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Phytochemical Analysis of Important Lettuces Available in South Indian Region

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ABSTRACT

The South Indian region is renowned for having a wide range of biological species. *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera*, and *Spinacia oleracea* were the four lettuces chosen for this study. The current study's objectives were to identify the presence of phytochemicals, quantitative analysis of total phenolic, flavonoid, saponin, tannin, and alkaloid contents, and determine the qualitative analysis of terpenoids, flavonoids, steroids, glycosides, philobatanins, proteins, coumarins, emodin, antharoquinoe, anthocyanin, carbohydrate, cardiac amino acids, and phenol in the chosen lettuce plants. Water, methanol, acetone and ethanol all were employed as solvents. Our research demonstrated that these evaluated plants' crude aqueous and organic solvent extracts contain medically significant bioactive components, which supports their usage in traditional medicines for the treatment of medical illnesses.

Keywords: Phytoconstituents, Ethanolic extract, Lettuce plants, Treatment of diseases, Biologically active compounds.

INTRODUCTION

Phytochemicals, which are non-nutritive plant compounds, provide disease-preventive qualities. Since they contain non-essential nutrients, they cannot be used by the human body to support a healthy lifestyle. It is common knowledge that plants make these compounds to protect themselves, but new study has shown that they can also shield people from disease. More than a thousand phytochemicals are known. Lycopene found in tomatoes, flavones in soy, and anthelmintic substances found in fruits are a few of the more well-known phytochemicals[1].

The study of phytochemicals is known as phytochemistry. These are plant-based compounds in a more limited meaning. To put it another way, the phrases are frequently used to describe the numerous primary and secondary metabolic chemicals present in plants[2]. Many of these have defences against disease and insect attacks. Additionally, they perform a number of defence mechanisms for people[3].

The substances that are found naturally in plants are known as phytochemicals. Due to their numerous medical applications, these phytochemicals are becoming more and more well-known nowadays. Asthma, arthritis, cancer, and other disorders are all greatly aided by phytochemicals. These phytochemicals have no negative effects, unlike pharmaceutical compounds[4]. Phytochemicals can be regarded as man-friendly medications because they treat ailments without harming people. The primary topics covered in this essay are phytochemical collection, extraction, and qualitative and quantitative analysis[5-6].

Because there is currently insufficient evidence to support their potential health benefits, phytochemicals are typically considered research substances rather than essential nutrients. Major groups of phytochemicals under study include carotenoids and polyphenols, which comprise phenolic acids, flavonoids, and stilbenes/lignans. Anthocyanins, flavones, flavanones, and isoflavones are only a few of the categories of flavonoids that can be further subdivided depending on their shared chemical structure. Flavones can also be divided into proanthocyanidins, epicatechins, and catechins. Over 25,000 phytochemicals have been identified in total, and the majority of these compounds are found in high concentrations in the colourful sections of plants, such as fruits, vegetables, nuts, legumes, whole grains, etc[7-10].

Phytochemists first isolate the compounds from the source plant by removing the leaves from lettuce plants, then they define their structures or test them in model systems in the lab, such as cell cultures, *In vitro* trials, or *In vivo* research with lab animals[11]. The area has difficulties in isolating certain compounds, figuring out their frequently complex structures, and defining which individual phytochemical is principally in charge of any given biological action[12].

Phytochemicals study used lettuce plants of *Solanum nigrum, Sesbania grandiflora* and *Spinacia oleracea* leafs extract. *Solanum nigrum* is commonly known as blackberry nightshade or Manathakkali in Tamil. In Africa, where it grows naturally, *Solanum nigrum* is both a food and a medical plant. It acts as capping agent. It belongs to the family of *Solanaceae*[13]. *Sesbania grandiflora* is commonly known as Agati keerai in Tamil and humming bird tree in English. It is omnipotent spinach and is capable of curing the psychological problems of human beings.

When baked, -carotene-rich *Sesbania grandiflora* leaves undergo modifications that affect the colour of the bread. The enzymatic browning may reduce the bread's brightness and yellowness[14].

Spinacia oleracea is a leafy herbaceous annual plant and commonly known as Pasalai in Tamil. The origin of this plant is central and western Asia. *Spinacia oleracea* is a good antibacterial activity against bacterial strains. It is very rich in omega-3 fatty acids, Vitamins and minerals. It contains more flavonoids, Vitamin C which increases in concentrations on total phenolic content and total antioxidant activity that leads to prevention from cancer cells. Vitamins A, C, K and the minerals of calcium, iron and potassium are the major micronutrients in spinach. Spinach also provides fiber and is low in calories[15].

Natural products have widespread pharmacological activity because they contain a variety of active chemical components, such as flavonoids, glycosides, terpenoids, lipids, oils,

steroids, and organic acids[16–17]. Chemical compounds come in a wide diversity, which makes analysis, authentication, and quick separation with acceptable accuracy, precision, and reproducibility difficult[18].

Saini *et al.,* described a research study which evaluated 30 postmenopausal women who took *M. oleifera* leaf powder daily for three months.[30] postmenopausal women made up the control group. *Sesbania grandiflora*, generally called as *Sesbania* and belonging to the Fabaceae family, is a frequent ingredient in Indian medicine. Agati, Corkwood Tree, and West Indian Pea are some of the common names for *Sesbania grandiflora*. The effectiveness of *Solanum nigrum* leaves' active ingredient and crude extract as preventative or curative antioxidants was assessed. The findings indicated that the brain's high fat content makes it susceptible to prooxidant damage brought on by stress. *Spinacia oleracea* L. leaves were subjected to pharmacognostical analysis to assess their macro- and microscopical characteristics as well as their total ash, insoluble ash, alcohol and water soluble extractive values.

The steps in a process for creating a composition of water-soluble phytomedicinal compounds are as follows: mixing plant material with water in a ratio of about 1:5 to about 1:50 for a period of time at a temperature between about 75°C and about 100°C to solubilize a significant portion of the plant material's thermal aqueous extractable phytocompounds, producing a first extract; and removing nearly all enzymes[19-23].

EXPERIMENTAL
MATERIALS AND METHODS

Collection of Plant Material

Collected leaves included those of *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera* and *Spinacia oleracea*. For the ethanol extract investigation, it was washed, dried in the shade, and pulverised.

Preparation of Ethanol Extracts

The samples were cleaned in running water, divided into manageable sized pieces, and then shade dried for a week at 35 to 40°C before being ground into a consistent powder with a 40 mesh size. The ethanol extracts were made by employing hot percolation procedures to soak 15 g of the dried powdered plant components in 40 of ethanol for two hours. The extracts were filtered through Whatman filter paper No. 42 (125mm) to get rid of everything that couldn't be extracted, like cellular components and other substances that wouldn't dissolve in the solvent used for extraction. The filtrate was kept at -20°C in labelled, sterile vials. The final filtrate served as a sample solution for the subsequent isolation[24].

Phytochemical screening test of ethanalic extract of samples

Screenings for phytochemical content were carried out according to protocol. For Qualitative analysis performed tests for terpenoids (Salkovsky test), flavonoids, Saponins test (Foam test), Tannins test (Bremer test), Alkaloids (Hager's test), Steroid (Salkowski test), Glycosides (Lieberman test), propionate (Precipitation test), Protein (Xanthoprotein test), Kumar's, Emodin, Anthraquinone, Anthocyanins, Carbohydrates, Cardiac glycosides, Xanthoproteins, Phenols. For Qualitative analysis used tests for Flavonoid, Tannin, Saponin, Alkaloid, Phenol, Terpenoid[25].

RESULTS AND DISCUSSION

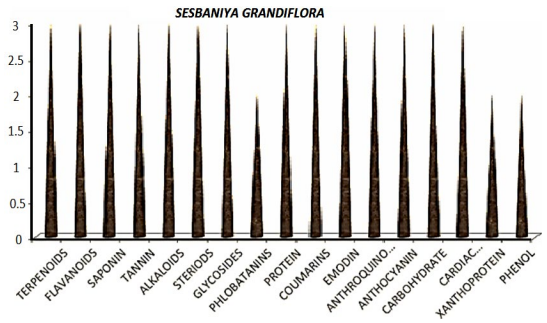
In the present investigation, comparison studies between phytochemicals present in the plant leaves of *Sesbaniya grandiflora, Solanum nigrum*, *Moringa oleifera* and *Spinacia oleracea* leaves in the ethanol extraction as shown in Table.

The existence of the same chemical substance, such as flavonoids, alkaloids, steroids, phenols, carbohydrates and anthraquinones is determined by the phytochemical test of ethanol extracts. While varying in quantity are various chemical compounds like phenol, cardiac glycosides, emodin, coumarins, glycosides, phlobatanins, tannins, saponins, terpenoids, amino acids and phytosterols.

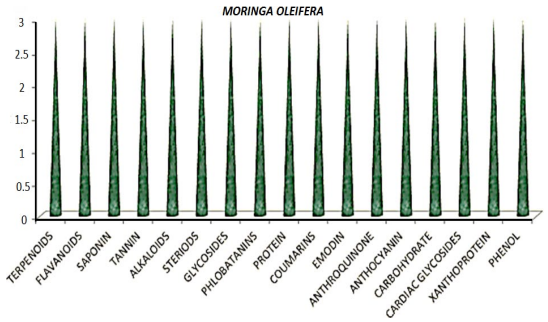
Table 1: Qualitative analysis of Lettuces

Phytocompounds	*Sesbaniya grandiflora*	*Moringa oleifera*	*Spinacia oleracea*	*Solanum nigrum*
TERPENOIDS	+++	+++	++	+++
FLAVANOIDS	+++	+++	++	++
SAPONIN	+++	+++	+++	+++
TANNIN	+++	+++	+++	+++
ALKALOIDS	+++	+++	+++	+++
STERIODS	+++	+++	+++	+++
GLYCOSIDES	+++	+++	+++	+++
PHLOBATANINS	++	++	++	++
PROTEIN	+++	+++	+++	++
COUMARINS	+++	+++	+++	+++
EMODIN	+++	++	+	+
ANTHROQUINONE	+++	+++	++	+++
ANTHOCYANIN	+++	+++	+++	+++
CARBOHYDRATE	+++	+++	+++	+++
CARDIAC GLYCOSIDES	+++	+++	+++	+++
XANTHOPROTEIN	++	+++	+++	+++
PHENOL	++	+++	_	+++

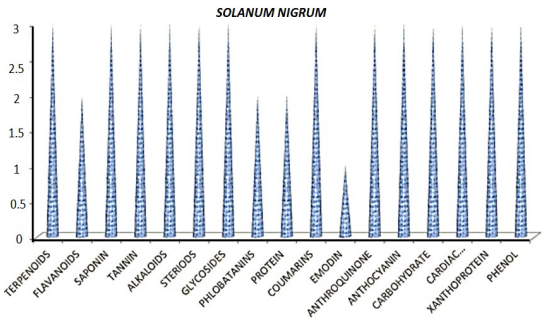
(+) = SLIGHTLY PRESENT, (++) = MODERATELY PRESEN, T (+++) = STRONGLY PRESENT, (-) = ABSENCE



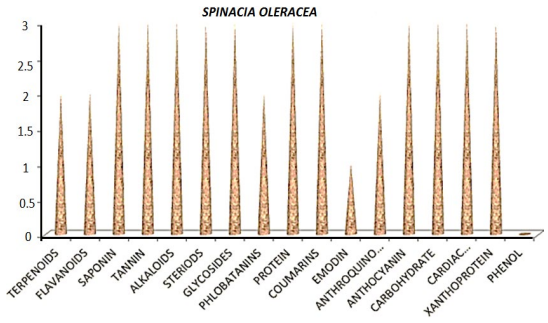
Qualitative analysis of *Sesbaniya grandiflora*



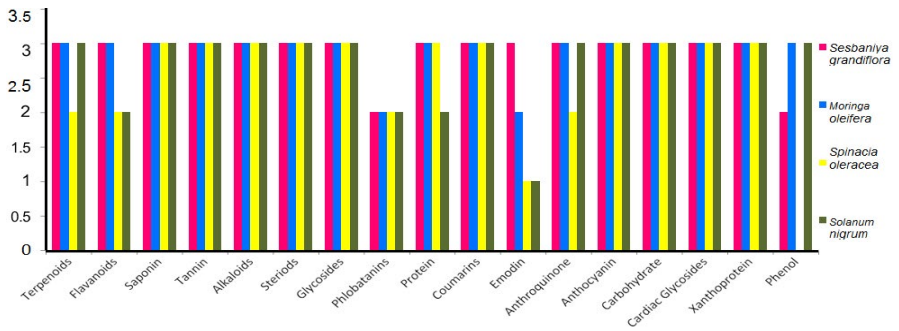
Qualitative analysis of *Moringa oleifera*



Qualitative analysis of *Solanum nigrum*



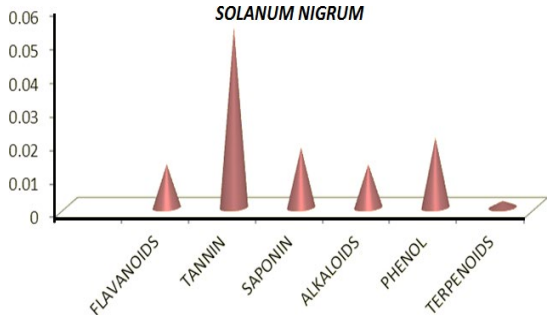
Qualitative analysis of *Spinacia oleracea*



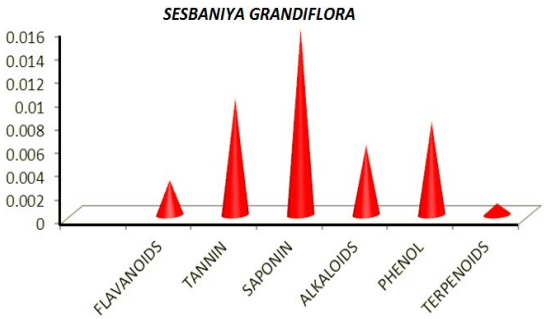
Quantitative analysis of Lettuces

Table 2: Quantitative analysis of Lettuces

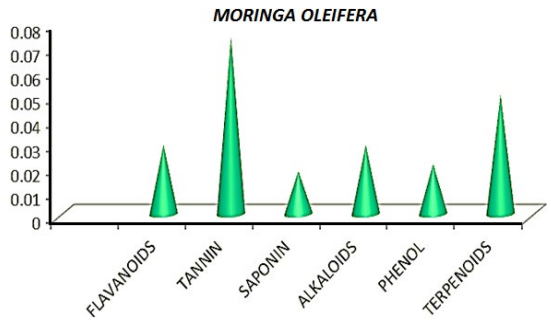
S.No	Phyto compounds	*Sesbaniya grandiflora*	*Moringa oleifera*	*Spinacia oleracea*	*Solanum nigrum*
01	FLAVANOIDS	0.003	0.029	0.021	0.013
02	TANNIN	0.01	0.074	0.078	0.054
03	SAPONIN	0.016	0.018	0.015	0.018
04	ALKALOIDS	0.006	0.029	0.018	0.013
05	PHENOL	0.008	0.021	0.049	0.021
06	TERPENOIDS	0.001	0.05	0.001	0.002



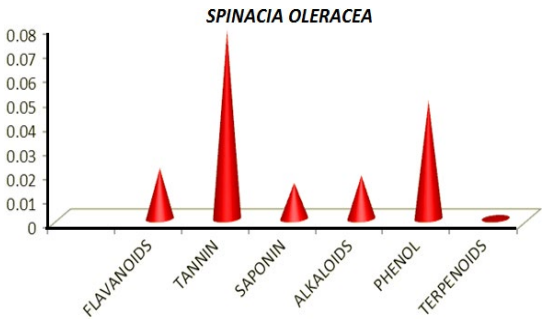
Quantitative analysis of *Solanum nigrun*



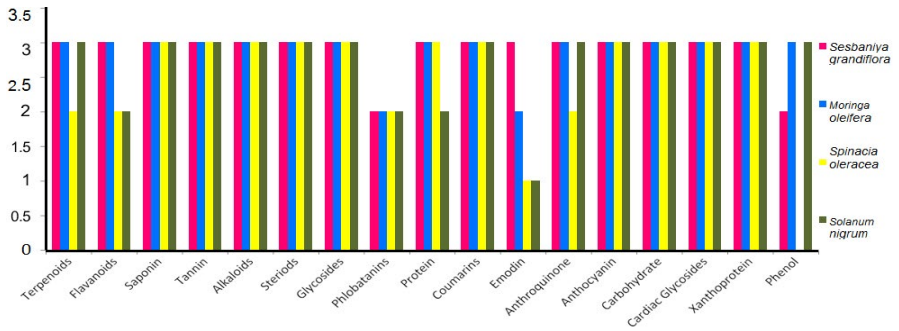
Quantitative analysis of Sesbania grandiflora



Quantitative analysis of *Moringa oleifera*



Quantitative analysis of *Spinacia oleracea*



Qualitative analysis of Lettuce

The characterisation of an active principle in charge of a harmful or advantageous impact that a crude plant extract exhibits is known as phytochemical analysis. Alkaloids are heterogeneous group substances that have an acyclic structure and one or more nitrogen atoms. These are frequently used as medicines and can have either beneficial or harmful impacts on people. Alkaloids are thought to have analgesic and anti-inflammatory properties that reduce pain, promote disease resistance, and increase stress tolerance.

Alkaloids were more effectively precipitated from ethanol extracts of the leaves of

Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera, and *Spinacia oleracea*. From a systematic perspective, flavonoids are arguably the most beneficial class of secondary plant compounds. The chemicals structurally descended from the parent substance flavone are known as flavonoids, and they have conjugated aromatic systems. Flavonoids have earned the moniker "nature's biological compound" due to their innate capacity to alter the body's response to allergens, viruses, and cancer-causing agents. They exhibit anti-inflammatory, antibacterial, and anticancer properties. In ethanol extracts of the leaves of *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera*, and *Spinacia oleracea*, flavonoids are present and exhibit varying degrees of precipitation.

The ethanol extracts of shade leaves, *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera*, and *Spinacia oleracea* leaves revealed a greater precipitation of phenolic content. Phenols are reported as antitumor agents and possess antioxidant capabilities. These chemicals have been found in greater numbers in plant tissues in recent years. These phytosterols can be found both free and as straightforward glucosides in higher plants, where they are presumably present almost everywhere. Natural products made from plants are currently being examined for the presence of novel medications with novel pharmacological mechanisms, taking advantage of higher plants' unique ability to synthesise a vast variety of secondary metabolites.

The creation of new chemotherapeutic drugs for advantageous structures is mostly based on plants. Numerous data have surfaced in recent years suggesting that the first step toward achieving this goal is the antibacterial activity of plant extracts and *In vitro* bacterial activity in human pathogenic bacteria.

For a variety of bacterial infectious disorders like pneumonia, diarrhoea, urinary tract infections, and even some skin conditions, leaf extract from *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera*, and *Spinacia oleracea* can have positive therapeutic benefits. The presence of plant secondary metabolites including alkaloids, flavonoids, tannins, phytosterols, etc. in the extracts may be the cause of the broad antibacterial properties.

Given that tannins are commonly applied topically to treat sprains, bruises and minor wounds, it is likely that the tannins and other plant phenols in this extract are what cause these widespread effects. Some of these findings have aided in the development of medications for therapeutic use in people as well as the identification of the active ingredient in charge of such actions.

Pharmaceutical corporations place a high priority on creating novel pharmaceuticals that can treat a variety of illnesses, and they are also particularly interested in phytochemical analyses of plants. Native lettuce plants are expected to have important phytochemical properties recognized by our study that are highly effective in treating various diseases of the region. Thus, from the present investigation medicinal properties of the selected four plants were identified based on the phyto constituents present in them.

The sources of the secondary metabolites, such as alkaloids, flavonoids, terpenoids, phlobatanins, and reducing sugars, are the chosen four lettuce plant leaves, *Sesbaniya grandiflora, Solanum nigrum, Moringa oleifera* and *Spinacia oleracea*. Lettuce plants play an important role in preventing various diseases. The anti-inflammatory, anti-cancer, anti-malarial, anti-bacterial, and anti-fungal properties of lettuce plants are attributed to secondary metabolites. In order to find and screen the phytochemicals most useful in the development of novel medications, lettuce plants are used. Due to the existence of the phytochemical elements, the results of the current investigations and prior phytochemical analyses are almost identical. The phytochemical analysis of lettuce plants is also significant and of commercial importance to research organisations as well as corporations that produce novel medications for the treatment of various disorders.

When compare to four Lettuce plants in Qualitative and Quantitative Phytocompounds, Moringa oleifera gives the best result. In Qualitative Phytocompound Moringa has the high range value. And also in that Quantitative Phytocompound Moringa has the highest value. Hence *Moringa oleifera* is Best Lettuce plant and also it has more medicinal properties. The extracts of Moringa leaves can be used in the treatment of Covid-19 to increase the immunity power. Hence due to the presence of

vitamins, minerals and high anti-oxidants. Moringa leaves extract has been used in the treatment of Covid-19, the continuous intake of Moringa leaves extract increase the immunity power of the patient affected in many viral infections.

CONCLUSION

Extracts from the plants *Spinacia oleracea*, *Solanum nigrum, Moringa oleifera*, and *Sesbaniya grandiflora* might be regarded as a good source of natural antioxidants and antimicrobials. Furthermore, it has been discovered that natural bioactive substances can thwart and stop the development of any disease. In qualitative analysis out of 17 compounds *Moringa oleifera* gives the best report in 15 compounds, *Sesbaniya grandiflora* gives in 14 compounds, *Solanum nigrum* gives in 13 compounds, *Spinacia oleracea* gives in 11 compounds. In quantitative analysis out of 6 compounds *Moringa oleifera* gives the best report in 6 compounds, *Solanum nigrum* gives in 5 compounds, *Spinacia oleracea* gives in 4 compounds, *Sesbaniya grandiflora* gives in 3 compounds. *Moringa olifera* gives the best report in qualitative and quantitative analysis out of four lettuce plants. Moringa leaves is one of the best food and also it is use for more medicinal purpose.

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