

**A COMPREHENSIVE STUDY OF NIGELLA SATIVA LINN. [UPAKUNCHIKA]:
MACROSCOPIC AND MICROSCOPIC FEATURES****Dr. Priya Gupta^{1*}, Dr. Sonal Singh Kushwaha² and Dr. Suman Panwar³**¹PG Scholar, Department of *Dravyaguna* Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.²PG Scholar, Department of *Dravyaguna*, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.³HoD & Prof., Department of *Dravyaguna*, Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.***Corresponding Author: Dr. Priya Gupta**PG Scholar, Department of *Dravyaguna* Shri Dhanwantry Ayurvedic College and Hospital, Chandigarh, India.

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ABSTRACT

This study provides a detailed exploration of the macroscopic and microscopic features of the Seeds of *Nigella sativa* Linn. also known as *Upakunchika* in Ayurveda, a plant widely known for its medicinal properties and extensively used in traditional medicine. The macroscopic examination includes a thorough description of the Seed's external morphology, highlighting key characteristics such as size, shape, color, and surface texture. The microscopic analysis delves into the histological details of the Seed, including the anatomical features of the pericarp, seed coat, and internal seed structures. This comprehensive study aims to enhance the understanding of *Nigella sativa* Linn.'s Seed characteristics, providing valuable insights for pharmacognostic identification and quality control in herbal medicine. Additionally, the findings contribute to the broader field of plant sciences by elucidating the structural adaptations that underpin the Seed's medicinal efficacy. Through this integrated approach, the study underscores the importance of detailed morphological and histological analysis in the characterization and utilization of medicinal plant.

KEYWORDS: *Nigella sativa* Linn., Macroscopic features, Microscopic features.**INTRODUCTION**

Nigella sativa Linn., commonly known as black cumin or black seed, is a flowering plant of the Ranunculaceae family, renowned for its extensive medicinal properties and historical significance in traditional medicine systems across the globe. In Ayurveda it is known with various names such as *Upakunchika*, *Sthulajeeraka*, *Upakunchi* etc.^[1,2] It is included in *Haritakyadi Varga* in *Bhavaprakasha Nighantu*.^[3] The seeds of *Nigella sativa* Linn. have been utilized for centuries in various cultures for their therapeutic benefits, including anti-

inflammatory^[4], antioxidant^[5], antimicrobial^[6], and anticancer activities.^[7] Despite its widespread use, there remains a need for a comprehensive understanding of the botanical characteristics of the plant, particularly its Seed, to support its identification, quality control, and utilization in medicinal preparations. This study focuses on the detailed macroscopic and microscopic features of the Seed of *Nigella sativa* Linn. The macroscopic examination aims to document observable traits such as size, shape, color, and texture, which are crucial for the accurate identification and classification of the Seed.

**Figure 1****Figure 2****Figure 1 and Figure 2: *Nigella sativa* Linn. Seeds.**

The microscopic analysis, on the other hand, delves into the histological structure of the Seed, providing insights into the organization and characteristics of the pericarp, seed coat, and internal seed structures. By combining macroscopic and microscopic analyses, this study seeks to enhance the botanical understanding of *Nigella sativa* Linn. Seed. The findings are expected to contribute significantly to pharmacognostic studies, ensuring the

authenticity and quality of *Nigella sativa* products in herbal medicine. Furthermore, this research provides valuable anatomical insights that may explain the functional and medicinal properties attributed to the Seed, thereby supporting its continued use and integration into modern therapeutic practices. Its Properties and Action^[8] are mentioned below in Table 1.

Table 1: Properties and Action of *Nigella sativa* Linn. Seed.

Properties	Action
Rasa	Katu, Tikta
Guna	Laghu, Ruksha
Virya	Ushna
Vipaka	Katu
Karma	Cakshushya, Deepaniya, Hrideya, Krimighna, Medhya, Pachana karma, Ruchya

MATERIAL AND METHODS

Seed Samples of *Nigella sativa* Linn. was purchased from Sector 26 Market of Chandigarh, India and was examined further. This examination involved visually inspecting the external characteristics of the Seed, such as colour, shape, size, and texture. Odor assessment was also done, as many Seeds had distinct smells that aided in their identification. Additionally, the texture and consistency of the Seed were evaluated by touch [Table 2]. It was essential to check for the presence of any foreign matter, as this could affect the herb's quality and purity. Overall, macroscopic examination, along with organoleptic evaluation, helped in determining the quality, authenticity, and suitability of the sample for medicinal or other applications. The standards were correlated with Quality Standards of Indian Medicinal Plants.

For Microscopic evaluation The preparation of a transverse section of a dry specimen involved several steps to ensure that the section was thin, even, and suitable for examination under a Compound microscope.

- Selection of Specimen: Seed is the useful part of *Nigella sativa* Linn. of the dry herbal specimen hence it was chosen for sectioning.
- Softening: The specimen was softened by soaking it in water for 24 hours.
- Sectioning: Thin, even sections of the specimen were cutted using a sharpe blade, with the thickness adjusted as needed.
- Mounting: The sections were transferred onto a glass slide and mounted ensuring proper arrangement and no overlapping.
- Drying: The mounted sections were allowed to dry thoroughly before staining.
- Staining: The sections were stained using safranin to enhance contrast and visualize specific structures of the rhizome.
- Cover-slipping: A coverslip was placed over the stained sections using a suitable mounting medium to protect them and improve clarity for microscopic examination.
- Labeling and Documentation: The slide was labeled with relevant information.

RESULTS

Table 2: Macroscopic features of *Nigella sativa* Linn. Seed included.

Features	Findings
Shape	Flattened, oblong, angular, rugulose tubercular, small, funnel shaped
Size	0.2 cm. long and 0.1 cm. wide
Colour	Black
Odour	Characteristic
Taste	Bitter

Table 3: Microscopic features of *Nigella sativa* Linn. Seed included.

Features	Findings (Observations)
Epidermis	Single layered Elliptic, thick-walled cells External covering- papillose cuticle (filled with dark brown content)
Parenchymatous cells	2-4 layers of thick walled Tangentially elongated
Reddish brown pigmented layer	Thick walled, rectangular elongated cells Inner side- thick walled, rectangular, elongated cells
Endosperm	Thin walled, polygonal cells filled with oil globules

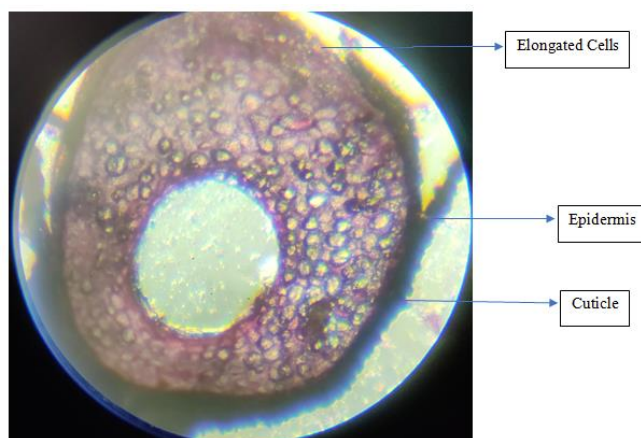


Figure 3: Epidermis, Elongated cells and Cuticle in T.S. of *Nigella sativa* Linn. Seed.

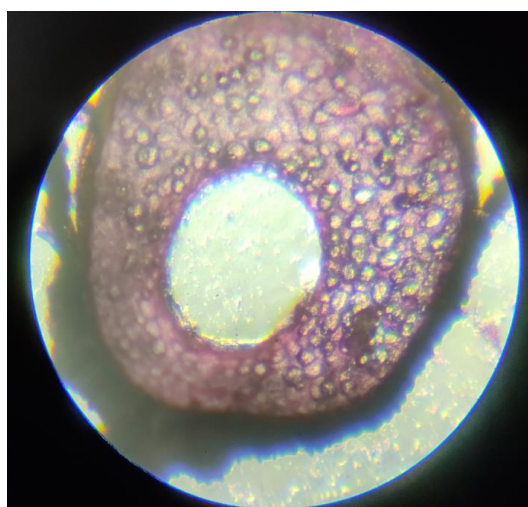


Figure 4: Pigmented Layer and Parenchymatous cells of T.S. of *Nigella sativa* Linn. Seed.

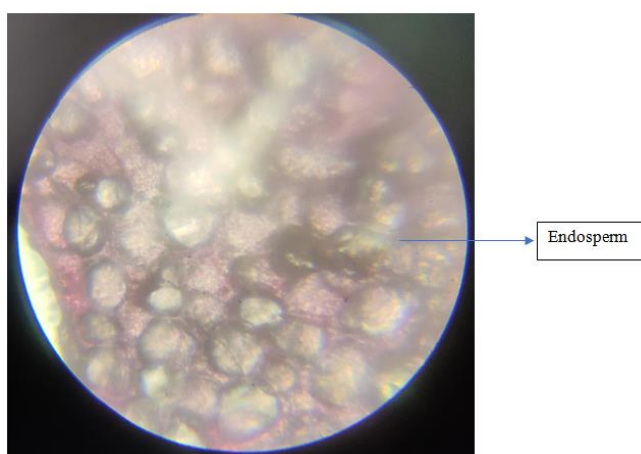


Figure 5: Endosperm of T.S. of *Nigella sativa* Linn. Seed.

DISCUSSION

The macroscopic analysis of *Nigella sativa* Linn. seeds reveal several distinctive features that aid in its identification. The seeds are characterized by their flattened, oblong, and angular shape, with a rugulose tubercular texture. Their small, funnel-shaped appearance, with dimensions of approximately 0.2 cm in length and 0.1 cm in width, provides a clear

morphological profile. The seeds' black colour is a notable identifying feature, along with their characteristic Odor and bitter taste. These macroscopic traits are essential for the initial identification and authentication of the seeds in both raw and processed forms, facilitating their correct use in various applications, including medicinal and culinary.

Microscopic examination of *Nigella sativa* Linn. seeds further substantiate their identification with detailed cellular structures. The epidermis consists of a single layer of elliptic, thick-walled cells, which are covered by a papilose cuticle containing dark brown content. This external covering is distinctive and aids in microscopic identification. Beneath the epidermis, the seeds possess 2-4 layers of thick-walled, tangentially elongated parenchymatous cells. A notable feature is the presence of a reddish-brown pigmented layer comprising thick-walled, rectangular elongated cells, providing a unique histological marker. The endosperm, composed of thin-walled, polygonal cells filled with oil globules, is crucial for the seed's nutrient storage and can be linked to its medicinal properties. These microscopic characteristics complement the macroscopic features and provide a comprehensive profile for the identification and quality assessment of *Nigella sativa* Linn. seeds.

CONCLUSION

The combined macroscopic and microscopic analyses of *Nigella sativa* Linn. seeds offer a thorough understanding of their distinctive features, facilitating their accurate identification and authentication. Macroscopically, the seeds are identifiable by their unique shape, size, colour, odor, and taste. Microscopically, the specific cellular structures, including the epidermal layer, parenchymatous cells, pigmented layer, and oil-filled endosperm cells, provide further confirmation of their identity. These analyses are essential for ensuring the correct utilization of *Nigella sativa* Linn. in various applications, especially in the pharmaceutical and nutraceutical industries. The detailed morphological and histological data serve as a reference for future research and quality control measures, ensuring the efficacy and safety of products derived from *Nigella sativa* Linn. seeds.

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