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Pharmacognostical Analysis of Rooibos Leaves

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ABSTRACT

Aspalathus linearis, (Family: *Fabaceae*) is commonly known as "Rooibos" used mainly due to its antioxidant properties. The study aimed to determine the pharmacognostical standards of "Rooibos" available in the local market. Evaluations were conducted in terms of macroscopic, microscopic, physicochemical and phytochemical analysis according to the WHO and other recommended procedures.Physiochemical investigation of plant for the total ash, acid insoluble ash, water soluble ash,sulphated ash values and loss on drying re 6.26%, 4.0%, 5.46%, 5.66% and 0.30%, respectively.

Keywords: Rooibos · *Aspalathus linearis*, *Fabaceae* , Rooibos, Pharmacognosy

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INTRODUCTION

Medicinal plants have been used globally by many traditional cultures for centuries, due to their therapeutic properties. Therapeutically, medicinal plants are used to maintain a healthy

status as well as to treat various health ailments and diseases.[1]According to the World Health Organization statistics (WHO), 80% of the population in developing countries depend on the beneficial properties of medicinal plants as their sole healthcare source. The popularity of medicinal plants has grown over the past few decades because of reduced side-effects and their affordability, compared to pharmaceuticalmedicine.[2]

Tea is the most commonly consumed beverage in the world. The growing popularity of tea may be attributed to the fact that it is rich in polyphenol antioxidants, which benefit the human body by preventing diseases and combating the production of reactive oxygen species (ROS).[3]

New technological processes are sought to enhance or utilize natural beneficial properties of plants and their waste products. One plant that is receiving special attention in this context, mainly due to its antioxidant properties, is the indigenous South African species *Aspalathus linearis* (Burm. Fil) R. Dahlgr. spp. *linearis*, (Family: Fabaceae) more commonly known as "Rooibos". It (**Figure 1**), is considered healthy, based on the fact that it was "harmless and satisfying" due to the absence of alkaloids and a low tannin content .[4]

Aspalathus linearis with its needle-like leaves is polymorphic—various wild forms have been described, each with characteristic morphology and geographical distribution. Some forms are prostrate and remain less than 30 cmtall, while other forms grow erect and may reach up to 2m inheight. The size, density of branching, development of short shoots, leaf size and flowering time of the biotypes vary considerably.[5] The seeds are hard-shelled, needing scarificationto germinate .[6] The biotypes can be divided into either re-seeders or re-sprouters.[7]

Genetic and polyphenolic differences between various populations have been demonstrated [8].The main commercial type is the so-called red type or Rocklands type, a densely branched non-sprouting form with uniformly yellow flowers and bright green leaves that turn arich red-brown colour after "fermentation" (actually enzymeatic oxidation, followed by chemical oxidation). Rooibos tea is made by pruning the plant's young stems but mostly needle-shaped leaves into 2–3 [(5)] mm long sections (using a altered silage cutter) after which they are fractured and bruised. This process also degrades most of the flavonoid content (mainly

as palathin) that was shown to occur throughout the green, unfermented leaf.[9]

Although rooibos does not contain caffeine, traces of the alkaloid sparteine were reported.[10] It is considered a low tannin beverage, especially when compared to *Camellia sinensis* teas. The leaf tannin content of fermented rooibosis 3.2% to 4.4%. [11]

Anecdotal evidence suggests an anti-allergic effect, helps boost appetite, lowers nervous tension and encourage healthy sleep.[12]It also alleviates ingestion, heartburn and nausea .[13]As outlined in the excellent review, the product also has numerous medicinal benefits (like antioxidant, anti-inflammatory, anti-carcinogenic, hypoglycaemic and photoprotective effects).

There is insufficient data on the drug's morphological and anatomical characteristics. This study aimed to evaluate the pharmacognostic characterization of the herb , followed by the evaluation of stability of its extract.

Figure 1: ***Aspalathus linearis leaves***

MATERIALS AND METHODS

Collection and Authentication of Plant Material

Sample collection: Drug samples were purchased from B D W (Pvt,) Ltd, Lucknow, India. Identity of the plant was confirmed through NBRI, Lucknow, India. Subsequently dried plant parts, were kept in airtight containers, to free from moisture and humidity until further study.

Anatomical Studies- Transverse Sections

For anatomical studies, the required samples of stem and leaf were cut and removed from the plant and instantaneously fixed in FAA (formalin- 5 ml + acetic acid- 5 ml + 70% Ethyl alcohol- 90 ml). Further the specimens were left in the preservative for two days; and were washed in distilled water and processed. Standard microtome techniques were followed for anatomical investigation. Transverse sections were prepared and stained with reagent. Photomicrographs were taken using digital camera.[15]

Physico-Chemical Evaluation

Physiochemical parameters such as foreign matter, moisture content, pH, ash constants and soluble extractive values were performed according to the official method prescribed and the WHO guidelines on quality control methods for medical plants material. [16]

Statistical analysis

All experiments were carried out in triplicate. Results are reported as mean ± standard error of the mean.

RESULTS AND CONCLUSION

Organoleptic characters:

Organoleptic and macroscopic characteristics of Rooibos leaves are tabulated in Table 1. Fresh plant has initially bitter taste followed by sweet aftertaste and distinctive odour. Dried drug powder is buff redish brown in color with characteristic odour.

Table 1 Macroscopic/organoleptic characteristics *Aspalathus linearis* (leaves and branches)

S. N.	Macroscopic characteristics	Inference
1	Colour	rich red-brown
2	Odour	Odour Faint Charcateristic
3	Taste	Slightly Sweet charcateristic
4	Shape	needle-shaped leaves
5	Size	2–3 (± 5) mm (Mean leaf length) and 930 (±24) µm (Mean leaf diameter)
6	Habit	woody shrub

Microscopic studies:

Young shoots and leaves in green A. *linearis* tea are dull green but yellowish to reddish-brown in normal "fermented" tea. The leaves (originally terete and needle-shaped—**Fig. 2**, are 0.5 to 1.2 (up to 1.5) mm in diameter (mean values vary from 930 to 1042 µm). It has clearly visible evenly distributed anomocytic Stomata on the leaf surface **(Fig. 3)**, which are usually at the level with the epidermis or slightly sunken. The mesophyll consists of two or three layers of palisade cells and there is no spongy tissue. The midrib vascular tissue consists of a large, somewhat circular bundle (five or six xylem cells in diameter) with added smaller bundles (rarely missing phloem) somewhat arranged in a ring with an inward-oriented phloem.

Figure 2 ***Aspalathus linearis*** **leaf**

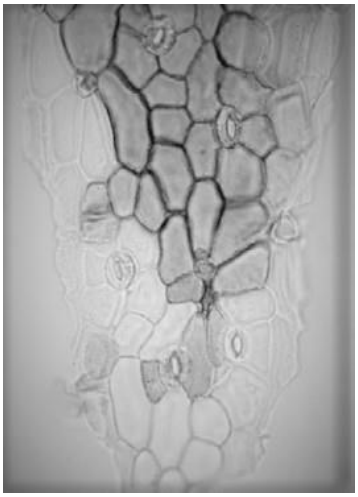

Figure 3 *Aspalathus linearis* leaf surface showing epidermal cells with anomocytic stomata

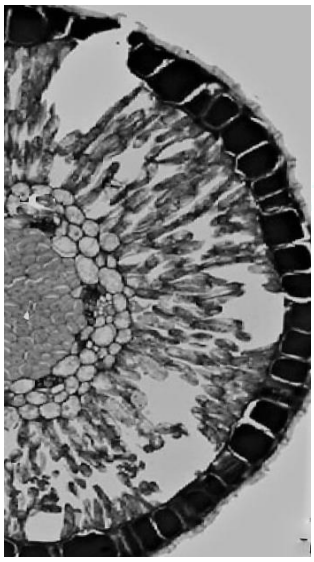

Figure 4 Transverse section of a *Aspalathus linearis* leaf

Physicochemical Evaluation

Air-dried powdered material was used for quantitative determination of different physicochemical evaluation. The results pertaining to these researches are summarized in **Table 2**

Table 2. Physiochemical parameter of *Aspalathus linearis* (Aerial parts)

S. N.	Parameter	% value (w/w)
1	Loss on drying	0.30%
2	Total ash	6.26%
3	Acid insoluble	4.0%
4	Water soluble	5.46%
5	Sulphated ash	5.66%
6	Alcohol soluble (Cold maceration)	7%
7	Alcohol soluble (Hot extraction)	2.25%
8	Water soluble (Cold maceration)	7.25%
9	Water soluble (Hot extraction)	2.00%
10	Petroleum ether	5.5
11	Chloroform	3.4
12	Ethyl acetate	2.8
13	Hydro alcoholic	8.6

According to the World Health Organization, the macroscopic and microscopic description of a medicinal plant is the initial step towards establishing the identity and the degree of purity of such materials and should be carried out before any tests are undertaken. Although, pharmacological studies are more reliable, accurate but expensive means to evaluate the plant drugs and involve regulatory approvals. [17] Moreover considering the increased consumption Rooibos teas, such a study was needed. This study essentially evaluated the diagnostic characters for determination of purity of the medicinally important aerial parts of the plant and , the result obtained would be handy in identification and standardization of the plant material towards quality assurance

Conflict of Interest: None

REFERENCES

1 Mahomoodally, M.F., Traditional medicines in Africa: an appraisal of ten potent African medicinal plants. Evidence-Based Complementary and Alternative Medicine, 2013(1), pp.1-14.

2 Mahmoud, T. & Gairola, S., Traditional knowledge and use of medicinal plants in the Eastern Desert of Egypt: a case study from Wadi El-Gemal National Park. Journal of Medicinal Plants, 2013; 1(6), 10-17.

3 Chen, Y.J., Kuo, P.C., Yang, M.L., Li, F.Y. and Tzen, J.T.,. Effects of baking and aging on the changes of phenolic and volatile compounds in the preparation of old Tieguanyin oolong teas. Food research International, 2013; 53(2), pp.732-743.

4 Cheney, R.H., Scholtz, E., Rooibos tea, a South African contribution to world beverages. Economic Botany 1963;17, 186–194.

5 Dahlgren, R., Revision of the genus *Aspalathus*. II. The species with ericoid and pinoid leaflets. 7. Subgenus Nortieria. With remarks on rooibos tea cultivation. Botaniska Notiser 1968; 121, 165–208.

6 Kelly, K.M., Van Staden, J., . Effect of acid scarification on seed coat structure, germination and seedling vigour of *Aspalathus linearis*. Journal of Plant Physiology 1985; 121, 37–45.

7 Schutte, A.L., Vlok, J.H.J., Van Wyk, B.-E., Fire-survival strategy—a character of taxonomic, ecological and evolutionary importance in fynbos legumes. Plant Systematics and Ecology 1995; 195, 243–259.

8 Van der Bank, M., Van Wyk, B.-E., Van der Bank, H., . Biochemical genetic variation in four wild populations of *Aspalathus linearis* (rooibos tea). Biochemical Systematics and Ecology 1995; 23, 257–262.

9 Baranska, M., Schulz, H., Joubert, E., Manley, M., 2006. In situ flavonoid analysis by FT-Raman spectroscopy: identification, distribution, and quantification of aspalathin in green rooibos (*Aspalathus linearis*).Analytical Chemistry 2006;78, 7716–7721.

10 Van Wyk, B.-E., Verdoorn, G.H., Alkaloids of the genera *Aspalathus*, *Rafnia* and *Wiborgia* (*Fabaceae–Crotalarieae*). South African Journal of Botany 1989; 55, 520–522.

11 Blommaert, K.L.J., Steenkamp, J., Tannien- en moontlike kafeïeninhoud van, Rooibostee, *Aspalathus* (Subgen. Nortiera) *linearis* (Burm. Fil) R. Dahlgr. Agroplantae 1978; 10, 49.

12 Van Wyk, B.-E., Van Oudtshoorn, B., Gericke, N., Medicinal Plants of South Africa. Briza Publications, Pretoria, South Africa, 1997; 290.

13 Joubert, E., De Beer, D. Rooibos (Aspalathus linearis) beyond the farm gate: from herbal tea to potential phytopharmaceutical. South African Journal of Botany 2011; 77, 869–886.

14 Nitin Kumar, Gaurav Saxena, Rashmi Goswami, Ankita Pant and Akanksha Sameul. Pharmacognostical and standardization parameters of *Artemisia roxburghiana* Wall.ex Besser(Aerial parts). 2018; 7(11): 524-527.

15. Indian Pharmacopoeia. Government of India Ministry of Health & Family Welfare. Published by The Indian Pharmacopoeia Commission. Ghaziabad, 2010, 3.

16. Mukesh S, Sikarwar, Boey Jia Hui, Kumutha Subramaniam, Bavani Devi Valeisamy, Ling KarYean, et al. Pharmacognostical, Phytochemical and Total Phenolic Content of Artocarpus altilis (Parkinson) Fosberg Leaves. J Applied Pharmaceutical Science. 2015; 5(5):094-100.