

# Studies on Qualitative and Quantitative analysis of Phytochemicals from *Spinacia oleracea* leaves

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## ABSTRACT

*Spinacia oleracea* is commonly known as spinach and belongs to the Chenopodiaceae family and its Ayurvedic name is Palak. It stands upright and is between 32 and 62 cm tall. It is a vegetable plant and is native to South-West Asia. In traditional Indian medicine, several components of this plant are utilized for a variety of medicinal effects, including diuretic, laxative, cooling, and carminative. A number of other anti-oxidants found in this plant, including flavonoids, polyphenols, tannins, and carotenoids, have been demonstrated to have anti-mutagenic, anti-inflammatory, anti-oxidant, anti-neoplastic and anti-cancer properties. In this research, we used water, methanolic and ethanolic extracts of *Spinacia oleracea* leaf for qualitative and quantitative analysis of phytochemicals. In qualitative analysis, saponins, tannins, phenols, flavonoids, and quinones are observed in each plant extract. In quantitative analysis, a methanolic extract shows the best results of extraction of TPC (14.5µg/ml), TFC (8.0µg/ml), and TTC (12.0µg/ml) from this plant extract.

**KEYWORD:** *Spinacia oleracea*, Phytochemical, Leaf, Extraction, FC Reagent

## Introduction

*Spinacia oleracea* is commonly known as spinach and belongs to the Chenopodiaceae family and its Ayurvedic name is Palak. It stands upright and is between 32 and 62 cm tall. It is a vegetable plant and is native to South-West Asia.<sup>[1]</sup> In traditional Indian medicine, several components of this plant are utilized for a variety of medicinal effects, including diuretic, laxative, cooling, and carminative.<sup>[2]</sup> It contains a lot of vitamins, including vitamins A, C, E, K, B6, B2, and other elements like manganese, magnesium, betaine, folate, calcium, iron, potassium, folic acid, copper, protein, phosphorus<sup>[3]</sup>, zinc, and omega-3 fatty acids. A number of other anti-oxidants found in this plant, including flavonoids, polyphenols, tannins, and carotenoids, have been demonstrated to have anti-mutagenic, anti-inflammatory, anti-oxidant, anti-neoplastic and anti cancer properties. The vegetable is a significant green leafy one. The chemical makeup of leafy greens has been the subject of numerous research works, which have revealed their numerous applications of agronomic benefits, micronutrient level content, and business worth.<sup>[4]</sup> This plant

is beneficial to human welfare and a healthy lifestyle why because it contains a few chemical elements and showed various significant medical applications. Bioactive compounds are found in large quantities in vegetables and fruits, and research suggests that some of these foods' antinutritional components may help lower the risk of certain disorders in humans.<sup>[5]</sup> Grains, cereals, legumes, fruits, and vegetables, all include phytochemicals as naturally occurring substances. By mixing with vitamins or other nutrients, these phytochemicals or antinutrients perform their therapeutic functions. In the globe today, more than 90 million individuals have Diabetes mellitus, a metabolic and endocrine disorder.<sup>[6]</sup> Mainly this leafy plant is control these diseases. This research work is done on qualitative and quantitative analysis of Phytochemicals from *Spinacia oleracea* leaves only.

## Materials and Methods

### Chemicals

Ethanol, methanol, distilled water, FC reagent, FD reagent, AlCl<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>, lead acetate, NaOH, FeCl<sub>3</sub>, conc.H<sub>2</sub>SO<sub>4</sub>.

### Collection of Plant Material

*Spinacia oleracea* leaves are collected from MIET garden, Meerut city, Uttar Pradesh state. Leaves are cleaned with tap water, dry under sunlight, and converted into powder form.

### Plant Extraction

Each one gram of leaf powder was taken into each 100 ml conical flask and soaked with 25 ml of methanol, ethanol, and water solvent. After 24hrs the sample was filtered by using Whatman filter paper.<sup>[7]</sup> The green-coloured filter samples were considered as ethanolic, methanolic, and water plant extracts for analysis of phytochemicals.

### Qualitative analysis of Phytochemicals

Here take 1 ml of plant extract sample in test tube and add various chemicals for colour observation.<sup>[8]</sup> The colour is indicates a presence of Phytochemical.

**Saponins:** 1 ml plant extract taken in test tube and add 1 ml water. After 10 min, the foam will appear in this tube.

**Tannins:** 1 ml plant extract taken in a test tube and add 1

ml ferric chloride. After 5 min, Bluish or greenish colour will appear in this tube [9].

**Phenols:** 1 ml plant extract taken in the test tube and add 1 ml lead acetate. After 10 min, precipitation will appear in this tube.

**Flavonoids:** 0.5 ml plant extract taken in the test tube and add few drops of sodium hydroxide (10%). After 10 min, yellow color will appear in this tube [10].

**Quinones:** 1 ml plant extract taken in the test tube and add 1 ml conc. Sulphuric acid. After 10 min, red color will appear in this tube.

### Quantitative analysis of Phytochemicals

- Total phenolic content (TPC) was estimated by using FC reagent
- Total flavonoid content (TFC) was estimated by using  $AlCl_3$  reagent
- Total tannin content (TTC) was estimated by using FD reagent

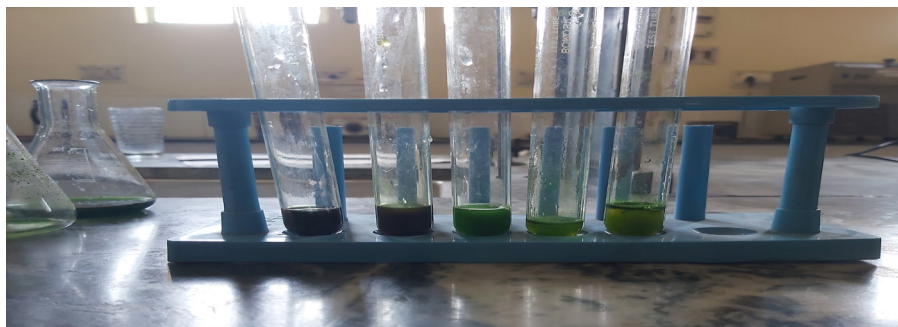


Figure 1. Ethanolic Extract Samples

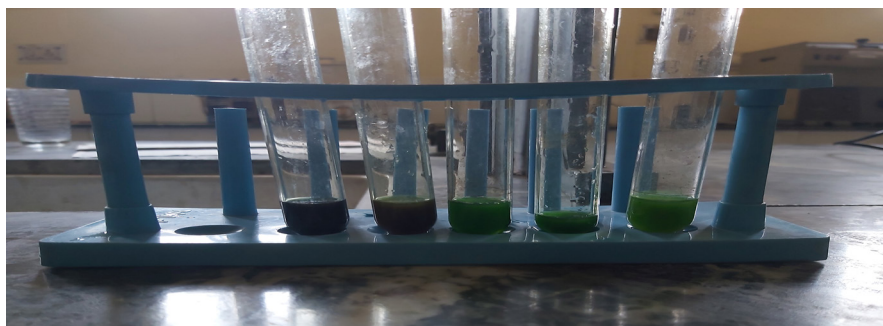


Figure 2. Methanolic Extract Samples

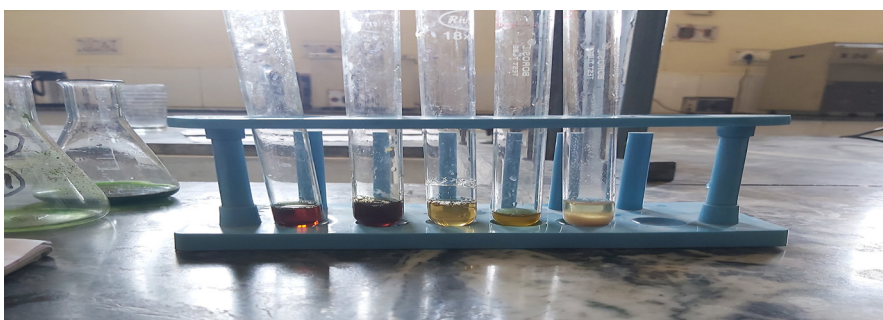


Figure 3. Water Extract Samples

## Results and Discussion

### Qualitative analysis of Phytochemicals

In this analysis we are observed various colours in the test tube. These colours are indicates a presence of phytochemicals and results were shown in table 1.

Here + means present and – means absent.

TPC	TFC	TTC
1 ml plant extract + 0.5 ml FC reagent + 1 ml sodium carbonate + makeup 10 ml volume with distilled water. After 30 min incubation period, absorbed the OD value at 680 nm by using a colourimeter.	1 ml plant extract + 1 ml 2% AlCl <sub>3</sub> . After 30 min incubation period, absorbed the OD value at 420 nm was by using colorimeter. <sup>[11]</sup>	1 ml plant extract + 0.5 ml FD reagent + 1 ml sodium carbonate + makeup 10 ml volume with distilled water. After 30 min incubation period, absorbed the OD value at 450 nm by using a colourimeter.

**Table 1. Qualitative Analysis of Phytochemicals**

S.No.	Phytochemicals	Ethanollic extract	Methanollic extract	Water extract
1.	Saponins	-	-	+
2.	Tannins	+	+	-
3.	Phenols	-	+	+
4.	Flavonoids	+	+	+
5.	Quinones	+	+	+

**Table 2. Qualitative Analysis of Phytochemicals**

S.No.	Phytochemicals	Ethanollic extract	Methanollic extract	Water extract
1.	TPC (µg/ml)	9.5	14.5	11.0
2.	TFC (µg/ml)	6.5	8.0	3.0
3.	TTC (µg/ml)	7.0	12.0	9.0

## Conclusion

*Spinacia oleracea* is commonly known as spinach and belongs to the Chenopodiaceae family and its Ayurvedic name is Palak. It stands upright and is between 32 and 62 cm tall. It is a vegetable plant and is native to South-West Asia. In traditional Indian medicine, several components of this plant are utilized for a variety of medicinal effects, including diuretic, laxative, cooling, and carminative. In this research, we used water, methanolic and ethanolic extract of *Spinacia oleracea* leaf for qualitative and quantitative analysis of phytochemicals. In qualitative analysis, saponins, tannins, phenols, flavonoids and quinones are observed in each plant extract. In quantitative analysis, methanolic extract was shows best results of extraction of TPC (14.5µg/ml), TFC (8.0µg/ml) and TTC (12.0µg/ml) from this plant extract.

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**Conflict of Interest:** None

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## Qualitative analysis of Phytochemicals

In this analysis, we observed various concentrations of Phytochemicals by using their reagents methodology [12]. In this process, methanolic extract shows the best results of extraction of TPC (14.5µg/ml), TFC (8.0µg/ml), and TTC (12.0µg/ml) and results were shown in Table 2.

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