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Pharmacognostic evaluation and physicochemical screening of the rhizomes of *Zingiber officinale* (Ginger)

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Abstract
Zingiber officinale is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. *Zingiber officinale* locally known as 'Ginger', in the pharmacognostic evaluation it revealed the availability of components like oil globules, Oleo-resin cells, Starch grains, which may have their individual role. The physicochemical screening of *Zingiber officinale* aimed towards to the evaluation of purity of crude drug and was found to be FOM (1.53%), Moisture content (12.12%), Total ash value (8.33%), Acid insoluble ash value (1.6%), Water soluble ash value (05%), Alcohol and Water soluble extractive value (2.4 and 8.3%) respectively. The study will provide referential information for the good quality, purity and identification for the future batches of *Zingiber officinale*.

Keywords: *Zingiber officinale*, pharmacognostic evaluation, physicochemical evaluation, quality, purity, etc.

Introduction
Since the beginning of time, people have sought out natural remedies for their illnesses. Like with animals, the first uses of medicinal plants were purely instinctual. Everything was based on experience because there was not enough information available at the time regarding the causes of the ailments or the specific plants that could be used as a remedy. As the rationale for using particular medicinal plants to cure particular ailments came to light throughout time, the use of medicinal plants gradually renounced the empiric framework and was instead built on explicative facts. Plants had been the source of treatment and prevention before the invention of iatrochemistry in the 16th century. However, the use of natural pharmaceuticals is once again a hot topic due to the decreasing efficacy of synthetic drugs and the rising contraindications to their use. [1]

The term "morphological evaluation," which also goes by the names "Organoleptic evaluation" and "Macroscopical evaluation," refers to assessments made with the "sense of an organ" and with "naked eyes." The term "morphological evaluation" refers to the process of identifying medicines based on their colour, flavour, size, form, and other distinctive characteristics like touch, texture, and sound. Morphology is the study of a basic drug's form, while Morphography is the description of that form. The official book's description of the colour, shape, and size of crude pharmaceuticals should be noted because these characteristics can change depending on a number of conditions. The approach of *microscopical* evaluation enables a more thorough analysis of the drug and can be used to recognise organised medications based on their histological characteristics. *Microscopical* evaluation refers to an evaluation that is impossible to perform with the human eye but is possible with a "Microscope". [2]

A common tropical shrub in Nigeria is *Zingiber officinale*. In English, it is frequently referred to as ginger. It is a perennial herb that stands 3 to 4 feet tall from the root stock and is semi-woody. The leaves and petals of the plant are used as medicines, and it grows quickly. In various parts of the world, the plant is used in traditional medicine to cure a variety of illnesses. Rheumatism, stomach issues, diabetes, wounds, snake bites, baldness, toothaches, respiratory issues, arthritis, bleeding, rash, etc. are some of these conditions. The plant's non-volatile extracts are known to have anti-inflammatory and antimicrobial properties. its effectiveness in treating wounds [3]. In conventional Indian Ayurvedic treatment, ginger is crucial. Traditional Indian beverages also contain it as an ingredient. One of the most common spices used in both vegetarian and non-vegetarian cuisines is fresh ginger.

Traditional Indian medicines, in particular for cough and asthma, include a mixture of fresh ginger juice, honey, and a small amount of fresh garlic juice. [4]
In ancient China's southern regions, ginger originally appeared. From there, it expanded to West Africa, the remainder of Asia, the Maluku Islands (also known as the Spice Islands), and India. When the ancient Romans traded with India in the first century, ginger was first seen in Europe. Probably native to Southeast Asia, ginger (*Zingiber officinale*) is a herbaceous perennial plant of the Zingiberaceae family. Its aromatic, pungent rhizome (underground stem) is used as a spice, flavouring, food, and medicinal.

Plant profile
Synonyms: Ginger root, Black Ginger, Zingiberic rhizome, Zingiber, Zingiberis.

Biological source- Ginger consist of the dried rhizomes of Zingiber officinale Roscoe.

Botanical Classification

Table 1: Scientific classification of *Zingiber officinale* [5].

Zingiber officinale	
Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Subdivision	Spermatophyta
Class	Liliopsida-Monocotyledons
Subclass	Zingiberidae
Order	Zingiberales
Family	Zingiberaceae
Genus	*Zingiber*
Species	*Zingiber officinale Roscoe*

Fig 1: Rhizomes of *Zingiber officinale*

A tropical plant, ginger thrives in hot, humid weather. China, Nepal, the US, India, Bangladesh, Taiwan, Jamaica, Nigeria, and Indonesia are among the countries that grow the plant. The largest producer of *Z. officinale* is India. *Z. officinale* is one of the export commodities from Indonesia, with a development area of 6,053 hectares and a rhizome demand of 12,106 tonnes per year for ginger seed. [6]

Material and Methods
Pharmacognostic Evaluations
Collection of Plant
The Rhizome of *Zingiber officinale* were procured from the local market of Bota (Maharashtra), cleaned and used for further evaluation.

Morphological Study
Investigations were also done on the new rhizomes. Studies on the rhizome's shape, size, exterior surface, inner surface, fracture, flavour, and Odour were conducted [7, 8].

***Microscopical* Study**
Zingiber officinale rhizomes were examined under the microscope using the transverse section method. In this technique, a sharp blade and a soft hand were used to cut the transverse part of the rhizome. The adulteration was then removed by transferring the thin portions into a watch glass filled with water. The section was then stained using staining agents, and to remove too much colouring, it was transferred once again into a watch glass filled with water. To prevent dryness and evaporation, the portion was placed on a clean glass slide with one or two drops of glycerin or water. The portion that was viewed with a compound microscope. [9, 10, 11]

Physiochemical Evaluation
The plant root was ground into a coarse powder, and quality control measures such total ash, acid insoluble and water soluble ash, water and alcohol soluble extractive values, and loss on drying were performed on it [12, 13, 14].

Result and Discussion
Pharmacognostic Evaluations
Morphological Study
The shape of the rhizomes are laterally compressed, bearing Short, Flat, Ovate and Oblique branches on the upper side, with bud at the apex. The rhizomes are of about 5 to 10 cm in length, 3 to 6 cm in width, 0.5 to 1.5 cm in thickness. The rhizomes are externally Buff In colour and internally Yellowish in colour having Agreeable and Aromatic odour with Agreeable and Pungent Taste. The rhizomes having Shoot, Starachy and Fibrous Fracture.

(a) (b)

Fig 2: (a) Length and (b) Width of *Zingiber officinale* Rhizomes.

***Microscopical* Study**
The micro-chemical tests for *microscopical* studies were performed by using Sudan red III, Picric acid and Iodine the observations are as mentioned in the table 2.

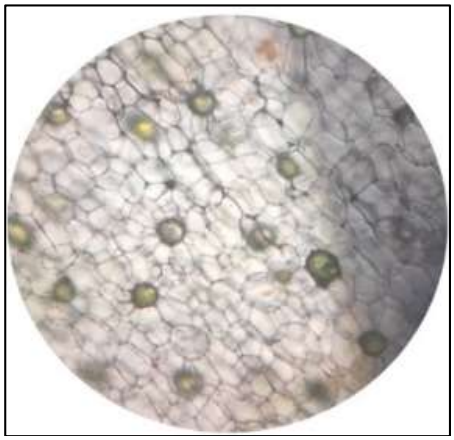
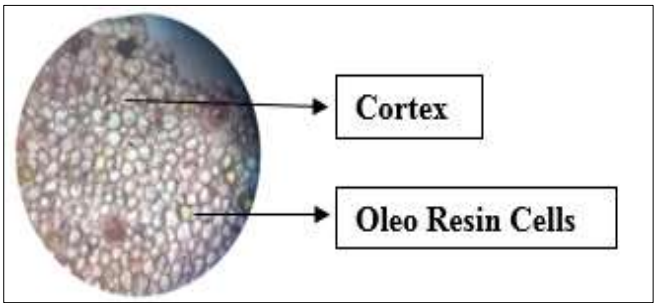


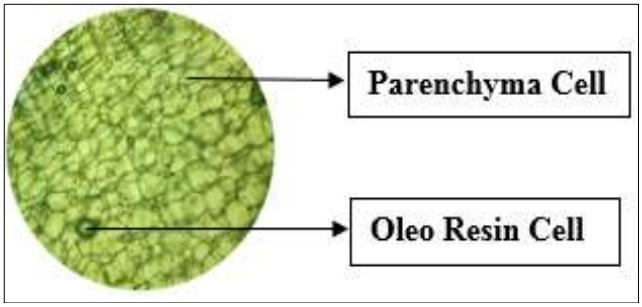
Fig 3: Transverse section of *Zingiber officinale* Rhizome

Table 2: Micro-chemical tests for rhizomes of *Zingiber officinale*

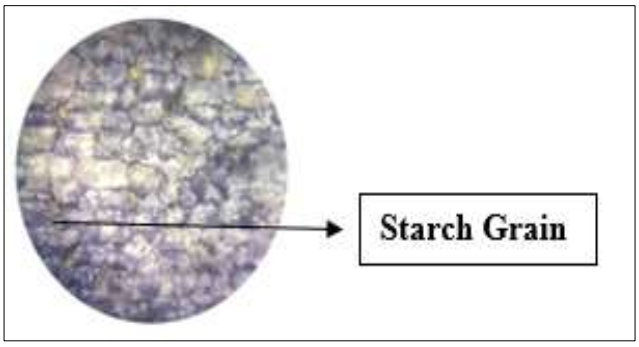
Test No.	Test	Observation	Inferences
1.	Sudan Red III	Red	Epidermis, Oil Globules
2.	Picric Acid	Yellow	Oil Globules
3.	Iodine	Violet	Starch Grains



(a)



(b)



(c)

Fig 4: Transverse section of *Zingiber officinale* Rhizome (a) for Test No. 1, (b) for Test No. 2 and (c) for Test No.3.

Physiochemical Evaluation

Physiochemical Studies such as Foreign Organic Matter, Moisture Content, Ash Value (Total Ash Value, Acid Insoluble Ash Value, Water Soluble Ash Value), Extractive Value (Alcohol Soluble Extractive Value and Water Soluble Extractive Value). Were presented in the table 3.

Table 3: Physiochemical Characteristics of *Zingiber officinale* Rhizome

Sr. No.	Parameters	Values
1.	Foreign Organic Matter	1.53%
2.	Moisture Content	12.12%
3.	Total Ash Value	8.33%
4.	Acid Insoluble Ash Value	1.6%
5.	Water Soluble Ash Value	05%
6.	Alcohol Soluble Extractive Value	2.4%
7.	Water Soluble Extractive Value	8.3%

Fig 5: Foreign Organic Matter

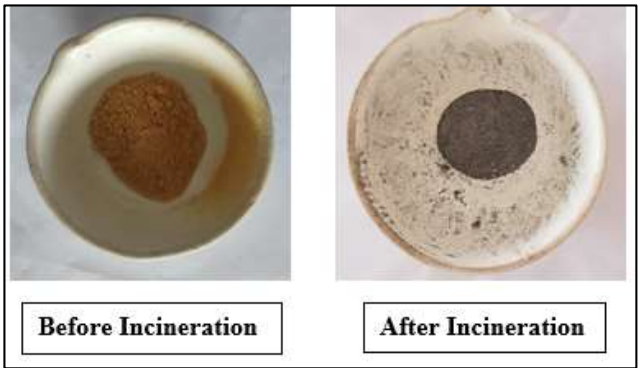


Fig 6: Total Ash Value

Fig 7: Extractive Value (Water Soluble and Alcohol Soluble)

Summary & conclusion

In conclusion, ginger is an ancient herb used widely in history for its many natural medicinal properties and based on the result obtained in the present study; the plants rhizomes might provide detail evidence to understand the presence of such Cortex, Oleo Resin Cell, Parenchyma Cell, and Starch Grains. Also the work is carried for the physicochemical characteristics evaluation of crude drug determined the quantitative parameters like ash value, extractive value and moisture content.

These easy-to-follow but reliable instructions may prove useful when using the medication as a home remedy. They may also be used by the manufacturers to determine and pick the raw components required to make the medications. As a result, more investigation should be conducted in the future to pinpoint specific chemical components and conduct a full, scientifically sound analysis of the pharmacological activity.

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