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Research Article

**ESTIMATION OF PHYTOCHEMICALS AND SUN  
PROTECTION FACTOR (SPF) NUMBER IN COMMONLY  
USED ETHANOLIC HERBAL EXTRACTS**<sup>1</sup>Chelluboina Prasanna Laxmi, <sup>2</sup>Dasari Ruchitha Reddy, <sup>3</sup>Dasireddy Saisri,<sup>4</sup>Gullipalli Rohini, <sup>5</sup>Chandaka Madhu<sup>1</sup>Avanathi Institute Of Pharmaceutical Sciences, Vizianagaram, AP-531162**Article Received:** February 2022**Accepted:** March 2022**Published:** April 2022**Abstract:**

The aim of the present study is phytochemical screening and the ultraviolet absorption properties of ethanolic herbal extracts of some commonly used vegetable sources by determining the sun protection factor (spf) number. The invitro SPF number is determined according to the spectrophotometric method described by Mansur et.al.,. Ethanolic herbal extracts were prepared and after dilution with alcoholic solutions the absorbance were recorded between 290-320 using uv-vis spectrophotometry. It was observed that all of the ethanolic herbal extract showed some UV protection capability.

**Keywords:** sun protection factor, spectrophotometric, ethanolic extract**Corresponding author:****Chandaka Madhu,**

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**INTRODUCTION:**

The sun is the Natural source of energy which is located at the center of the solar system <sup>(1)</sup>. It mainly consist of hydrogen helium <sup>(2)</sup> and heavy metals <sup>(3)</sup>. The sun emits different types of electromagnetic radiations (IR, UV & Visible) in which UV Rays shows both beneficial ( synthesis of vitamin D3) as well as harmful effects ( allergic reaction) <sup>(4)</sup> , immuno suppression, photo aging and skin cancer<sup>(5)(6)</sup> Based upon the wave length range the UV Radiation is mainly divided into three distinct bands UVA (320-400nm) , UVB ( 290-320nm) and UVC (200-290nm). In which UVC is effectively filtered by ozone layer <sup>(7)</sup>. UVB is primarily associated with Erythema and sun burn. UVA is primarily associated with skin cancer.

The sun care products are widely used to protect the skin from UV Radiations by physical sun screens (those that reflect the sun light) or chemical sun

screens (those that absorb the sun light) <sup>(8)</sup>. But sun screen products are causing hyper sensitivity on sensitive skins which we can rectify by using herbal sun screens. However now a day's research have climbed that cosmetic having herbal components are more suitable for hyper allergic skin because they are less irritant and more easily adjustable to the skin. So the present study is to estimate the phytochemicals and SPF number of Herbal extracts which are having a good anti-oxidant property.

SPF can be calculated by applying the following formula know as Mansur equation

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times ABS(\lambda)$$

WHERE CF=Correction Factor (10),  $EE(\lambda)$  = Erytmogenic Effect of Radiation With Wavelength ( $\lambda$ ),  $ABS(\lambda)$  = Spectrophotometric Absorbance Value at Wavelength ( $\lambda$ ) The Values of  $EE \times I(\lambda)$  are Constants. Which is given in the table -1

Table:1

wave length	EE*I
290	0.015
295	0.0817
300	0.2874
305	0.3278
310	0.1864
315	0.0837
320	0.018

**MATERIALS AND METHODS:****Materials required:**

Chemicals Required : Ethanol ,Water

Instruments used : Double Beam-UV-Spectroscopy (UV-Win software), Heating Mantles

Glassware Required: Beaker (50ml & 100ml), Volumetric Flasks (25 ml,50ml & 100 ml), Glass Rods, Pipettes (1ml ) ,(500 ml)Round Bottom Flask and Condenser.

**Collection and authentication of plant material:**

The plant material *Musa Acuminata*, *Cucumis Sativus*, *Carica Papaya*, *Vitis Vinifera*, *Malus Domestica*, *Daucus Calota*, *Solanum Lycopersum* and *Beta Vulgaris* was collected in the month of FEB 2015 from local market, in Gandimaisamma, Hyderabad.

**Preparation of ethanolic extract:**

The Ethanolic extract of the plant was prepared using reflex condensation process. The fresh fruits about 200g was weighed and placed in a 500 ml round bottom flask with 200ml of ethanol and its

refluxed for 8 hrs at 40°C . Then suspension was filtered through a fine muslin cloth. The solvent was evaporated by heating until ¾ is reduced. The remaining solvent is evaporated under room temperature. A semisolid residue was obtained. The percentage yield and phytochemical screening is studied.

**Sample preparation:**

0.5 g of all samples was weighed, transferred to a 50 mL volumetric flask, diluted to volume with ethanol, followed by ultrasonication for 5 min and then filtered through cotton, rejecting the first 5 mL. A 2.5 mL aliquot was transferred to 25 mL volumetric flask and diluted to volume with ethanol. Then a 5.0 mL aliquot was transferred to a 25 mL volumetric flask and the volume completed with ethanol. The absorption data were obtained in the range of 290 to 320, every 5 nm, and 3 determinations were made at each point, followed by the application of Mansur equation.

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times ABS(\lambda)$$

**RESULTS AND DISCUSSION:****Table:2- THE PERCENTAGE YIELD OF ETHANOL EXTRACT:**

S.No	Name of The Plant	Percentage Yield (%)
1	<i>MUSA ACUMINATE colla</i>	2.8%
2	<i>CUCUMIS SATIVUS</i>	2.9%
3	<i>CARICA PAPAYA</i>	3.6%
4	<i>VITIS VINIFERA</i>	4.6%
5	<i>MALUS DOMESTICA</i>	3.1%
6	<i>DAUCUS CAROTA</i>	3.6%
7	<i>SOLANUM LYCOPERISUM</i>	3.3%
8	<i>BETA VULGARIS</i>	3.4%

**Table:3- PHYTOCHEMICAL SCREENING:**

Name of the plant	Alk	Carb	Gly	Tan	Phytos	Flav	sapo	Pro	muci
<i>MUSA ACUMINATE colla</i>	+	+	+	+	+	--	--	--	--
<i>CUCUMIS SATIVUS</i>	+	+	+	+	+	--	--	--	--
<i>CARICA PAPAYA</i>	+	+	+	+	+	--	--	+	--
<i>VITIS VINIFERA</i>	+	+	+	+	+	+	+	+	--
<i>MALUS DOMESTICA</i>	+	+	+	+	+	--	--	--	--
<i>DAUCUS CAROTA</i>	+	+	+	+	+	+	--	--	--
<i>SOLANUM LYCOPERISUM</i>	+	+	+	+	+	--	--	+	--
<i>BETA VULGARIS</i>	+	+	+	+	+	+	--	--	+

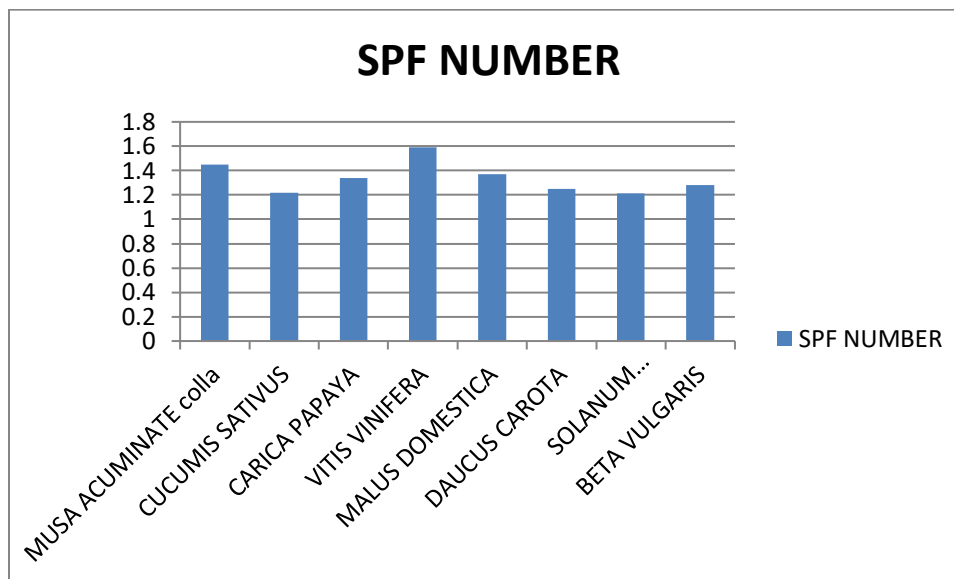
The above table indicates the presence (+) or absence (-) of phytochemicals in ethanolic extract--  
 Alk:Alkaloids , Carb:Carbohydrates , Gly:Glycosides, Tan:Tannins, Phytos:Phytosterol, Flav:Flavanoids ,  
 Sapo:Saponins , Pro:Proteins , Muci:Mucilages

**Table:3: ABSORBANCE OF ETHANOLIC HERBAL EXTRACTS**

s.no	wave length	EE*I	Absorbance							
			<i>MUSA ACUMINATE,</i>	<i>CUCUMIS SATIVUS,</i>	<i>CARICA PAPAYA,</i>	<i>VITIS VINIFERA</i>	<i>MALUS DOMESTICA</i>	<i>DAUCUS CAROTA</i>	<i>SOLANUM LYCOPERISUM</i>	<i>BETA VULGARIS</i>
1	290	0.015	0.174±0.004	0.139±0.002	0.150±0.001	0.122±0.002	0.158±0.002	0.154±0.002	0.136±0.003	0.123±0.002
2	295	0.0817	0.168±0.002	0.135±0.003	0.145±0.003	0.199±0.003	0.154±0.002	0.146±0.003	0.139±0.008	0.123±0.003
3	300	0.2874	0.154±0.002	0.129±0.002	0.144±0.003	0.177±0.002	0.149±0.001	0.128±0.001	0.125±0.001	0.118±0.001
4	305	0.3278	0.145±0.004	0.125±0.003	0.136±0.003	0.158±0.001	0.148±0.002	0.118±0.002	0.124±0.002	0.123±0.002
5	310	0.1864	0.134±0.003	0.125±0.004	0.133±0.003	0.147±0.001	0.146±0.004	0.110±0.002	0.120±0.002	0.124±0.003
6	315	0.0837	0.126±0.002	0.124±0.004	0.125±0.001	0.140±0.001	0.145±0.004	0.095±0.003	0.118±0.002	0.125±0.003
7	320	0.018	0.117±0.001	0.118±0.001	0.126±0.003	0.137±0.002	0.140±0.001	0.86±0.003	0.118±0.002	0.124±0.002

**Table:4: SPF NUMBER FOR THE ETHANOLIC EXTRACT**

S.No	Name of The Plant	SPF NUMBER
1	<i>MUSA ACUMINATE colla</i>	1.45
2	<i>CUCUMIS SATIVUS</i>	1.22
3	<i>CARICA PAPAYA</i>	1.34
4	<i>VITIS VINIFERA</i>	1.59
5	<i>MALUS DOMESTICA</i>	1.37
6	<i>DAUCUS CAROTA</i>	1.25
7	<i>SOLANUM LYCOPERISUM</i>	1.21
8	<i>BETA VULGARIS</i>	1.28



From the table -2 we have come to know the percentage yield of the ethanolic herbal extract were obtained in which the *Vitis vinifera* is having highest yield is about 4.6% and the lowest is *Musa acuminata* is about 2.8%

From the table -3 shows all the ethanolic herbal extracts contain alkaloids, carbohydrates, glycosides, tannins and phytosterol but in *Carica Papaya*, *Vitis Vinifera* and *Solanum Lycopersum* the proteins were present. whereas flavanoids are present in *Vitis Vinifera*, *Daucus Arota* and *Beta Vulgaris*. Especially the saponins were present in *Vitis Vinifera* and mucilages were present in *Beta Vulgaris*

SPF number plays an important role in sun screens for measuring the effectiveness in protecting the skin from sun radiation. From the table -4 We have found that, when the UV radiation range is increasing the absorption by the herbal extracts were gradually reducing. But from the table no-4 we have come to know that the ethanolic herbals extract which are used are have some sun protection property having the range of 1.59-1.21 in which *Vitis Vinifera* is having the highest SPF number of about 1.59 and the lowest is *Solanum Lycopersium* is about 1.21 SPF number.

### CONCLUSION:

The SPF values of the ethanolic extracts of some commonly found vegetables sources were evaluated. It was found that all are having almost similar UV protection capabilities, along with their many beneficial effects, easily available, cheap and safety.

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