WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 11, 586-592. Review Article ISSN 2277–7105

COMPARATIVE PHARMACOGNOSTICAL STUDY OF WILD AND CULTIVATED *BETA VULGARIS LINN.*

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Article Received on
10 April 2024,

Revised on 01 May 2024,
Accepted on 22 May 2024

DOI: 10.20959/wjpr202411-32620

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ABSTRACT

Beta vulgaris Linn. is an important medicinal plant belonging to the family Chenopodiaceae. It is commonly known as Beetroot or garden beet. The root is used in traditional Indian medicine for treating fertility issues, hypertension, cancer, and urinary tract disorders. Due to its wide use in Indian traditional medicine, it was important to standardize its roots. Various quality control parameters such as extractive values with ethanol, ash values, foreign organic matter, loss on drying, pH of aqueous solution, total phenolic and total flavonoid content were determined. The results obtained from the preliminary pharmacognostic standardization of the root of Beta vulgaris are very helpful in determining the quality and purity of the crude drug. They provide insight into the effectiveness and comparative characteristics of the plants grown in the wild and cultivated plants.

KEYWORDS: Beta vulgaris, Wild, Cultivated, Quality control, Comparative.

INTRODUCTION

The beetroot is the taproot portion of a beet plant. It is known as beets in North America and as beetroot in British English. It is also referred to as the table beet, garden beet, red beet, dinner beet, or golden beet. The root is succulent and tuberous, with mostly basal, ovate to oblong-ovate leaves and greenish flowers. It is cultivated as a vegetable throughout India,

with the two commonly grown varieties being Crimson Globe and Detroit Dark Red, both having globular-oval roots. In Indian traditional systems of medicine, beetroot is used for various purposes such as haemagglutination, antifertility, antifungal, anticlastogenic, anti-cancer activity, antiprotozoal, antiviral, and diuretic activities, as well as effects on respiration. Several workers have reported on the plant's nutritive value. The amino acid composition of leaf protein includes threonine, valine, cysteine, methionine, isoleucine, leucine, phenylalanine, lysine, histidine, arginine, aspartic acid, serine, glutamic acid, proline, glycine, alanine, and tyrosine. (Subba Rao et al., 1972; Rao et al., 1956).

The cooked beetroot, when subjected to steam distillation, produced 17 volatile constituents. The major ones were pyridine (5.6%) and 4-picolene (54.4%) (Sengupta and Pal, 1971). Beetroot is a rich source of red and yellow pigments called betalains, which include red-violet betacyanins and yellow betaxanthins. The major constituent of the red pigment is betanin (75-95%), while vulgaxanthine I is the principal pigment of the yellow betaxanthin group. Additionally, beetroot contains isobutane, isobetanidine, betanin, isoprebetanin, and vulgaxanthin II.(Anonymous, 1988). The presence of hocyanins and betalains in the same plant has never been reported, and they seem to be mutually exclusive in the plant kingdom (Stafford et al., 1994). This study focuses on establishing quality standards for B. vulgaris root in accordance with WHO guidelines (Adil Ahmad, *et al*. 2013).

Plant profile

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Order:	Caryophyllales
Family:	Amaranthaceae
Genus:	*Beta*
Species:	*B. vulgaris*

Figure 1: Beta vulgaris.

MATERIALS AND METHOD

Plant material

The cultivated beetroot was sourced from local farmers in the Nanded district of Maharashtra, while the wild plants were collected from the forest area of Kinwat Tq in Nanded District. To extract Beta vulgaris, the dried roots of the plants were powdered and then soaked in 70% ethanol for 3 days.

Determination of Ethanol soluble extractive value

4 grams of accurately weighed powdered material was placed in a glass stoppered conical flask. 100 ml of ethanol was added to the flask, and the total weight, including the flask, was measured. The flask was then shaken well and allowed to stand for 1 hour. A reflux condenser was attached to the flask, and it was gently boiled for 1 hour. Then, it was cooled and weighed. The weight was adjusted to the original total weight by adding the required amount of ethanol. The flask was shaken well and filtered rapidly through a dry filter paper. After that, 25 ml of the filtrate was transferred to a tarred flat-bottomed dish and evaporated to dryness in a water bath. Then, the dish was dried at 105 °C for 6 hours, cooled in a desiccator, and weighed. The content of extractable matter (% w/w) air-dried material was calculated as follows:

% Methanol soluble extractive matter = weight of residue/ weight of sample ×4×100

Determination of total ash content

The powdered material (2 g) was accurately weighed and placed in a crucible. The material was spread evenly in a layer and ignited to a constant weight by gradually increasing the heat to 500-600 °C until it turned white, indicating the absence of carbon. The remaining ash was allowed to cool in a desiccator. The content of total ash (in mg/g) of air-dried material was calculated as follows:

% Total ash = weight ash/ weight of sample × 100

Determination of acid-insoluble ash

HCl (2 N; 25 mL) was added to the crucible containing the total ash, covered with a watch glass, and boiled gently for 5 min. The watch glass was rinsed with 5 mL of hot water and the rinsed contents were added to the crucible. The acid-insoluble matter was collected on an ashless filter paper and washed with hot water until the filtrate was neutral. The filter paper containing acid-insoluble matter was transferred to the original crucible, dried on a hot plate, and ignited to a constant weight. The residue was allowed to cool in a desiccator and weighed. The content of the acid-insoluble ash (in mg/g) of air-dried material was calculated as follows:

% Acid insoluble ash = weight ash/ weight of sample ×100

Determination of water-soluble ash

Water (25 mL) was added to the crucible containing the total ash, covered with a watch glass, and boiled gently for 5 min. The watch glass was rinsed with 5 ml of hot water and added to

the crucible. The water-insoluble matter was collected on an ashless filter paper and washed with hot water. The filter paper containing the water-insoluble matter was transferred to the original crucible, dried on a hot plate, and ignited to a constant weight. The water-soluble ash content was calculated using the following equation

% Water soluble ash = total ash content-water insoluble residue in total/ ash weight of sample ×100

Foreign matter analysis

Foreign matter presence may be due to faulty collection of crude drugs or due to deliberate mixing. It was separated from the drug so that the results obtained taste are important parts of the morphology of a particular drug.

Determination of pH

The pH of the 1% solution of extract was determined by making an appropriate concentration of powdered drug in an aqueous solution, filtering, and checking the pH of the filtrate. A digital pH meter was utilized to ascertain the pH of the mixtures.

Preliminary phytochemical screening of Beta vulgaris root extracts

Qualitative chemical tests were performed for extracts of plants. The extracts were shown to contain active phytochemical elements such as alkaloids, carbohydrates, glycosides, tannins, and saponins.

Total Phenolic Content

Total phenolic content was estimated by the Folin– Ciocalteu colorimetric method, based on the procedure of Azlim Almey, 2010, using gallic acid as a standard phenolic compound. A linear calibration curve of gallic acid with an R2 value of 0.9917 was obtained (not shown). Figure 2 shows the mean TPC of the B. vulgaris extracts measured using the GAE equation of $Y = 0.001x + 0.002$ ($R^2 = 0.984$), whereby Y = absorbance at 765nm and X = concentration of total phenolic compounds in mg per ml of the extract. The Ethanolic extracts, of wild B. vulgaris, showed the of (11.23 ±0.13 mg/g) and the cultivated B. vulgaris showed a TPC of (08.42 ±0.13 mg/g).

Table 1: Physicochemical charecterestics.

Physicochemical Character	WBA	CBA
Total ash (%w/w)	11.93	10.03
Acid insoluble ash ash (%w/w)	1.33	1.25
Water insoluble ash ash (%w/w)	7.99	6.52
Foreign organic matter (%w/w)	1.32	1.66
Loss on drying ash (%w/w)	13.52	11.09
pH	5.75	5.43

Table 2: Phytochemical screening of wild and cultivated Beta vulgaris.

Sr. No.	Chemical test	WBA	CBA
1.	**Alkaloid** Dragondroff's test Mayers test	 + +	 + +
2.	**Carbohydrate** **Molish test** **Fehlings test** **Benedict test**	 + + +	 + + +
3.	**Glycosides** Bortanger test	 +	 +
4.	**Saponin Foam test**	-	-
5.	**Tannin**	+	+
6.	**Phenolic**	+	+
7.	**Flavonoid**	+	+
8.	**Saponin**	-	-
9.	**Mucilage**	-	-
10.	**Lipids/Fats**	-	-

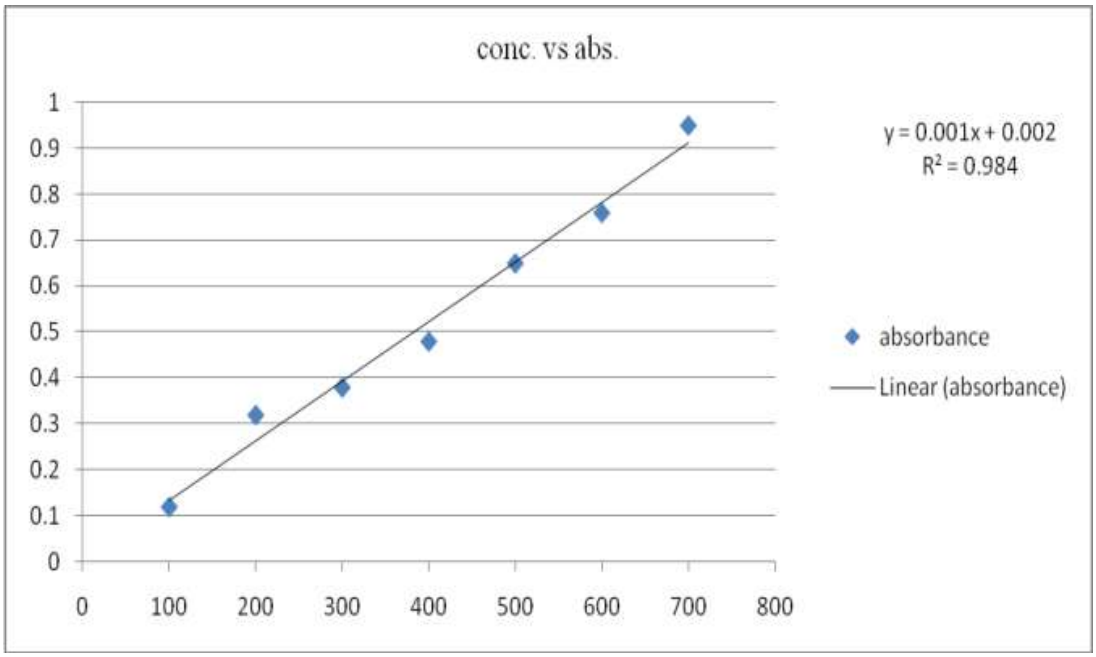

Figure 1: Calliberation curve of GAE.

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