorption 0.75, 0.5, 0.25 and 0.15 respectively.

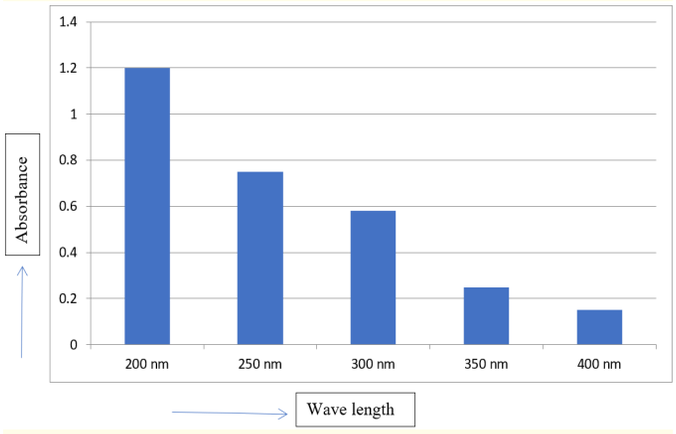

Figure 3: UV radiation absorption by the acetone extract of *S. cumini* L. leaves during winter.

UV absorption spectra of acetone extract of *S. cumini* L. leaves of summer is shown in figure 4. The extract showed maximum UV absorption at 200 nm. It was 1.0. UV ray absorptions by the same extract at 250 nm, 300 nm, 350 nm and 400 nm wave lengths were 0.7, 0.5, 0.2 and 0.1 respectively.

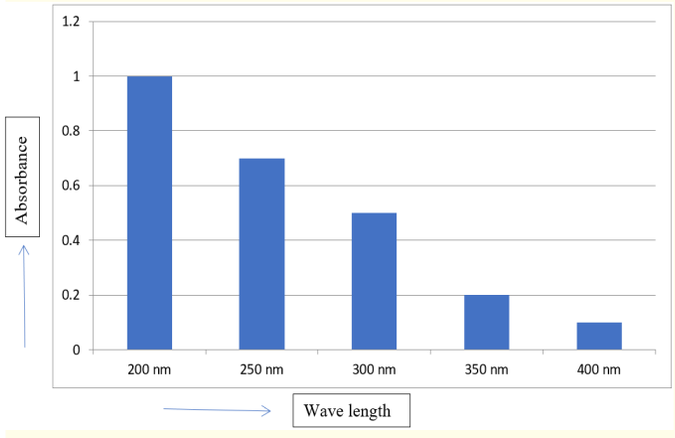

Figure 4: UV radiation absorption by the acetone extract of *S. cumini* L. leaves during summer.

Figure 5 shows UV absorption spectra of acetone extract of *S. cumini* L. leaves of autumn. At 200 nm the extract absorbs maximum UV rays. It was 0.92. At 250 nm, 300 nm, 350 nm and 400 nm wave lengths acetone extract of *S. cumini* L. leaves, however, showed absorption 0.67, 0.48, 0.15 and 0.08 respectively.

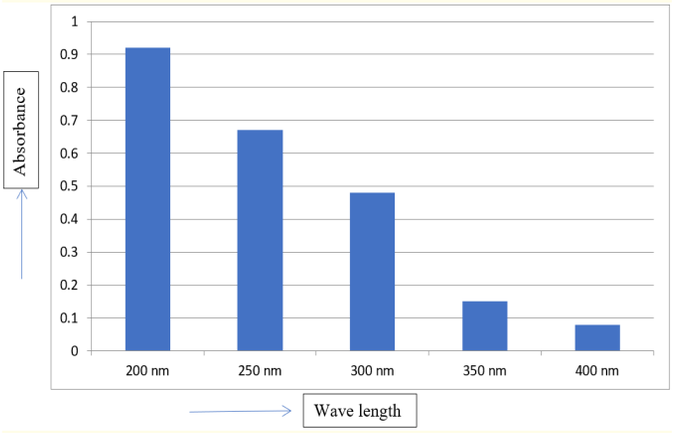

Figure 5: UV radiation absorption by the acetone extract of *S. cumini* L. leaves during autumn.

Effect of season on number of phenolic compounds in *S. cumini* L. leaves is shown in figure 6. *S. cumini* L. leaves collected during rainy season had 63.0 mg phenolic compounds in 1 g dry wt of the leaves whereas *S. cumini* L. leaves collected during winter, summer and autumn had 40.0, 35.0, 30.0 mg of phenolic compounds per g dry wt of the leaves respectively.

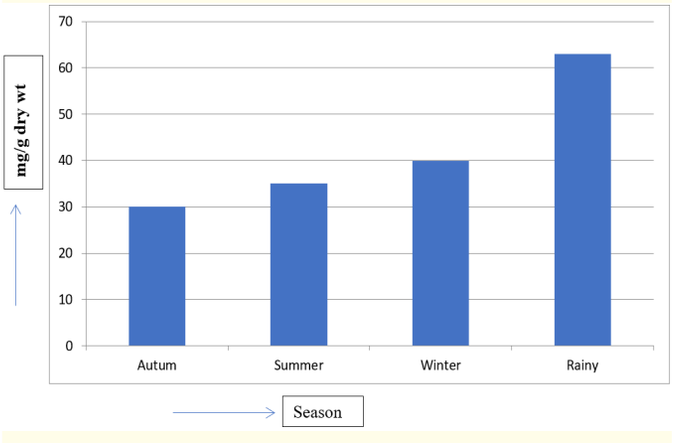

Figure 6: Number of phenolic compounds in *S. cumini* L. leaves: Effect of season.

Discussion

Solar UV-radiation is required for cutaneous synthesis of vitamin D. This covers almost 90% of the vitamin D-requirements of

the human body. But the solar UV radiation has adverse effects also. One of the important environmental risk factors for development of non-melanoma skin cancer is solar UV-radiation. Besides, solar UV-radiation has lot of detrimental effects. One example is photosensitivity reactions to ingested drugs.

Excessive exposure to UV carries profound health risks including pigmentary changes, atrophy, wrinkling etc. [11-13]. 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].

In the present study we have confirmed UV absorbing property of acetone extract of *S. cumini* L. leaves. The plant leaves collected during winter, summer, autumn and rainy seasons showed UV absorbing property in all wave lengths of UV region, but maximum absorption was found in 200 nm wave length (figures 2-5).

When compared the UV absorbing property of acetone extract of *S. cumini* L. leaves of different seasons, we have noticed that *S. cumini* L. leaves collected during rainy season had maximum UV absorbing property in 200 nm followed by *S. cumini* L. leaves collected during winter, summer and autumn (Figure 7).

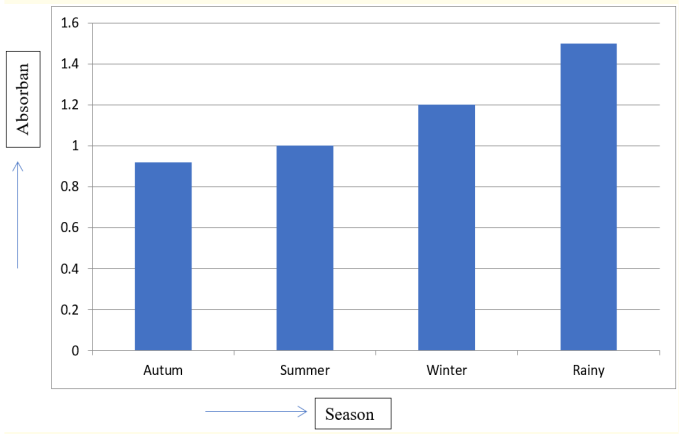

Figure 7: Seasonal effect on UV radiation absorption by the acetone extract of *S. cumini* L. leaves.

This is probably the influence of climate of different seasons on secondary metabolites in medicinal plants. Several authors demonstrated that season can change amount of bio active compounds in different parts of the plants [14-23].

In the present study we also estimated amount of phenolic compounds in *S. cumini* L. leaves of different seasons. Results showed that *S. cumini* L. leaves of rainy season had maximum amount of phenolic compounds (figure 6). This high number of phenolic compounds may have correlation with maximum UV absorbing property of *S. cumini* L. leaves of rainy season. Ebrahimzadeh., *et al*. also showed a positive correlation between number of phenolic compounds in plant's leaf and its UV absorption property [8].

UV absorption property of *S. cumini* L. leaves may be due to presence of other compound(s) apart from phenolics. Presently work is now going on in this direction.

Conclusion

Acetone extract of *S. cumini* L. leaves of rainy season contains high amount of phenolic compounds and has maximum UV radiation absorbing property.

Recommendation

In preparation of sun screen lotion and other UV guard materials acetone extract of *S. cumini* L. leaves of rainy season may be used.

Acknowledgement

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Conflict of interest

Nil.

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