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Phytochemical screening of *Solanum nigrum* L and *S. seaforthianum* Andr. of Rewa district (M.P.) India

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Abstract

The present investigation designed to evaluate the phytochemical screening on leaf extract of *Solanum nigrum* L and *S. seaforthianum* Andr. From of Rewa districts (M.P.) India. Three study site were selected such as Chorhata, University campus and Govindgarh etc. The phytochemical constituents like alkaloids, saponins, tannins, flavonoides and proteins of both species in dry and shady areas was investigated qualitatively. The results reveals that the protein is more abundant on *Solanum nigrum* L of shady areas than *S. seaforthianum* Andr. as comparatively of dry areas of three different districts of the same. Apart from protein, other phytochemical constituents such as alkaloids, saponins, tannins, flavonoides are more or less presence in both species of the study areas. The study scientifically validates the use of both species in traditional medicine.

Keywords: Phytochemicals, *Solanum nigrum* L, *S. seaforthianum* Andr.

Introduction

Herbal remedies have been used in Homeopathy, Ayurvedic, Allopathy and traditional medicine since time immemorial. Medicinal plants play a major role in traditional and modern systems. Their use has been augmented by various studies and uses due to the many side effects resulting from the use of synthetic drugs, antibiotics and high costs. People in the rural areas mainly rely on medicines to treat their ailments due to the unavailability of modern medicines and hospitals. In developing countries, 80% of the population still use traditional remedies derived from natural resources (Chopra *et al.*, 1996 and Farnsworth *et al.* 1985) [1-2]. In India, with more than 75% of the population living in rural areas (Anonymous, 1991 and Rabe and Staden, 1977) [3-4] close to natural resources, rich medicinal uses have existed among the indigenous people for years.

The therapeutic properties of medicinal plants are mainly due to the presence of a variety of complex chemical compounds of different formations that occur as secondary metabolites. Medicinal plants form a large group of economically important plants that provide the basics for the use of traditional medicine. The medicinal value of plants lies in some chemical reactions that produce a specific physical action in the human body. Phytochemical research based on ethno pharmacological information is generally considered to be an effective means of detecting new anti-infective agents from higher plants (Karthikeyan, *et al.* 2009 and Duraipandiyan, *et al.* 2006) [5-6].

Therapeutic drugs Not only for the discovery of drugs, but also for the synthesis of complex chemicals Revealing new sources of economic substances such as tannins, oils, gums, precursors is valuable information that requires knowledge of the chemical components of the plant. In addition, knowledge of the chemical components of plants is even more valuable in discovering the true value of folk remedies (Arokiyaraj, 2013 and Mojab, *et al.* 2003) [7-8].

It is widely distributed as phytochemical plant components that play many environmental and physiological roles. Woody plants can synthesize and store a variety of phytochemicals in their cells, including alkaloids, flavonoids, tannins, cyanogenic, glycosides, phenolic compounds, saponins, lignins and lignans. Phytochemical variations show biological effects as a consequence of antioxidant properties. Various polyphenols (phenolic acid, hydrolyzable tannins, flavonoids) have anticarcinogenic and anti-mutagenic effects (Uruguiga and Leighton, 2000) [9].

Plants may contain bioactive chemicals that produce physical and biochemical functions in the human body. These bioactive components include alkaloids, tannins, flavonoids and phenolic compounds. Natural products from plants have received a lot of attention in recent years due to their wide range of pharmacological properties, including antioxidant and antitumor activity (Edeoga, *et al.* 2005) [10].

Solanum Nigrum L and *S. Seaforthianum* Andr. Plant for Primary Health Care Important aspects of medicinal plant resources. Black Night Shade is a decode weed of the Solanaceae family. It is a green, smooth, semi-climbing stalk 10-60 cm long. The whole organ is slightly ovate and diamond-shaped with slightly transverse leaves. It is common in wet forests, riverbanks, barren land, old land, roadside ditches and farmland.

Solanum seaforthianum Andr. It is a biannual herbaceous plant. It is 1-2 m tall with young parts. hirsute pilose or glandular hairy, stem with hooked, leaves opposite upto 22 cm long, ovate, acute, sinuate or pinnatifid and prickly on both surface, petiole prickly, flowers white in sessile or sub-sessile few flowered lateral cymes, berry globose, yellow when ripe. It is frequent to common along roadsides, river bund, in waste plus, infrequently in cultivated fields.

Several workers have studied the phytochemical constituents of different plant species from time to time in different parts of the world. Certain authors have reported phytochemical studies of *Solanum nigrum* L. (Ravi, *et al.* 2009 and Santhi & Nadanakunjidam, 2011) [11-12]. Other workers have worked on phytochemical constituents of different medicinal plants such as (Dash, *et al.* 2008; Parekh and Chanda, 2007; Prasad, *et al.* 2008; Periyasamy *et al.* 2010; Koche, *et al.* 2010 and Mallikharjuna, *et al.* 2007) [13-18]. The phytochemical studies of *Solanum nigrum* L and *Solanum seaforthianum* Andr. of Rewa district areas is so far limited. Therefore, an attempt was made to evaluate the phytochemical constituents of *Solanum nigrum* L and *Solanum seaforthianum* Andr. of Rewa districts in the present investigation.

Material and Methods

Plant Collection and Identification: Fresh samples of *Solanum nigrum* L and *S. seaforthianum* Andr. free from disease were collected from dry and shady areas of different localities of Chorhata, University campus and Govindgarh sites. The plant materials were identified as per method (Jain and Rao, 1976) [19] and herbarium deposited in Department of Botany, Govt. Science P.G. College, Rewa (M.P.).

Preparation of Plant Material: The leaves were washed thoroughly 2-3 times with running tap water, leaf material was then air dried under shade. After complete shade drying the plant material was grinded in the mixer, the powder was kept in small plastic bags with proper labelling.

Extraction of Plant Material: Preparation of aqueous extracts: In the first grinded leaves materials of 5 gm weighed using an electronic balance & 5gm of plant material were crushed in 25 ml of sterile water, then heat at 50-60 c and it was filtered using Whatman filter paper no.1. then filtrate was centrifuged at 2500 rpm for 15 minutes & the filtrate was collected in sterile bottles and was stored by refrigeration at 5°C until use (Harborne, 1973) [20].

Preliminary Phytochemical Analysis: This was carried out according to the methods described by Trease and Evans (1989) [21]. Qualitative phytochemicals analysis of the crude powder of the *Solanum nigrum* L and *S. seaforthianum* Andr. for the tests of phytochemicals as a alkaloid, saponin, tannins, flavonoides and protein etc. (Oguyemi, 1979) [22] were made as shown below –

- **Test for Alkaloides:** 200 mg plant material were taken and added 10 ml Methanol and then filtered. After that 2 ml filtrate were taken and added 1% HCL with steam 1 ml filtrate and 6 drops Mayer's reagent/Wagners reagent/ Dragendorffs reagent. It produced Creamish/Brown/Red/Orange precipitate indicate the presence of alkaloids.
- **Test for Saponins:** Approximate 0.5 ml filtered were taken and added 5 ml distilled water. Frothing persistence indicate presence of Saponins.
- **Test for Tannins:** 200 mg plant material were taken and added 10 ml distilled water and then filtered. After that 2 ml filtered were taken and added 2 ml FeCl₃ Blue. Then black precipitate indicate the presence of Tannins & Phenols.
- **Test for Flavonoides:** 200 mg plant material were taken and added 10 ml Ethanol, then filtered. After that 2 ml filtrates were taken and added conc HCL and magnesium ribbon. Pink, Tomato, Red colour indicate the presence of Flavonoides, Glycoside.
- **Test for Protein:** Take 3-5 ml of the plant extract or filtrate and added few drops of Millons reagent and mix thoroughly and heat. White precipitate is formed and the precipitate turns brick red after boiling.

Results and discussion

Following the analytical study, *Solanum Nigrum* L and *S. seaforthianum* Andr. shown in Tables 1 and 2.

Table 1 shows that the extract of *Solanum nigrum* L of study area is rich in tannins, while alkaloids, saponins, tannins and flavonoids are found in moderate amounts in the shades of 3 different sites. The results revealed that *Solanum nigrum* L leaf extract was rich in protein in relatively shady areas of arid regions of 3 study sites.

Table 1: Qualitative Phytochemical Screening of *Solanum nigrum* L of Rewa district (M.P.) India

Name of the phytochemicals	Chorhata		University campus		Govindgarh	
	Dry area	Shady area	Dry area	Shady area	Dry area	Shady area
Alkaloid	+	++	+	++	+	++
Saponin	+	++	+	++	+	++
Tannins	+	++	+	+++	+	++
Flavonoids	+	++	+	++	+	++
Protein	+	+++	+	+++	+	+++

Note Book: +++ = Abundant, ++ = moderately presence, + = present

Table 2, it was observed that saponin and tannins are abundant on leaf extract of *Solanum seaforthianum* Andr. in dry areas of University campus and Govindgarh study site than Chorhata one. On the other hand, alkaloid, flavonoids, proteins are moderately present in leaf extract of *Solanum seaforthianum* Andr. in dry areas of Chorhata, University

campus study site but in Govindgarh, the result indicate the presence of alkaloid. In shady areas, alkaloid and saponin are moderately present on leaf extract of *Solanum seaforthianum* Andr. of these study sites as comparatively than other phytochemical constituents.

Table 2: Qualitative Phytochemical Screening of *Solanum seaforthianum* Andr. of Rewa district (M.P. India)

Name of the phytochemicals	Chorhata		University campus		Govindgarh	
	Dry area	Shady area	Dry area	Shady area	Dry area	Shady area
Alkaloid	++	+	++	+	+	+
Saponin	++	+	+++	++	++	+
Tannins	++	+	++	+	+++	++
Flavonoids	++	+	++	+	++	+
Protein	++	+	++	+	++	+

Note: Book: +++ = Abundant, ++ = moderately presence, + = present

Quality assurance of phytochemical elements extracted from the leaf extract of *Solanum nigrum* L and *S. seaforthianum* Andr. reveals the presence of alkaloids, saponin, tannins, flavonoids, proteins etc. Pure unmixed alkaloids and their synthetic products are used as basic agents to treat their analgesic, antispasmodic and bacterial effects (Okwu and Okwu, 2004) [23]. In the present study, the alkaloid content observed in *Solanum nigrum* L and *S. seaforthianum* Andr. it may be responsible for their highly respected treatment rates even though the exact mechanism of action is not well understood. Saponin is a special class of glycosides with soap properties. It has the property of lowering and strengthening red blood cells. Some of the properties of saponin include the formation of forms in aqueous solution, haemolytic activity, cholesterol-binding properties and acidity (Sodipo, *et al.* 2000) [24]. These structures offer high therapeutic functions in the leaf structure from *Solanum nigrum* L and *S. seaforthianum* Andr. Tannins are also known as an antibacterial agent. Tannins (more commonly called tannic acid) are polyphenols dissolved in water present in many plant foods. Water-based tannins polyphenols reduce protein. Tannins have been reported to inhibit the development of microorganisms by depleting small amounts of protein and making protein-rich ones inaccessible to them. The growth of many fungi, yeasts, bacteria and viruses was inhibited by tannins. Phytotherapeutically plant-based tannin is used to treat undiagnosed diarrhoea, inflammation of the mouth and throat and slightly damaged skin (Westendary, 2006) [25]. In this study, the presence of tannins may have caused a sharp taste in both *S.nigrum* L and *S. seaforthianum* Andr. and it has been reported to speed up the healing of wounds and inflamed mucous membranes. Flavonoids are powerful water-soluble antioxidants and free radical scanners, preventing oxidant cell damage with strong anticancer activity. Intestinal Flavonoids reduce the risk of heart disease. Like antioxidants, flavonoids from these plants provide anti-inflammatory activity. This, in turn, may be the reason *Solanum nigrum* L and *S. seaforthianum* Andr. used for the treatment of wounds, burns and ulcers in herbal medicine. In addition to these secondary metabolites, due to the higher protein content in the leaf *Solanum nigrum* L than *S. seaforthianum* Andr. which can serve many of the medicinal properties shown by plants. For example,

different types of proteins are isolated from medicinal plants and have been found to be effective against certain diseases Tsao, *et al.* 1990) [26].

Phytochemical components for the treatment of various ailments / diseases such as cough, liver problem, stomach ache, skin diseases, inflammation, jaundice, toothache have medicinal properties of both species. Various workers reported (Srivatasava & Nyihi, 2010 and Gogoi & Islam 2012) [27-28].

Conclusion

In the present investigation *Solanum nigrum* L and *S. seaforthianum* Andr. due to the presence of phytochemicals there are potential sources of useful drugs and can be used in the treatment of many diseases / ailments and also for use in the pharmaceutical and cosmetic industries. However more studies are needed to distinguish the active formula from the raw extract for proper drug development.

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