

Research Article

## Comparison of Antioxidant Activity in the Methanolic Peels Extracts of *Solanum lycopersicum* and *Solanum lycopersicum* Var. *Cerasiforme*

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### ABSTRACT

Oxidative stress is one of the vital factors which causes serious illness to humans. The reactive oxygen species also accelerates the aging process and antioxidants are crucial in daily diet as it will help to protect body from free radicals and their threats. The current study focuses on the comparison of antioxidant activity in the methanolic peels extract between two tomato species namely *Solanum lycopersicum* and *Solanum lycopersicum* var. *Cerasiforme* (cherry tomato). Tomatoes have abundant antioxidant properties and was determined by DPPH free radical scavenging assay. Methanolic extracts (by maceration method of extraction) of both peels showed high radical scavenging properties, however peels of *Solanum lycopersicum* var. *cerasiforme* proved to have higher antioxidant properties. The IC<sub>50</sub> result revealed that methanolic peels extract of *Solanum lycopersicum* var. *cerasiforme* was found to be 619.14 µg/ml compared to *Solanum lycopersicum* with 697.16 µg/ml. Thus, the present study reveals that the peels of tomatoes exhibit great potential for antioxidant activity and may be useful for their medicinal and nutritional functions.

**Keywords:** Antioxidant, *Solanum lycopersicum*, *Solanum lycopersicum* var. *Cerasiforme*, DPPH.

### INTRODUCTION

Our body cells face tremendous of formidable threats which may arise from many sources. However, cancer is one of the most common diseases in the recent years that results in damages of the cells and genetic materials, which is caused by one of dangerous threats called the free radicals. Free radicals are atoms with an unpaired electron and this can lead to the damages of the cells. The body actually has its own way to protect itself from free radicals. The best way is to extract antioxidants from our daily nutrition plan, which it works by giving electron to the free radicals and directly terminate the reaction before molecules are damaged. Antioxidant properties are crucial in daily diet as it will help to protect body from free radicals and also promotes good health. Diets of rich fruits and vegetables show a lower rates of cancer, assuming the potential inference of this is which these diets are actually containing high antioxidants content. Antioxidant is an important property, which can be found high in tomatoes and many other plants, as it fights oxidation process which may results in cell damages. However, different plants and also species of tomatoes may differ in the content of antioxidants properties. The focus of this study is to determine the antioxidant properties of tomato fruits peel of two different species of tomatoes; *Solanum*

*lycopersicum* and *Solanum lycopersicum* var. *cerasiforme*.

Moreover, a comparison study was conducted on the pulp extract to analyse the antioxidant activity of cherry tomatoes with other tomatoes species and the results revealed that higher antioxidant activity was found in the cherry tomatoes pulp methanolic extracts compared with other species of tomato pulp extracts, which was determined by using beta-carotene bleaching assay<sup>1</sup>. However in this study, we are more focus on fruits's peels because of the abundant presence of flavonols like quercetin and kaempferol in tomato peels which also indicates a higher antioxidant properties<sup>2</sup>. Further studies has supported the above statement, that the skin of fruit contains highest amount of phenolics compounds compared to its flesh<sup>3</sup>. Researches were made keeping the consideration on size of the tomatoes and results found that higher phenolic content is found in tomato fruit with smaller size due to more surface area<sup>4</sup>. However, it is not just size differences indicates the antioxidant properties as polyphenol content does not strictly correlated with smaller size or bigger size of tomatoes. Tomatoes are rich in polyphenol constituents and this indicates its antioxidant properties. Tomatoes have good levels of flavonoids quercetin and kaempferol and also shows greatest constituents of many minerals, vitamin and due the

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Table 1: Nature, Percentage Yield of the Extracts.

Extract	Nature	Percentage Yield
Crude extract of <i>Solanum lycopersicum</i> peels	methanol Brownish Orange	2.15
Crude extract of <i>Solanum lycopersicum</i> var. <i>Cerasiforme</i> peels	methanol Brownish Orange	2.12

Table 2: Free radical scavenging activity of *Solanum lycopersicum* peel extract.

Concentration (µg/ml)	S.D	Mean of percentage inhibition (%)	Percentage of inhibition (%) ± SEM
7.818	0.015	11.54	11.54 ± 0.015
15.625	0.153	16.4	16.4 ± 1.153
31.25	0.031	13.01	13.01 ± 0.031
62.5	0.105	14.59	14.59 ± 0.105
125	0.015	15.16	15.166 ± 0.015
250	0.035	22.17	22.17 ± 0.035
500	0.115	35.29	35.29 ± 0.115
1000	0.161	79.3	79.3 ± 0.161

Table 3: Free radical scavenging activity of *Solanum lycopersicum* var. *Cerasiforme* peel extract.

Concentration (µg/ml)	S.D	Mean of percentage inhibition (%)	Percentage of inhibition (%) ± SEM
7.818	0.035	7.24	7.24 ± 0.035
15.625	0.035	10.41	10.41 ± 0.035
31.25	0.025	6.56	6.56 ± 0.025
62.5	0.145	2.71	2.71 ± 0.145
125	0.133	7.35	7.35 ± 0.133
250	0.025	14.14	14.14 ± 0.025
500	0.111	32.58	32.58 ± 0.111
1000	0.09	74.43	74.43 ± 0.09

Table 4: IC<sub>50</sub> value of standard vs sample extracts.

Extracts	IC50 (µg/mL)
Ascorbic acid	11.50
<i>Solanum lycopersicum</i>	697.16
<i>Solanum lycopersicum</i> var. <i>cerasiforme</i>	619.14

presence of carotenoid pigment, lycopene which contributes the red colour and also antioxidant properties<sup>5</sup>. The skin of tomato contain highest number of lycopene thus it indicates the tomato peel have abundant antioxidant properties<sup>6</sup>. Tomatoes have many beneficial nutrients and rich in antioxidants. Antioxidant properties in tomato will help to fight formation of free radical which is a cause of cancer<sup>7</sup>.

## MATERIAL AND METHODS

### Chemicals

2,2 -Diphenyl-1-picryl hydrazyl (DPPH) was obtained from Sigma Aldrich Co, St Louis, USA. Ascorbic acid was obtained from S.D. Fine Chem, Ltd., Biosar, India. All other chemicals used were of analytical grade.

### Collection and Identification

Two different species of tomatoes; *Solanum lycopersicum* and cherry tomato; *Solanum lycopersicum* var. *cerasiforme* were purchased (15 kg each) from Cameron Highlands and was identified. The tomatoes fruits of both species were cleaned to remove any residual matters by using tap water then dried and peeled. The peel was then dried at 40°C using hot air oven for 48 hours. After the drying process, the sample was grinded to coarse powder using blender and stored in air tight container for further process.

### Extraction

Weighed about 200 g of dried powdered peels of both samples and were individually extracted with 2 L of methanol as solvent using maceration method for 14 days with occasional shaking. The liquid was strained off and marc was pressed to remove the excess solution followed by filtration. Both the extracts were concentrated to dryness under reduced pressure and controlled temperature using rotary evaporator. The percentage yield of the extracts were calculated. The collected extracts were stored in air tight containers in refrigerator for further study.

### In vitro Antioxidant activity

The in vitro method is based on the inhibition. Samples are added to a free radical – generating system, inhibition of the free radical action is measured and this inhibition is related to antioxidant activity of the sample. Method vary greatly as to the generated radical, the reproducibility of the generation process, and the endpoint that is used for determination. Both the extracts were tested for in vitro antioxidant activity. The final concentration of the extract and standard solutions used were 1000, 500, 250, 125, 62.5, 31.25, 15.625 and 7.812 µg/ml. the absorbance was measured spectrophotometrically against the corresponding blank solution.

The percentage inhibition was calculated by using the following formula.

$$\% \text{ Inhibition} = \frac{\text{OD control} - \text{OD Sample}}{\text{OD control}} \times 100$$

IC<sub>50</sub>, which is the concentration of the sample required to scavenge 50% of free radicals was calculated.

### DPPH Assay

The present study on estimation of free radical scavenging activity of tomato peels were determined using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay<sup>8</sup>.

### Reagents:

2, 2-Diphenyl-1-picryl hydrazyl solution (DPPH, 100 µM): Accurately weighed 22 mg of DPPH in 100 ml of methanol. From this stock solution, 18 ml was diluted to 100 ml with methanol to obtain 100 µM DPPH solution.

### Preparation of Extract Solutions

Accurately weighed 21 mg of each extracts and dissolved in 1 ml of freshly distilled DMSO to obtain solutions of 21 mg/ml concentration. These solutions were serially diluted separately to obtain the lower concentrations.

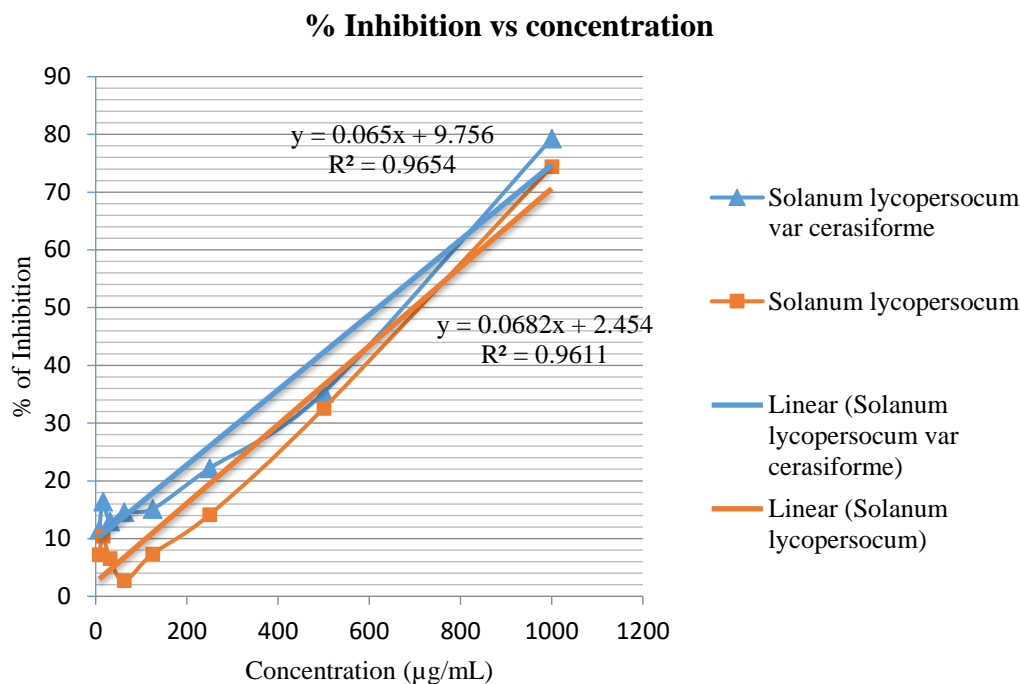


Figure 1: DPPH scavenging activity of sample peels.

#### Preparation of Standard Solutions

Accurately weighed 10 mg of ascorbic acid and dissolved in 0.95 ml of freshly distilled DMSO to get 10.5 mg/ml concentration. These solutions were serially diluted separately to obtain the lower concentrations.

#### Procedure

To 2 ml of DPPH solution, 100 µl of each of the extract or standard solution was added separately. The solution were incubated at 37 °C for 30 min and the absorbance of each solution was measured at 490 nm using UV spectrophotometer<sup>9</sup>.

## RESULTS AND DISCUSSION

#### Extraction yield

The percentage yield and nature of the extracts were given in Table 1.

#### DPPH Radical Scavenging Activity

The antioxidant activity was determined using DPPH radical scavenging activity on the methanolic extracts of *Solanum lycopersicum* and *Solanum lycopersicum* var. *Cerasiforme* peels. The results were shown in the Table 2 and 3. The highest radical scavenging activity was recorded in the *Solanum lycopersicum* var. *Cerasiforme* peels when compared to *Solanum lycopersicum* peel extract. However, both the extracts were found to be very less active compared to the standard ascorbic acid. The ascorbic acid showed higher free radical scavenging properties with 11.50 µg/ml when compared to the peels of *Solanum lycopersicum* and *Solanum lycopersicum* var. *Cerasiforme* which is 697.16 µg/ml and 619.14 µg/ml of respectively as shown in Table 4. Thus, the result can conclude that the present study proposed that the *Solanum lycopersicum* var. *Cerasiforme* peels methanolic extracts possess high potential of antioxidant properties when

compared to *Solanum lycopersicum* peel extract. A comparison graph of DPPH radical scavenging activity of both extract peels was presented in the Figure 1.

## CONCLUSION

Antioxidant properties are crucial in daily diet as it will help to protect our body from free radicals and also promotes good health. The *Solanum lycopersicum* and *Solanum lycopersicum* var. *cerasiforme* peels extracts were examined for the free radical scavenging activity using DDPH assay method. The results revealed that the peels of both extracts were shown to have free radical scavenging activity but when coming to comparison the *Solanum lycopersicum* var. *cerasiforme* proved to have higher antioxidant activity than the *Solanum lycopersicum* species. Thus, this study is beneficial for further references in choosing peels of tomato species as alternative sources of antioxidants and can be further investigated to use as a beneficial ingredients in natural product industry.

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