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Research Paper

Portulaca Oleracia: A Natural UV-B Protecting Agent

Textiles

KEYWORDS : Portulaca Oleracea, UV absorption, methanol extract, SPF

Vandana Gupta — Ph.D Scholar Deptt of Textile and Apparel Designing, Chaudhary Charan Singh, Haryana Agricultural University, Hisar, Haryana1

Saloni Gupta — Ph.D Scholar Deptt of Environmental Science and Engineering, Guru Jambheshwar University of Science and Technology, Hisar, Haryana

Nirmal Yadav — Professor Deptt of Textile and Apparel Designing, Chaudhary Charan Singh, Haryana Agricultural University, Hisar, Haryana1

ABSTRACT

The present study aimed at screening methanol extract of Portulaca oleracea for its UV absorbing properties. The extract was subjected to spectrophotometric analysis for getting absorption spectra in wavelength range 290 nm – 320 nm (UV-B). The results revealed that the methanol extract of P. oleracia shows good absorption in UV-B range. Thus, it can be considered as potential natural source, for developing UV protective products such as textiles by application in the form of dyes, or finish and can be used by consumers to protect themselves from harmful UV radiations.

INTRODUCTION

Long exposure to UV rays can cause not only sunburn but also premature skin ageing (Sivaramakrishnan, 2008), skin cancer and eye disorder such as cataracts (Gupta, 2005). Natural products have been traditionally accepted as remedies for many diseases. The beneficial medicinal effects of plant products typically result from the combination of secondary metabolites (Bellini *et al.,* 2013). This property can be exploited by extracting the potential part or component of plant in developing products such as dyes, finishes and sunscreen (Manoj, 2014) with UV protective ability. As today's, consumer are demanding more and more value addition in the products preferably obtained from natural and renewable sources (Gupta, 2005).

Portulaca oleracea (Common Purslane; also known as Verdolaga, Pigweed, Little Hogweed or Pusley) is an annual succulent in the family Portulacaceae, which can reach 40cm in height. It is found throughout India and the Middle East, but is naturalized elsewhere, and in some regions, is considered an invasive weed. The whole plant is considered antiphlogistic (takes the heat out), a bactericide, antidiabetic, calmative, diuretic, and refreshing agent (Boulos, 1983 and Nadkami, 1999). Sanja *et al.*, has proved the antioxidant activity of the methanol extract using methods such as DPPH free radical scavenging, reducing power estimation by FeCl3, nitric oxide free radical scavenging, super oxide scavenging activity Sanja *et al., (*2009). The extract has a tendency to scavenge the free radicals involved in the ageing process and skin wrinkling and thus may provide some photoprotective action (Mishra *et al.,* 2011).

The present study was conducted with the aim to screen the UV-B absorbing property of *Portulaca oleracea* , a weed.

MATERIAL AND METHODOLOGY

Plant material

The required fresh and tender parts of *Portulaca oleracea* (leaves and stem) were collected from Haryana Agricultural University, Hisar. They were shade dried, crushed into fine powder and extracted through soxhlet apparatus using methanol as solvent, at 55-60^0 C for 4-5 hours. The extracts obtained were filtered, concentrated in rotary evaporator. The dried extract was stored in air tight container at 4^0 C for further study.

Sample preparation

10mg of methanol extracts were weighted accurately and dissolved in 1ml of distilled water, to produce the solution of 10mg/ml. The UV absorbing readings was taken for wavelengths ranging from 290 to 320 at 5nm interval by using double beam spectrophotometer. (Hamid, 2015). SPF for methanol extract of *Portulaca oleracea* was calculated from the formula given by Mansur *et al.,* by utilizing values given by Sayre *et al.,* SPF was calculated three times and mean value was taken in consideration. In vitro SPF can be calculated by following equation:

SPF = CF × 320-290 ∑EE × I × Abs

solar intensity spectrum, Abs-Absorbance of sunscreen product, CF-correction factor (=10). The value of EE x I are constant and predetermined as shown in table 1 **Table 1.**

Values of EE*I used in the calculation of SPF

Wavelength (λ nm)	EE*I (Normalized)
290	0.0150
295	0.817
300	0.2874
305	0.3278
310	0.1864
315	0.0839
320	0.0180
Total	1

EE- Erythemal effect spectrum, I-solar intensity spectrum

RESULTS AND DISCUSSION

The UV absorption activity and SPF of methanol extract of leaves and stem of *Portulaca oleracea* was studied by using the double beam UV spectrophotometer at 10mg/ml concentration. The methanol extract screened showed maximum UV absorption in the range of 290-320 nm (as shown in Table 2). In the present study it was found that *Portulaca oleracea* extract have SPF 22.92 which is an acceptable range according to Skin Cancer Foundation who considers SPFs of 15 or higher acceptable UVB protection for normal everyday activity, and SPFs of 30 or higher acceptable for extended or intense outdoor exposures. (Henry *et al.,* 2012).

Table 2: SPF values of Portulaca oleracea

S.no.	Wavelength (λ nm)	10mg/ml
1.	290	2.405
2.	295	2.406
3.	300	2.290
4.	305	2.298
5.	310	2.265
6.	315	2.229
7.	320	2.190
Sun Protecting Factor (SPF)		22.92

Discussion

P. oleracea contains number of phytochemcials such as

glycosides, flavonoids (Bakkiyaraj, S., & Pandiyaraj, S., 2011) The high UV absorbing and SPF value of *P.oleracea* could be attributed to the presence of flavoloids, which are one of the major antioxidant and UV protective agents (Angeb, 2012) in plants**.** (Khazaelia & Mehrabanib, 2008) studied UV absorption and antioxidant property of some common medicinal plants, which have flavonoids and other phenolics as the most important components. The results showed the SPF of 24.79 and 25.69 of leaves extract of *Dracocephalum moldavica* L (Lamiaceae) and flowering tops of *Viola tricolor* L. (Violaceae), and considered high amount of phenolics and flavonoids compounds as the cause of high SPF.

Conclusion

Human skin is constantly exposed to UV radiations present in sunlight. This may induce number of harmful effects on skin which includes sunburn, wrinkles, photosensitivity and may more. The use and development of novel preventive and therapeutic strategies such as finishing on textiles (having dyes and finishing agents) and development of sunscreen and other cosmetics with natural products UV absorbing efficiency can help to combat the increasing need of the environmental and health conscious consumers. *P.oleracea* is one candidate which can help in prevention of adverse effects of UV radiation on the skin and thus evaluation especially as textile finishing agent is awaited.

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