

Qualitative Screening of Bioactive Compounds in Roots of Sea buckthorn (*Hippophae rhamnoides L.*)

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ABSTRACT

Sea buckthorn is a deciduous ancient plant, which gained worldwide attention mainly of its extensive nutritional and medicinal potential. Presence of various kinds of bioactive compounds makes it more potent and increases its nutritional value. Many studies shows that the Sea buckthorn plant (berries, leaves, stem, bark) contain the vital chemicals and nutritional constituents like flavonoids, terpenoids, organic acids, coumarins, alkaloids, steroids, phenolic acids, carotenoids, amino acids, tannins, saponins, vitamin C and Lycopene and polyphenols. SBT shows antimicrobial and antiviral properties. It was proved that SBT extensive role in the management and lower the risk of heart related disease, tumors, and diabetes, as well as gastrointestinal and dermatology. Every part of the sea buckthorn plant like (berries, seeds, roots, leaves, stems, and thorns) has significance role in medicinal, cosmeceutical, and nutraceutical field and finds a wide variety of applications and utilization in making more than 200 products worldwide.

Keywords: sea buckthorn (SBT), flavonoids, terpenoids, coumarins, polyphenols.

INTRODUCTION

Sea buckthorn (*Hippophae rhamnoides L.*) is multipurpose deciduous shrub in the family Elaeagnaceae, also called as a Sea berry, Sand thorn or Sallow thorn, bearing orange-yellow berries. Elaeagnaceae is also known as an oleaster family has three genera *Hippophae*, *Shepherdia* and *Elaeagnus* and roughly to 70-80 species, which distributed throughout the world. SBT is the natural source of Vitamin C and lycopene and several other major bioactive compounds like flavonoids, terpenoids, organic acids, coumarins, alkaloids, steroids, phenolic acids, carotenoids, amino acids, tannins, saponins and polyphenols, which have been claimed to reduce cholesterol, platelet aggregation, hypertension and blood sugar. These chemical components are responsible for the species remarkable observed biological activities, such as antioxidant, anti-cancerous (1), anti-diabetic, antibacterial, muscle relaxant effect, anti-diarrheal. In addition, SBT is considered to be beneficial in treating tumors, stomach tumors and skin ailments. Accumulating evidence shows that sea buckthorn is a promising plant that could serve as a natural remedy for the reduction of Heart related diseases (2) and other health related ailments such as diabetes, inflammatory diseases, thrombosis and cancer.

MATERIAL AND METHODS

Collection of samples: The Fresh roots (*Hippophae rhamnoides L.*) were collected in august 2021 from Rangreek area located in Lahaul-Spiti (*Himachal Pradesh*), India. Roots were dried at room temperature for 7 days. The ground materials were used for methanol extraction.

Preparation of SBT Extract (oven dry method): Fresh roots were washed with distilled water to make it free from all impurities then cut into small pieces and dried it for 12-48 hrs. at temp. of around 42-50 degree Celsius. Then the samples were grinded well for the fine powder with the help of mechanical blender.

The fine powders of the sample extracts were transferred into a fresh airtight container and label it properly for the further use.

Solvent preparation of SBT Roots Samples: (*Ethanol Extract*): Take 10 gm. of samples in 100 ml of conical flask and dissolved in 50ml of 95% methanol/ethanol. Extraction was allowed to stand for 48 - 72 hrs. At 27 to 30 degrees Celsius, then filtered it out for the further investigation (3,4).

Phytochemical Screening (Qualitative analysis): The extracts were used as such for determination of Phenols, Amino acids, Alkaloids, Saponins, Tannins, Steroids, Flavonoids, Terpenoids (5,6).

Test for Phenolic compounds: *Ferric Chloride Test* - The root extract (10 mg) dissolved in 5 ml of distilled water. Added 5% ferric chloride solution in this, a dark color shows the presence of phenolic compound in the root extract (7).

Test for Alkaloids: *Mayer's reagent test:* 0.5 g root extract of plant was mixed with 7 ml of 1% HCl, warmed and filtered it out. 2 ml of filtrate was titrated separately with Mayer's reagent; yellow precipitation indicates the presence of alkaloids (8).

Test for Saponins: *Foam Test* - 0.5 gm of extract was shaken with 2ml distilled water, if foam produce persists for 10 minute it indicates the presence of saponins (9).

Test for tannins: *Lead acetate test* - The extract (20 mg) is dissolved in distilled water and to this, 3 ml of 10% lead acetate solution is added. A bulky white precipitate shows the presence of tannins.

Test for steroids: 3 ml of chloroform was added to 1 ml of extract, and was filtered. To the filtrate, con. H₂SO₄ was added by the sides of the test tube, A reddish brown color

ring with a slightly greenish color was taken as the indication for the presence of steroids (10).

Determination of flavonoids: Ethyl acetate test - 30 mg portion of plant sample was heated with 10 ml of ethyl acetate over a steam bath for 2-3 min, filtered it and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution. A yellow coloration was appeared which shows the presence of flavonoids (11).

Test for terpenoids (Salkowski test) 5 ml (1 mg/ml) of root extract was mixed in 2ml of chloroform, and concentrated H₂SO₄ (3ml) was carefully added to form a layer. A reddish brown coloration of the interface was formed which indicated the positive presence of terpenoids (12).

RESULTS AND DISCUSSION

Preliminary examination of Sea buckthorn root extract indicated the presence of important bioactive compounds like phenols, alkaloids, saponins, tannins and, steroids which have important nutritional and medicinal values. Phenolic compounds, flavonoids, tannins play an important role in cancer prevention and treatment, lower cardio vascular disease, lower blood glucose response, cell protective, anesthetics, cardio protective, and anti-inflammatory agents.

Terpenoids, Saponins and Alkaloids are secondary metabolites, which have medicinal properties like antimicrobial, anti-cancerous, anti-hyperglycemic, analgesic and anti-inflammatory and anti-parasitic.

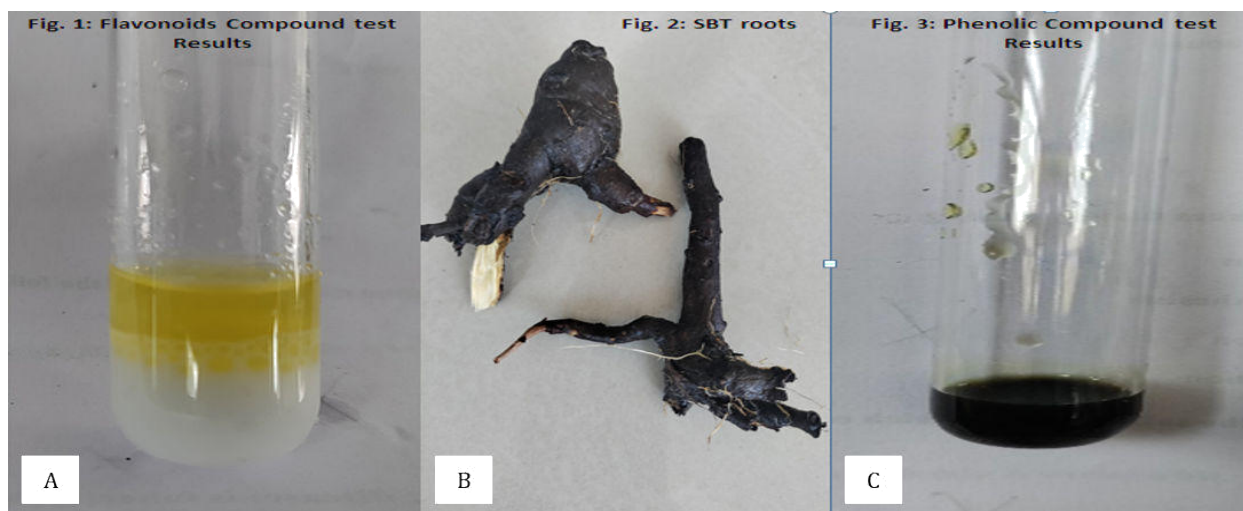


FIGURE 1: (A) Flavonoids Compound Test Results; **FIGURE 2:** (B) SBT Roots; **FIGURE 3:** (C) Phenolic Compound Test Results

TABLE 1: Qualitative analysis of SBT Roots sample

S.NO	Phytochemical Tested	Test Performed	Test Result
1.	Phenolic compounds	Ferric chloride Test	++
2.	Alkaloids	Mayer's Test	+
3.	Saponins	Foam Test	+
4.	Tannins	Lead Acetate Test	+
5.	Steroids	Ring Test	+
6.	Flavonoids	Alkaline Reagent Test	++
7.	Terpenoids	Salkowski Test	+

++ indicates: strong presence, + indicates: weak presence, - indicates: strong absence.

CONCLUSION

Sea buckthorn root (Fig. 2) extracts was rich in phytochemical activity as shown in Table 1. Qualitative Screening of Sea-buckthorn roots showed the strong presence of bioactive compounds like Flavonoids, Phenolic compounds, Alkaloids, Saponins, Tannins, Steroids, and Terpenoids. As per the results phenolic compounds and Flavonoids were strongly present (Fig.1 & Fig. 3) in the root sample whereas other compounds like alkaloids, saponins, tannins, steroids and terpenoids were positively present in the root sample.

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