

## Comparison of Nutrients of Microgreens in Soil and Coco Pith.

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**ABSTRACT:** Microgreens are aromatic greens, also known as vegetable or micro herbs, that have rich flavours, nutritional value, and add a splash of colour to a variety of dishes. It grows within 7-21 days (harvest, stem cotyledon, and emerging true leaves), 2–3 inch height. It had higher levels of  $\alpha$ -Tocopherol and Carotenoids. It had a shelf life of no more than ten days at 5 °C. Qualitative analysis of phytochemicals was performed according to a standard protocol. The microgreen extracts (coriander and radish) were prepared using a methanolic extraction method. The Antioxidant activity was performed by the DPPH method, and the results were obtained for the extracts. The protein estimation was done through the Folin-Lowry method, and that resulted in its presence. Thus, Coriander and Radish are useful in such biological activities and have beneficial effects.

**KEYWORDS:** Phytochemical analysis, Antioxidant analysis, Protein estimation, *Coriandrum sativum* and *Raphanus sativus*.

### I. INTRODUCTION

Microgreens, also known as vegetable or micro-herbs, are flavorful greens that add colour and aroma to various cuisines. They are high in micronutrients and phytochemicals, with higher levels of  $\alpha$ -tocopherol and carotenoids than mature vegetables. Microgreens are considered functional foods and superfoods due to their numerous health benefits, including anti-inflammatory, antioxidant, antimicrobial, anti-cancer, and anti-diabetic properties, heart disease, and more. They are rich sources of polyphenols, which are linked to a lower risk of cardiovascular disease, lower levels of "bad" LDL cholesterol, and triglycerides. Common microgreens include lentils, radish, broccoli, and sulforaphane, which have anti-cancer and potential antidepressant properties. *Coriandrum sativum*, a glabrous aromatic herbaceous annual plant, is used in

food preparation, preservation, and preventing food-borne illnesses. *Raphanus sativus*, a chilly annual in the Cruciferae family, is a popular home medicine for its minerals, vitamins, and antioxidants. Coco pith, an organic by-product of the coir industry, is considered a lightweight alternative to sphagnum peat in decorative plants. Soil is a vital component of agricultural plants, serving as a storage area for water and nutrients, and providing an environment for the breakdown and immobilization of materials added to the surface. Natural phenolic phytochemicals in plants have been increasingly studied for their beneficial health effects on coronary heart disease and cancers due to their antioxidant activity.

Coriander has been used in medicine. Various parts of this plant, including the leaves, flower seed, and fruit, have antioxidant activity, diuretic activity, anti-diabetic activity, sedative activity, anti-microbial activity, anti-convulsant activity, hypnotic activity, anthelmintic activity, and anti-mutagenic activity. Coriander fruits and oil are used to mask the taste or correct the nauseating or gripping properties of other medications. Aromatherapy also makes use of coriander. In traditional medicine, coriander is used to treat rheumatism and joint discomfort as well as an anti-inflammatory and to treat intestinal parasites. (Muhammad, M., Faqir, M. A. et al., 2013)

The Cruciferae (mustard family) includes radish. Depending on when it is sown, *Raphanus sativus* is an annual that grows in the chilly season. Radishes have been grown for a very long time, both in China and the Mediterranean region. Before the construction of the pyramids, radishes were a popular food in Egypt and are one of our most anciently domesticated plants. Typically, commercial radishes are either red or white and have a diameter of about 2 cm. In 21 to 28 days (or longer in cool conditions), they reach market size. Daikon, commonly known as the Chinese oriental radish, belongs to the Longipinnatus group of radishes. These have a 25 cm diameter and can reach lengths of up to 75 cm. These could be many kilograms heavy. The colour of

radishes ranges from white to black (Kaneko, Y. and Matsuzawa, Y., 1993).

## II Materials and methods

### 2.1 Plant Materials:



Fig. 1: *Raphanus sativus* (Radish)



Fig 2: *Coriandrum sativum* (Coriander)

### 2.2 Cultivation

Based on a few literary studies, its prevalence, and its accessibility locally. Two types of seeds were selected for growing microgreens (coriander and radish). The selected seeds were available in the local market as well as in agro-based shops. The seeds were collected, weighed cultivated in two mediums i.e., soil and coco pith.

### 2.3 Extraction

For extract preparation, the solvent used was methanol. The extract was prepared using the infusion method. For extraction, 5g of powder prepared from the dried microgreens material was used, and it was carried out using 50 ml of methanol solvent. After extraction, the solvents were filtered and evaporated from the microgreens extract using a heating mantle having more than 30°C. The resulting dried mass was then powdered and dissolved in methanol, and the final concentration was 1000mg/ml.

### 2.4 Qualitative Phytochemical Analysis

Sr.no	Phytonutrients test	Procedure	Interpretation
1	Mayer's test	1ml extract + 1ml Mayer's reagents	Alkaloids form white, creamy precipitates
2	Wagner's test	1ml extract + 1ml Wagner's reagents	Alkaloids form brown/reddish precipitates
4	Benedict test	0.5 ml extract + 0.5 ml Benedict reagents, boil for 2 minutes	Carbohydrates form green/yellow/red precipitates
5	Ninhydrin test	1ml extract + a few drops of ninhydrin solution	Protein forms a purple colour

6	Biuret test	2ml extract + 1 drop 2% CuSO <sub>4</sub> + 1ml ethanol + KOH pellets	Proteins form a pink colour
7	Ferric chloride test	2ml extract + a few drops of neutral 5% FeCl <sub>3</sub>	Phenolic compounds form a deep blue colour formation
9	Lead Acetate test	1ml extract + a few drops of 10% lead acetate	Creation of yellow fluorescence show presence of flavonoids
10	Ferric chloride test	1ml extract + a few drops of neutral 10% FeCl <sub>3</sub>	Flavonoids show green colour precipitations

Table 1: Qualitative Phytochemical Analysis of Different Plant Extracts

## 2.5 Quantitative Analysis of Different Microgreens Extracts:

### a) Total Phenolic content:

Take different aliquots of the sample in a test tube and make a final volume of 1 ml using distilled water. For the standard curve, take 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 ug/ml Gallic acid solution (1 mg/ml). Add 1 ml of Folin-Ciocalteu reagent and incubate for 5 minutes at RT. Add 1 ml of sodium bicarbonate (10 %). Mix by vortexing and incubate for 30 min at RT. Absorbance was measured at 725 nm using a spectrophotometer. Prepare the standard curve. The total phenolic content in all the extracts was calculated using the following formula:

$$C = c V/M$$

C = Total phenolic content mg GAE/g dry extract

c = Concentration of gallic acid obtained from calibration curve in mg/ml

V = Volume of extract taken for experiment in ml

M = Dry weight of the extract in grams. (Singleton, V. L. and Rossi, J. A., 1965)

### b) Total Flavonoid Content:

The standard curve was plotted for 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 ug/ml Rutin/Catechin stock solution. For the plant sample, take different aliquots of the extract in test tubes. Add 0.1 ml of 1 M potassium acetate and allow to stand for 5 min. Add 0.1 ml of 10% AlCl<sub>3</sub> to all tubes and mix well. After

5 min, add 1 ml of 1 M NaOH and finally 1.8 ml of distilled water in each tube and mix well. Incubate the mixture for 30 min, and absorption was taken at 415 nm against a blank (i.e., without sample extract).

$$C = c V/M$$

C = Total flavonoid content mg catechin/g dry extract  
c = Concentration of catechin obtained from calibration curve in mg/ml

V = Volume of extract taken for experiment in ml

M = Dry weight of the extract in grams. (Zhishen, J., Mengcheng, T. and Jianming, W., 1999)

## 2.6 DPPH ASSAY

Different volumes of microgreens extract were made up to 50µl with methanol, and a final volume of 3 ml was made with methanol. 150µl of DPPH (0.1 Mm) solution was added and mixed well. This reaction was incubated in dark conditions at room temperature for 30 minutes. The absorbance of the reaction mixture was read at 517 nm. 3 ml of DPPH was taken as a control. The % radical scavenging activity of the sample extract was calculated by using the following formula.

$$\%RSA = \frac{\text{Abs control} - \text{Abs sample}}{\text{Abs control}} \times 100$$

%RSA = Radical scavenging activity,

Ab control = absorbance of DPPH radical + methanol;

Abs sample = absorbance of DPPH + Sample extract.

(Loganayaki, N., Siddhuraju, P. and Manian, S., 2013)

### III Results:

#### 3.1 Analysis of Growth of Different Microgreens Cultivated in Different Media:

Sr. no.	Microgreens	Quality of cultivation (gm)	Medium of cultivation	Cultivation days (n)	Growth after harvest (cm)	Quality obtained (gm)
1	Coriander	25	Soil	10	5.2	150
			Coco pith	9	5.5	150
2	Radish	25	Soil	16	4.2	100
			Coco pith	16	4.4	90

Table 2: Growth of different microgreens in different media

The above results showed that in the coco pith medium, the length of microgreens was found to be longer in comparison to soil grown micro greens. Microgreens are young, delicate greens that are used as a garnish or to improve the colour, texture, or flavour of a wide range of main dishes. They are among the numerous new salad greens on the market that are typically identified by their size and maturity.

In terms of colour (such as red or purple), textures, or distinctive flavours, they are valuable. Growers who are interested in making sprouts for retail sales should be familiar with the dangers and safety measures outlined in the FDA document Draft Guidance for Industry: Reducing Risks to Microbiological Food Safety in the Production of Sprouting Seed (Ebert, A.W., 2022).

#### 3.2 Results for Cultivated Microgreens in Different mediums



(a)



(b)

Figure 3: (a) Coriander Soil and (b) Coriander Coco pith

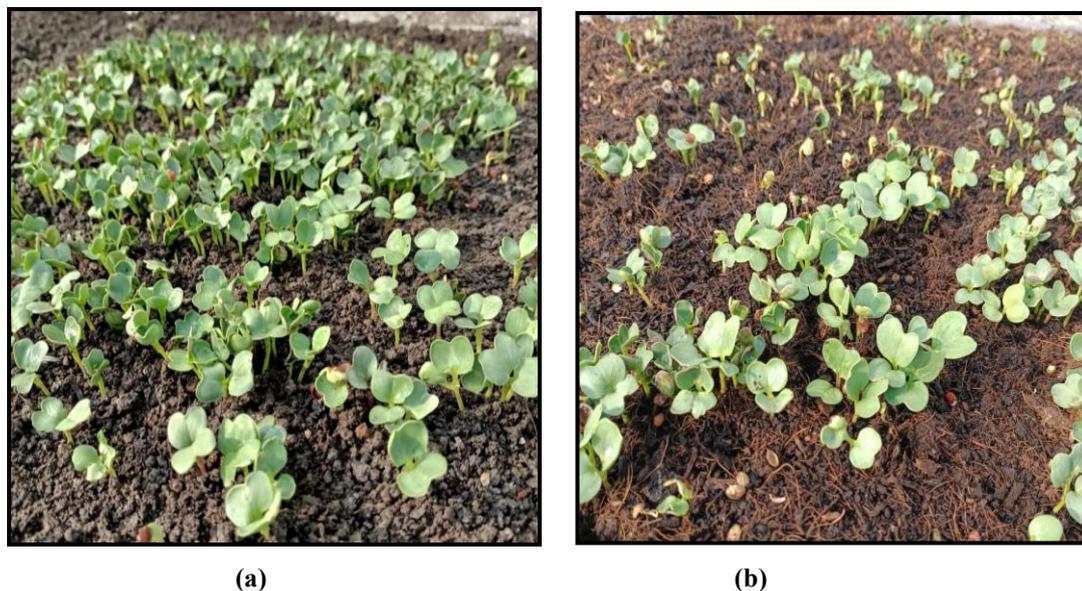


Figure 4: (a) Radish Soil and (b) Radish Coco pith

In recent years, the popularity of microgreens as a new culinary trend has grown. The purpose of this review is to present information on microgreens in the Brassicaceae family, including information on their history, production, growth medium, mineral components, and shelf life. The production of microgreens, growth media, postharvest elements, and the effects of artificial lighting conditions on the growth and antioxidant properties of the microgreens are the main topics of this review. The findings demonstrate that lighting settings that are favourable for plant growth are the best for microgreen growth. The production and quality of microorganisms and mineral elements in 30 different microgreens species

are summarised in the current review. ICP's evaluation of the mineral elements (Kalal, D., Verma, S. and Solanki, H. A., 2021)

In Ethiopia, erectile dysfunction is treated with conventionally used medicinal plants. The information and statistics used in this review of Ethiopia's traditional medicinal herbs were gathered from the literature. Different medicinal plants' phytochemical analyses found lead compounds, alkaloids, saponins, tannins, phenols, and terpenoids, among other substances. The findings of this investigation demonstrated that healing plants have phytochemicals. (Agidew, M. G., 2022)

### 3.3 Results of Phytochemical Analysis

Sr. no.	Test phytochemicals	Extraction of <i>Coriandrum sativum L</i> (coriander coco pith)	Extraction of <i>Coriandrum sativum L</i> (coriander soil)	Extraction of <i>Raphanus sativus</i> (radish coco pith)	Extraction of <i>Raphanus sativus</i> (radish soil)
1.	Flavonoids	+	+	+	+
2.	Alkaloids	+	+	-	+
3.	Protein	+	+	+	+
4.	carbohydrate	+	+	-	+
5.	Phenols	+	+	-	-

Table 3: Phytochemical analysis of different microgreens

By performing a qualitative test of phytochemicals, result indicates presence of phytonutrients such as

Flavonoids, Alkaloids, Proteins, carbohydrates, and phenols as shown in Table 3. Seven therapeutic herbs

underwent phytochemical investigation. By using the Folin-Ciocalteus reagent method, the total phenolic and flavonoid contents of the plants' aqueous extracts were calculated, while all of the tested plants included phenols, tannins, flavonoids, and saponins. The findings showed that the plants under study contained phytochemicals of significant therapeutic value. These plants have tannins and phenols as their main phytochemical components. It was also discovered that saponic acid was present in the plant extracts. These results imply that these plants are demonstrating their efficacy as a source of bioactive chemicals for the treatment of various diseases. (Yadav, RNS. and Agarwala, M., 2011).

The current study uses polyethyl ether (PE) to assess the phytochemicals of ten medicinally significant plant species, including *L. officinale* leaf, *F. vulgare* stem, *S. Saponaria*, and *V. macrocarpon*. The largest concentrations of alkaloids, flavonoids, saponins, and terpenes were found in the extracts of these ten plants. These plants' extracts also had the lowest concentrations of flavones and thiobarbituric acid. The findings of this study imply that these plants are a possible source of novel medicinal compounds or plant-based templates. (Madhu, M., Sailaja, V., Satyadev, TNVSS and Satyanarayana, MV., 2016)

### 3.4 Result of quantitative Phytochemical analysis

Sr. no.	Extract	Total phenol content mg/g	Total flavonoid content mg/g
1	<i>Coriandrum sativum</i> L (coriander coco pith)	62.15	363.89
2	<i>Coriandrum sativum</i> L (coriander soil)	37.75	706.77
3	<i>Raphanus sativus</i> (radish coco pith)	74.24	340.79
4	<i>Raphanus sativus</i> (radish soil)	172.90	222.3

Table 4: Quantitative analysis of different microgreens

By performing quantitative tests of phytochemicals shown in Table 4, *Coriandrum sativum* L. (coco pith) and *Coriandrum sativum* L. (soil) showed higher total flavonoid content and lower phenolic content as compared to *Raphanus sativus* (radish coco pith) and *Raphanus sativus* (radish soil).

In Africa, there is a native tropical tree called *Okoubaka aubrevillei* that is revered. Phytochemical substances are found in the bark and leaves of this plant. A phytochemical screening of the tree's leaf

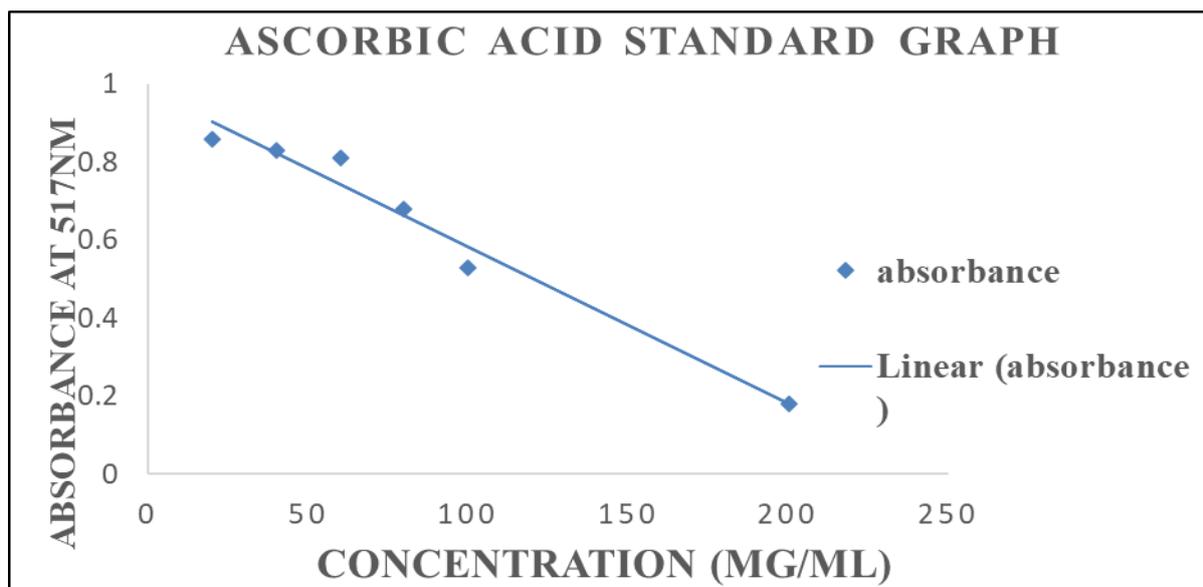
and bark extracts has been done. *O. aubrevillei*'s leaves and bark have undergone qualitative examination of the chemicals present. According to the findings, holosides, coumarin, and glycosides could be found in the tree's leaves as well as its own leaves. The presence of phenolic compounds, hexadecanoic acid, ethyl sulphate, and eicosapentaenoic acids distinguished the bark and leaves' phytochemical makeup. (Akintola *et al.* 2020)

### 3.5 Result of antioxidant analysis

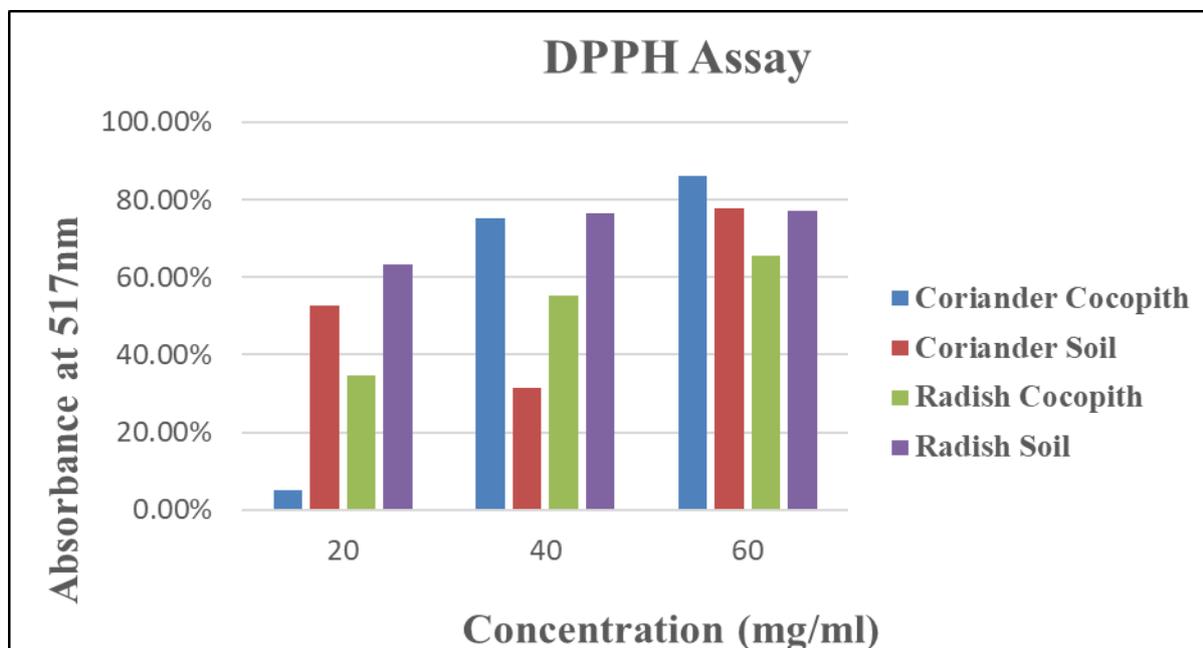
Sr. no	Concentration	% RSA of standard ascorbic acid (%)	%RSA of <i>Coriandrum sativum</i> L	%RSA of <i>Coriandrum sativum</i> L	%RSA of <i>Raphanus sativus</i>	%RSA of <i>Raphanus sativus</i> (radish soil)
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			(coriander coco pith)	(coriander soil)	(radish coco pith)	
1	Control	2.101	2.101	2.101	2.101	2.101
2	20	58.6387	4.94	31.57	34.73	63.15
3	40	59.257	75.15	52.63	55.15	76.4
4	60	60.63	86.3	77.89	65.47	77.3
5	80	69.492	-	-	-	-
6	100	94.726	-	-	-	-
7	200	86.387	-	-	-	-

Table 5: Antioxidant analysis of different microgreens



Graph 1: Standard Graph of Ascorbic acid



Graph 2: DPPH assay

The RSA% of *Coriandrum sativum L* (coriander coco pith) is 86.31%, the RSA% of *Coriandrum sativum L* (coriander soil) is 77.89%, the RSA% OF *Raphanus sativus* (radish coco pith) is 65.47%, and the RSA% of *Raphanus sativus* (radish soil) is 77.3% at a concentration of 60 mg/ml shown in Table 5. The result of antioxidant activity by DPPH methods showed that the Coriander coco pith shows higher antioxidant activity. Radish soil and Coriander soil show moderate antioxidant activity, and Radish Coco-pith shows the lowest antioxidant activity.

This study used the DPPH radical scavenging method to assess the antioxidant activity of the plant species *Ageratum conyzoides* Linn. The outcomes demonstrated that the ethanolic extract of the plant's leaves had greater antioxidant potential than the reference standard ascorbic acid. For ascorbic acid and alcoholic leaves extract, the absorbance for reducing power was determined to be 0.0390 and 0.0989, respectively. The presence of flavonoids and phenols may be the cause of the ethanol extract's greatest antioxidant action. (Tailor, C. S. and Goyal, A., 2014)

A medicinal plant called *fructosa religiosa* has been used to cure several illnesses. This study's objective was to investigate the antioxidant capabilities of a weak leaf extract of *F. religiosa*. In this study, 2,2-Diphenyl-1-picrylhydrazyl (DPPH) was used to create MgO nanoparticles (NPs) by DPPH. X-ray diffraction (XRD), scanning electron microscopy

(SEM), and Fourier transform infrared (FTIR) spectroscopy (FT-IR) were used to characterise the NPs. The outcomes demonstrated that every extract suppressed free radicals in a manner based on its content. Of all the metal oxide (MgO) NP samples investigated, the aqueous extract of *M. oleifera* leaf exhibited the strongest antibacterial activity. The dinitro salicylic acid (DNS) approach for evaluating the antioxidant activity of the diluted leaf extract was evaluated. (Baliyan, S., et al., 2022)

#### IV. Conclusion:

The study aimed for the nutrient analysis of the microgreens grown in two different media. Comparative studies in soil and coco pith show the presence of alkaloids, flavonoids, carbohydrates, and phenol content in radish and coriander. *Coriandrum sativum L* proved to be an abundant source of nutrients, phytochemicals, and antioxidants compared to *Raphanus sativum*. Further, the growth condition and antioxidant activity need to be further studied. These microgreens are interesting due to their availability as well as direct consumption by humans without any adverse effects. From the above results due to the high antioxidant activity of microgreens. Therefore, it will eventually be able to fight cancer. Improving the microgreens' growing conditions (light-wavelength, temperature, EC, and pH of water) will increase their biomass.

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