

Evaluation of total Phenol, Flavonoid and Anthocyanin Content in Different Varieties of Eggplant

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Abstract

Eggplant or brinjal (*Solanum melongena*) fruit is known as vegetables of diet food because of high moisture content and low coloristic value. Eggplant is endowed with nutrients as other plants. The eggplant fruit possess medicinal properties because of the presence of phyto-chemicals which attributes to its anti-carcinogenic activity. In this study, five eggplants genotypes (violet nadan, long green, small round green, violet suphol and violet with white stripes) were evaluated for total phenolic activity, total flavonoid activity and anthocyanin activity. The results showed that the total phenolic and flavonoid values of eggplant varieties extract varied from 856.76 to 386.75 gallic acid equivalents mg/100 g extract and total flavonoid content from 102.01 to 22.62 catechin equivalents mg/100 g extract Violet suphol which contained high total phenolic and flavonoid content had better anthocyanin value as compared (129.29 mg/gm) to other varieties. Vegetables provide the body, an added source of antioxidants to fight against free radicals.

Keywords anthocyanin, eggplant, flavonoid, phenol

Introduction

Eggplant is endowed with nutrients and the phyto-chemicals present in it protects against the cancer development. Due to its diuretic effect, it has the ability to increase the urine output. The consumption of eggplant is also recommended in the cases of kidney stone, cardiovascular diseases, hypertension and fluid retention. Eggplant helps to promote biliary functions, as well as the production of pancreatic juice. The predominant phenolic

compound found in all varieties is chlorogenic acid. There are different varieties of eggplants worldwide including violet suphol, long green eggplant, small round green eggplant, violet with white stripes etc. Eggplant is widely used for making various dishes and is ranked amongst the top 10 vegetables in terms of antioxidant capacity [1]. Antioxidant activities and phenolic compounds are found in the whole eggplant fruit [2]. The purple eggplant skin possesses a high capacity in preventing the peroxide formation by chelating ferrous iron [3-4].

Methodology

Preparation of extract

Fresh eggplant of each variety was cleaned, air dried for 2–3 h, and ground to powdered form. The powdered sample was then extracted with 400 mL of ethanol for 24 hr at room temperature in shaker. It was then filtered through Whatman filter paper. The filtered mixtures were kept air dry for 48 hrs and the obtained extracts were stored at 4°C until used.

Determination of total phenolic content

Appropriately diluted test extracts (200 μ L) were mixed with 125 μ L of Folin–Ciocalteu reagent and 250 μ L of 7% aqueous sodium carbonate was added. Water was then added to adjust the final volume to 2 mL and allowed to stand in the dark for 40 min. The absorbance of the mixture was read at 760 nm against reagent blank using a spectrophotometer and Gallic acid was used as standard.

Determination of total flavonoid content

Further, 500 μ L extract was mixed with 1.25 mL of distilled water. To this, 75 μ L of 5% sodium nitrite solution was added. Then, 150 μ L of a 10% Table 1

Shows phenol, flavonoid and anthocyanin content isolated bacteria according to age sex and teeth cleaning

S. No	Eggplant Sample	Total phenol content (mg/g)	Total flavonoid content (mg/g)	Anthocyanin content (mg/g)
01	Violet nadan	640.415	62.41	98.63
02	Long green	286.75	22.62	41.93
03	Small round green	435.330	46.28	64.35
04	Violet suphol	856.76	102.01	123.29
05	Violet with white stripes	397.80	35.55	58.24

aluminum chloride solution was added after 6 mins. It was then allowed to stand for another 5 min before adding 500 IL of 1M sodium hydroxide. The reaction volume was brought to 3 mL with the addition of distilled water and absorbance was measured at 510 nm. The total flavonoid content was expressed as catechin equivalents.

Determination of total anthocyanin content

Anthocyanin content of the apple peels was measured using a spectrophotometric pH differential protocol [5]. The extracts were mixed thoroughly with 0.025 M potassium chloride pH 1 buffer in 1:3 or 1:8 ratio of extract to buffer. The

absorbance of the mixture was then measured at 510 and 700 nm against distilled water blank. Then, the extracts were combined with sodium acetate buffer pH 4.5, and the absorbance was measured at same wavelengths. Anthocyanin content was expressed as milligrams of cyanidin 3-glucoside equivalents.

Results and Discussion

Comparison of phenol, flavonoid and anthocyanin content

Table 1 showed the total phenol, flavonoid and anthocyanin content in experimental eggplant varieties. The maximum phenol content was obtained in violet suphol that was 856.76 mg/gm. The minimum was obtained in long green 386.75 mg/gm. The phenol content of violet nadan was 640.415 mg/gm, whereas the phenol content of small round green was 435.33mg/gm. and violet with white stripes was 397.80mg/gm (Figure 1). In a study, where 69 eggplant varieties were studied, the TPC ranged between 280 to 834 mg/kg [6].

Singh et al. [7] identified many kinds of phenolic compounds such as N-caffeoylputrescine, 5-caffeoylquinic acid, and 3-acetyl-5-caffeoylquinic acid from eggplant pulp. The phenol content depends on the solvent with varying polarity, pH, temperature, extraction time and composition of

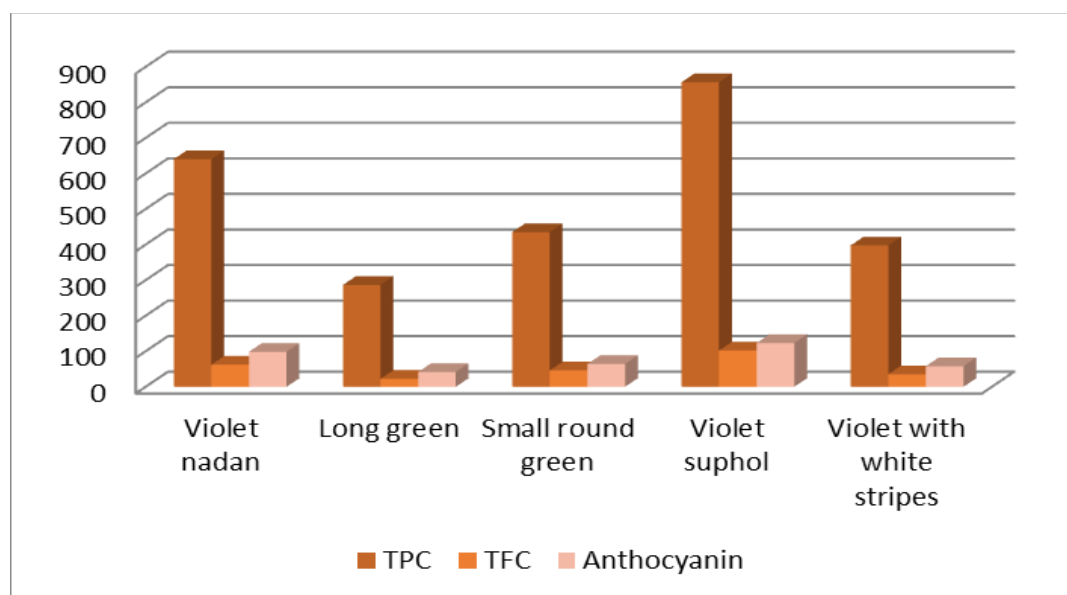


Figure 1. Graphical representation of phenol, flavonoid and anthocyanin content in the studied eggplant genotype

sample. Under the same extraction time and temperature, the solvent and composition of the samples are known as the most important parameters [8]. The highest flavonoid content was obtained in violet suphol that was 102.01 mg/gm. The lowest was obtained in long green with 22.62 mg/gm. Violet nadan have second highest flavonoid content that was 62.41 mg/gm. The flavonoid content of small round green and violet with white stripes was 46.28 mg/gm and 35.55 mg/gm, respectively. Flavonoids comprise a large group of natural phenolic compounds existing in high concentrations in vegetables. This class of naturally occurring polyphenolic compounds cannot be synthesized by humans. The solubility of the solute into solvent is different due to the polarity differences. Water, methanol and ethanol are the commonly used polar solvents for extraction. Chloroform, ethyl alcohol etc. are non-polar solvents. This may be reason for the variation of flavonoid content in different genotypes. The maximum anthocyanin content of 129.29 mg/gm. was observed in violet suphol and the minimum of 41.93 mg/gm. was observed in long green variety of eggplant. The second highest anthocyanin content of 98.63 mg/gm was shown by violet nadan variety. In small round green variety, the total anthocyanin content was 64.35 mg/gm. and that of violet with white stripe is 58.24 mg/gm.

Anthocyanins are usually acknowledged as the major and most significant collection of water soluble pigments in nature [9]. They are liable for the blue, purple, red and orange colors of several fruits and vegetables. Noda et al. [3] reported that nasunin, delphinidin-3-(p-coumaroylrutinoside) - 5-glucoside, is a representative anthocyanin in eggplant peel. The concentration of anthocyanin increases at the time of ripening and thus, cultivation practices have a great impact on anthocyanin content. Moreover, differences in harvest practices between any two cultivation systems may have an impact on anthocyanin content in eggplant [10].

Conclusion

Ethanol extract of different varieties of eggplant showed considerable amount of phenol, flavonoid and anthocyanin content. Among all, violet suphol showed maximum phenol, flavonoid and anthocyanin content, respectively. The current study concluded that the eggplant varieties are

excellent source of antioxidants and can be effectively used for cancer treatment.

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