AN OVERVIEW STUDY ON MEDICINAL IMPORTANCE OF RADISH AND ITS ROOT SKIN USED AS NATURAL DYE

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ABSTRACT
An overview of the ethnobotanical properties of Raphanus sativus have been studied in this article. The Radish roots are used as medicinally important foods as well as root skin are used as natural dye. Skin colour solution is stable at 100°C and can be used as food dye etc. The colour pigments extracted from root skin with warm distilled water for 15 to 30 minutes. Thermal and duration stability of dye solution and dyeing of beaten rice was studied.

KEYWORDS: Raphanus, Red radish, traditional medicinal importance, extaction colour, thermal stability, dyeing food.

INTRODUCTION
Recent research has focused on natural vegetables product as an alternative for disease control in developing countries. The present study is focused towards compiling the ethnobotanical and scientific importance of red radish root shown in (Fig 1).

Radish (Raphanus sativus L.), which is originated from Europe or Asia, is presently cultivated all over the world. The leaf and root of radish are used as most common edible vegetables in N.E Region of India, radishes are varying in size and colour such as red, pink, white or grey-black because of various bioactive compounds present in its seed, leaf and root.[1] Radish contains various phytochemicals, glucosinolates products.[2] Radish offers numerous health benefits. They are rich in nutritional components, amino acid (like ascorbic acid and folic acid), fibre minerals carbohydrates and protein.[1] The common people use it as a laxative, stimulant, digestive aid appetizer and in stomach disorders.[3]

Overview of Radish
Taxonomy of the plant
Kingdom : Plantae
Division : Angiosperms
Order : Brassicales
Family : Brassicaceae
Genus : Raphanus
Species : Raphanus sativus
Common name : Radish
Local name (Assamese) : Ronga Mula
Binomial name : Raphanus sativus L.

Natural Habit and Habitat
Radish, Raphanus sativus, is a herbaceous annual or biennial crop grow very well in cool moist climates, at temperatures between 10°C and 27°C in a well-draining sandy loam or loam in full sun to part shade.[6]

Geographical distribution
Geographical distribution of radish includes Middle Asia, Europe, China, India and Japan. On the basis of geography, spring or summer radish and winter radish varieties are available.

Biophysical limits
They grow in season from April to June and from October to January in most parts of North America; in Europe and Japan. They are available year-round due to the plurality of varieties grown. Radishes are best planted in soil temperatures are above 27°C.

Cultivation
Radishes grown in full sun in loamy or sandy soils. Many varieties germinating in 3–7 days and reaching maturity in 3 to 4 weeks. The soil pH range is 5.8–6.8 for radish growth. After harvest, radishes can be stored without loss of quality for 2 or 3 days at room temperature and about two months at 0°C (32 °F) with a relative humidity of 90–95%.[7] At the time of sowing sufficient moisture, irrigated field are necessary and before sowing, dry weather frequently necessary. Thin to 1.6” or 6” apart to ensure adequate room for root development. Before sowing, be sure the soil is cultivated and loose as deep as the radishes will be long. Raised beds are ideal for long radishes. The radish plant...
produces multiple purple or pink or white flowers on racemes which produce 2–12 seeds. The reddish brown seeds are oval and slightly flattened. Radish plants easily cross-pollinate with wild radish and other nearby relatives.

![Radish plant](image)

**Fig. (1): Red radish plant.**

**Propagation:** Seed-sown outdoors in situ in succession from late winter to the middle of summer. Germination takes place within a few days of sowing the seed. If you want a constant supply of the roots then you need to sow seed every 2 - 3 weeks.

**Genetics Resources:** Becker germplasms was very abundant, which could be further exploited for radish’s genetic improvement. The genetic similarity coefficient between the red and white fleshy radishes was 0.83 indicating genetically close relationship in radishes with different fleshy colours. Genetic diversity of 30 radish (*Raphanus sativus* L.) accessions was investigated at the phenotypic level with morphological characters and at the DNA level using the Random Amplified Polymorphic DNA (RAPD) technique.

**Health Benefits of Radish**

**Minerals:** Many minerals like potassium, iron and calcium are found in radishes and they play an important role in body’s metabolism.

**Vitamin Benefits:** The vitamins A, C and K are present in radishes help to prevent skin disorder to a great extent. The consumption of radishes results in better cell production and cell repair.

**Weight Loss:** The high water content and non-digestible carbohydrates are presence in the radish. Consumption of radish helps to avoid excess calories and fat accumulation in the body. Radishes are high in fiber and low glycemic index, which helps in weight loss and increases the efficiency of the metabolism for all bodily processes.

**Skin Diseases:** Radishes contain Vitamin C and K and antioxidants (phosphorus, zinc members of vitamin-B complex) are good for the quite effective in preventing skin diseases and inflammation.

**Dandruff:** Radishes can be used to fight with dandruff problem. Rub scalp with radish juice and cover with the help of a towel. After an hour, wash it thoroughly.

**Cholesterol and Heart diseases:** Radishes reduce the absorption of cholesterol by signalling the blood and heart help preventing any cardio diseases. Radishes are a great source of anthocyanins. Anthocyanins have been the subject of numerous medical studies and have been positively linked to reducing the cardiovascular disease.

**Blood pressure:** Radishes are a very good source of potassium that can relax the blood vessels and therefore increase blood flow. It reduces the blood pressure by widening the flow of the blood, instead of forcing it through narrow, constricted channels.

**Cancer:** Radishes are detoxifiers and rich in vitamin-C, folic and anthocyanins, they have been treated many types of cancer, particular colon, kidney, intestinal, stomach and oral cancer. They can cause apoptosis, cell death, thereby eliminating cancerous cells from reproducing.

**Respiratory Disorders, Bronchitis and Asthma:**

Radishes are an anti-congestive, meaning that it decreases congestion of the respiratory system including irritation of the nose, throat, wind-pipe and lungs. They are a great disinfectant and rich in vitamins which further protects the respiratory system from infections.

**Side effect:** Large amount of radish can irritate the digestive tract, pregnancy and breast-feeding process. Stay on the safe side and avoid using more than usual food amounts. Gallstones patient shouldn’t used radish.

**Used Dose:** There is no scientific information to determine an appropriate range of dose of radish. The natural products are not always necessarily safe and dosages can be important.

**Prospects:** The leaves and roots of the plant are used as food and also as medicine. From literature was collected essential nutrients in low content shown in Table-1. It is a good detoxifier. It is used for stomach and intestinal disorders, bile duct problem, loss of appetite, laxative effect upon the intestine, gastric problem constipation, pain and swelling (inflammation) of the mouth and throat, tendency towards infections, inflammation or excessive mucus of the respiratory tract, bronchitis fever, colds and cough. The plant also shows anti-tumour activity. The seeds of the *Raphanus sativus* species can be pressed to extract seed oil. Wild radish seeds contain up to 48% oil content, and while not suitable for human consumption the oil is a potential...
source of bio-fuel. The radish root skin colour is used as food dye.

Table 1: Nutritional contents of radish (per 100g).

<table>
<thead>
<tr>
<th>Components</th>
<th>contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>66 KJ (16 kcal)</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>3.4 g</td>
</tr>
<tr>
<td>Sugars</td>
<td>1.86 g</td>
</tr>
<tr>
<td>Dietary fibre</td>
<td>1.86 g</td>
</tr>
<tr>
<td>Fat</td>
<td>0.1 g</td>
</tr>
<tr>
<td>Protein</td>
<td>0.68 g</td>
</tr>
<tr>
<td>Thiamine (B1)</td>
<td>0.012 mg</td>
</tr>
<tr>
<td>Riboflavin (B2)</td>
<td>0.039 mg</td>
</tr>
<tr>
<td>Niacin (B3)</td>
<td>0.012 mg</td>
</tr>
<tr>
<td>Pantothenic acid (B5)</td>
<td>0.071 mg</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>0.071 mg</td>
</tr>
<tr>
<td>Folate (B9)</td>
<td>25 μg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>14.8 mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>25 mg</td>
</tr>
<tr>
<td>Iron</td>
<td>0.34 mg</td>
</tr>
<tr>
<td>Magnesium</td>
<td>10 mg</td>
</tr>
<tr>
<td>Manganese</td>
<td>10 mg</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>20 mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>233 mg</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.28 mg</td>
</tr>
<tr>
<td>Other constituents</td>
<td>6 μg</td>
</tr>
<tr>
<td>Fluoride</td>
<td></td>
</tr>
</tbody>
</table>

µg= micrograms, mg= milligram.

MATERIAL AND METHODOLOGY

Red Radish root samples were collected from local area (Jorhat, Assam) of NE region of India. The root skin samples were prepared for dye extraction.

The moisture content of the skin samples were determined on air dried basis. Drying of the sample was continued until constant mass was obtained. A definite mass of each sample was treated with proper solvent (water) repeatedly to get complete extraction of raw dye. The dried samples were preserved for future use of dye extraction under nitrogen atmosphere in air tight packets to prevent degradation of the sample by fungal growth.

Extraction of Dye

5 g of red radish root skin was taken as received basis and digested with 100 ml of distilled water in a stopper flask and magnetically stirred 1/2 hours at warm condition at 60°C. The experiment was repeated until the solvent became colourless. The colour phase was separated from the residue skin by cotton filter. The extracted were concentrated under vacuum rota evaporator. Percentage of extracted dye from skin was determined by specific density method in liquid state.

Thermal stability were studied by taking 1mg/50ml aqueous dye solution and transferred into two numbers of test-tubes and its heating at 25°C and 100°C for constant time 10 minutes. This dye solution were cooled in an ice bath followed by ambient temperature. Its colour intensity was determined by UV spectrophotometry absorbance 283 nm (Using Thermo Scientific Instrument).

Water solution of dye was prepared (2mg/50ml) and the beaten rice put into the dye bath for 5 minutes wherein the absorption of dye on the coloured beaten rice takes place. After withdrawing the beaten–rice from the dye bath, the beaten–rice was air-dried at room temperature.

A process of determining the colour stability was studied for 7 days at room temperature 25°C. The colour stability of the dye solution was tested/analysed by UV-spectroscopy at 283 nm absorbance.

RESULT AND DISCUSSION

Degree of Extraction

In the root skins 14.5% of moisture concentration were determined. The concentration of the dye extracted from skin was found to be 13.5% (as dry basics of the skin) shown in (Fig 2) and pH of dye solution was 6.5. This percentage of dye extraction was determined by specific density method. This method is the comparison of the density of dye solution with the density of the distilled water as shown in (Fig. 2).

Fig. (2): Red Radish (A) skin (B) dye extraction with water.

Degree of Thermal stability

Aqueous dye solutions were subjected to various temperature for 10 minutes, their colour absorbance were detected at 364 nm in a UV spectrophotometer at 25°C and 100°C. Result shows that up to 100°C, colour of the dye solution remained stable at 25°C and 100°C as shown in [Fig. 3-(1) and (2)] respectively both having same absorbance.

Degree of duration stability

The colour duration stability of the dye solution was tested/analysed by UV-spectroscopy at 364 nm absorbance and optical density remain unchanged at 25°C. The colour intensity was same i.e no photochemical reaction occurs with colour pigment during the 168 hours at room temperature 25°C as shown in [Fig. 3 (3)].
Colouring of Food
The colour co-ordinates were positive with food colour in the space diagram as shown in (Fig.4). It indicates a good coloration of beaten-rice and easy formation of food colour complex.

CONCLUSION
Radish or *Raphanus sativus* plant species which commonly available N E Region India is used as vegetables. From the point of review we can interpret that radish has good medicinal properties for human beings. The colour content of red radish skin extracted in our experimental studies can be used as natural dye for food coloration and thermal stability is up to 100°C for a duration of minimum 168 hours at room temperature 25°C. scientific conservation, propagation and cultivation of the species is recommended for sustainable use.

REFERENCES