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Research Article

Pharmacognostical and plysicochemical evaluation of seeds of *Nigella sativa* Linn. with special reference to evaluation of seed oil

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Abstract

Many drugs commonly used today are of herbal origin. Indeed, about 25 percent of the prescription drugs dispensed in the United States contain at least one active ingredient derived from plant material. Some are made from plant extracts; others are synthesized to mimic a natural plant compound. *Nigella sativa* Linn. belonging to the family Ranunculaceae was taken up for the present study and reported on the possible pharmacognostical, changes in physiological effects of the plant as effected by varying concentration of kinetin during pre-sowing seed treatment and evaluation of seed oil. The microscopical studies revealed the presence of endosperm, fibers, calcium oxalate and oil glands. Various physicochemical parameters such as ash values, moisture content and swelling index were determined. Extraction of the seed was done and percentage of oil present in seed was determined. The oil obtained from the seed was evaluated for the following values like refractive index, optical rotation, specific gravity, iodine value, saponification value, acid value etc. All these finding are reported in present paper.

Key words: *Nigella sativa*, Pharmacognostical evaluation, Seed oil.

Introduction

Herbal Medicine is the oldest form of healthcare known to mankind. Herbs had been used by all cultures throughout history. It was an integral part of the development of modern civilization. Primitive man observed and appreciated the great diversity of plants available to him. The plants provided food, clothing, shelter and medicine. Much of the medicinal use of plants seems to have been developed through observations of wild animals and by trial and error. As time went on, each tribe added the medicinal power of herbs in their area to its knowledge base. They methodically collected information on herbs and developed well-defined herbal pharmacopoeias. Indeed, well into the 20th century much of the pharmacopoeia of scientific medicine was derived from the herbal lore of native people[1].

Nigella sativa is a flowering plant, native to southwest Asia. It is small prostrate herb about 45 cm high 2-3 slender leaves pinnatisect, 2-4 cm long cut into linear segment, segments oblong. Flowers pale, blue on solitary long peduncles, seeds trigonous and black in colour. The plant has a rather stiff, erect, branching stem, bears deeply-cut greyish-green leaves and terminal greyishblue flowers, followed by odd, toothed seed vessels, filled with small somewhat compressed seeds, usually three-cornered, with two sides flat and one convex, black or brown externally white and oleaginous, strong agreeable aromatic odour, like that of nutmegs, and a spicy, pungent taste. The flowers are delicate, and usually coloured pale blue and white, with 5–10 petal. The fruit is a large and inflated capsule composed of 3–7 united follicles, each containing numerous seeds. It has a pungent bitter taste and a faint smell of strawberries.[2-3] The present paper deals with the pharmacognostical and physicochemical evaluation of seed of *Nigella sativa* Linn.2

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Material and Methods

Collection and authentication of seeds

The seeds of the selected plant were collected from the Deori village of Jabalpur District of Madhya Pradesh and were identified and authenticated by Late Dr. J. L. Shrivastava, Scientist & Head, Biodiversity and Medicinal Plant, State Forest Research Institute, Jabalpur, (M.P.).

Study of macroscopic and microscopic characters

Macroscopic characters

Morphologically seeds were studies and the results are reported.

Microscopic characters

Collection

The plant specimens of the proposed study were collected from the local villager of Jabalpur district of Madhya Pradesh, care was taken to select healthy part and for normal organs. The seed were soaked in distilled water for 12 hours. Then required samples of different organ were fixed in FAA (formalin-5ml+ Acetic acid 5ml+ 70% Ethyl alcohol-90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary-butyl alcohol as per the schedule given by Sass, 1940[4]. Infiltrations of the specimens were carried out by gradual addition of paraffin wax (melting point 58-60 ^{0} c) until TBA solution attained super saturation. The specimens were casted into paraffin blocks.

Fig. 1: Whole plant *Nigella sativa* Linn.

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Sectioning

The paraffin embedded specimens were sectioned with the help of rotary microtome. The thickness of the sections were 10- 12 µm. Dewaxing of the sections was done by customary procedure. The sections were stained with Toluidine blue as per the method published by Brien, 1964. Since the Toluidine blue is a polychromatic stain, the staining results were remarkably good; and some cytochemical reactions were also obtained. The dye rendered pink color to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the protein bodies etc. Wherever necessary sections were also obtained with safranin and fast green and IKI (for starch). For studying, the microscopy 5% sodium hydroxide was prepared. Glycerine mounted temporary preparations were made for macerated/cleared materials powdered materials of different parts were cleared with NaOH and mounted in glycerine medium after staining, different cell component were studied and measured.

Photomicrographs

Microscopic description of tissue are supplemented with micrographs wherever necessary, photographs of different magnification were taken with Nikon Labphot 2 Microscopic unit. For normal observation bright field was used for the study of crystals, starch grain and a lignified cell, polarized light was employed. Since these structures have bire fringent property under polarized light they appear bright against dark background. Magnification of the figure is indicated by the scale bars. Descriptive terms of the anatomical features are as given in the standard anatomy book[5].

Physico-chemical evaluation

The seeds of *Nigella sativa* Linn. was subjected to standard procedure for the determination of various physicochemical parameters[6].

Extraction and evaluation of oil

Method: Mechanical

Procedure: The seeds obtained from each treatment were dried in shade separately and was subjected to rotatory mills for the extraction of oil.

Evaluation of oil

The seed oil obtained from *Nigella sativa* Linn. was estimated for the following quantitative parameters as per the standard procedure[7-8] .

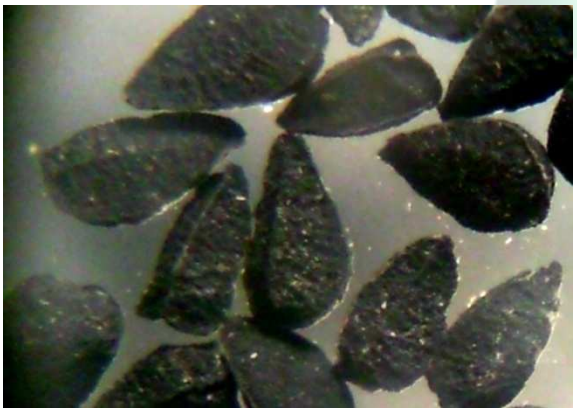

Fig. 2: Morphology of seeds

Table 1: Macroscopy of seeds of *Nigella sativa*

Parameter	Characters
Color	Black
Shape	Ovate
Appearance	Rough seed coat
Odor	Characteristics on crushing the seeds
Seed length	0.3 cm
Seed width	0.5 cm

Results and discussion

The plant *Nigella sativa* Linn. is an indigenous herb which was chosen for this study. The plant belongs to the family Ranunculaceae. The scanty availability of information on this plant facilitates the study on it. The attempt was made to study the pharmacognostical, and evaluation of seed oil. Seeds are black, small, endospermic with small embryo and having rough surface. The seeds are slightly longer with a pointed apex and fixed base.

Microscopy of seeds (Powder as well as T.S.) reveals the presence of lignified fibres, non-lignified multicellular fibres, epidermal cells, endosperm containing micro-rased type of oil globules with calcium oxalate crystals. A typical rannunculaceous seed which is dicot, bitegmic and is composed of parts epidermis, embryo and endosperm.

Epidermis is 2-3 layered consists of testa and tegnum. Outer layer above epidermis in testa and tegnum is inner layer. A single layer of perisperm is present which in papery in nature. Also, lignified and non-lignified fibers are present.

Thick walled rectangular shaped endosperm is present beneath the epidermis which is cellular in nature. It consists of micro-rased type of oil globules and calcium oxalate crystals.

The physicochemical analysis of seed of *Nigella sativa* Linn. was carried out. In this study ash values (total ash, acid insoluble ash and water soluble ash), moisture content, swelling index and foreign organic matters were determined.

The dried seeds of *Nigella sativa* were subjected to rotatory mills for the extraction of fixed oil. The percentage yield of oil was found to be 32.26% v/w. The fixed oil obtained from seeds of the plant *Nigella sativa* Linn. was subjected to evaluation (Table 3) which reveals the quantity of various parameters. The color of oil is pale yellow brown, odor is aromatic having agreeable taste.

Acknowledgment

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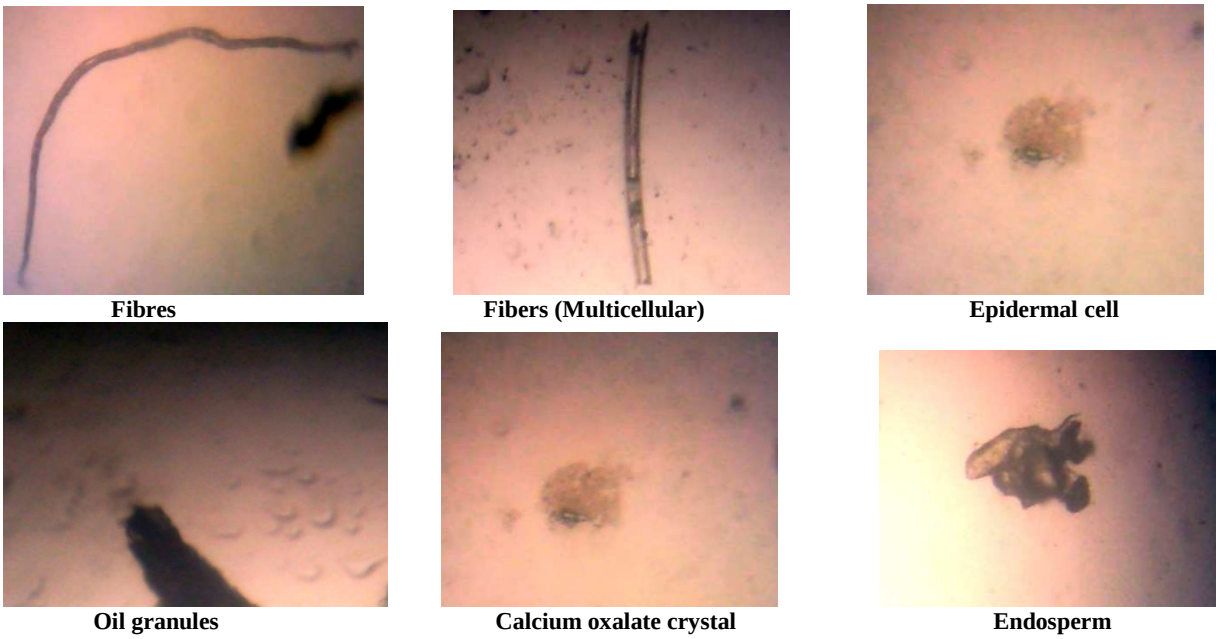

Fig. 3: Powder microscopy of seed

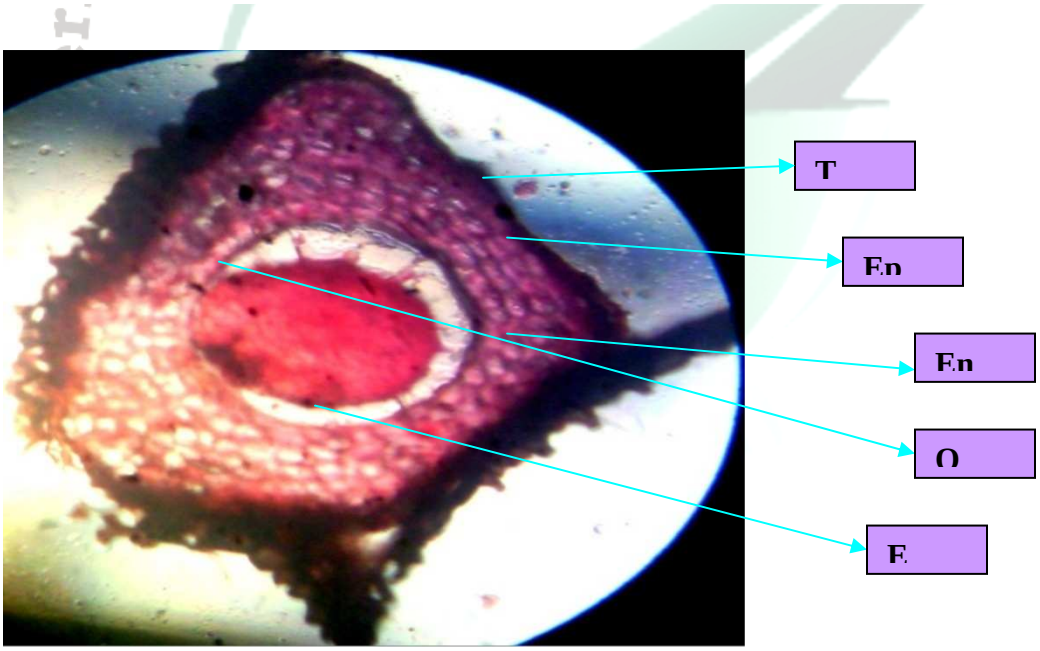

Fig. 4: Anatomy of seed
T: Testa, **Ep**: Epidermis, **En**: Endosperm, **O**: Oil granules **E**: Embryo

References

1) Ved D. K. and Goraya G. S. (2008). Demand and supply of medicinal plants in India, Bisen Singh Mahendra Pal Singh, Dehradun & FRLTH, Banglore, India.
2) The wealth of India, A dictionary of Indian Raw materials and Industrial products, Vol-I, Published and printed by National Institute of science communication (NISCOM) Council of Scientific and Industrial Research (CSIR), New Delhi, 270-273.
3) *Nadkarni K.M., Indian Materia Medica, Vol-I, Bombay Popular Prakashan, second edition, 1927, reprint 1995,854-856.*
4) Sass J. E. (1940). Elements of Botanical Micritechniques, Mc. Graw Hill Book Co., New York, 222.
5) *Paliwal G. S. (1974). Plant anatomy laboratory manual, 1st edition, Central book depot, Allahabad, 52-54.*
6) *The Ayurvedic Pharmacopoeia of India, Part-I, Vol-I, Published by The controller publication, Govt. of India, Ministry of Health & Family Welfare, 2001, 137-146.*
7) Tailang Mukul and Sharma Ashok (2008). *Phytochemistry (theory and practical),* 1st edition, Birla publication, 240-247.
8) Indian Pharmacopoeia (1996). Government of India ministry of health and family welfare, Vol. II, published by the controller of publication, Delhi, A-50-52, A-93-99.

Table 2: Physico-chemical analysis of *Nigella sativa* Linn. seeds

Parameters (% w/w)	Seed Samples
Total ash (TA)	4.9672
Water soluble ash (WSA)	1.2350
Acid insoluble ash (AIA)	0.5822
Moisture content (MC)	2.35
Swelling index (SI)	7
Foreign organic matters (FOM)	3.22

Table 3: Evaluation of seed oil of *Nigella sativa* Linn.

S/No.	Parameters	Values obtained
1.	Organoleptic character	
	▪ Colour	Yellowish brown
	▪ Odour	Aromatic
	▪ Taste	Agreeable
2.	Refractive index	1.4836
3.	Optical rotation	+1.56º
4.	Specific gravity	0.8756
5.	Saponification value	201.26
6.	Unsaponification matter	0.03
7.	Iodine value	115.50
8.	Acetyl value	25.20
9.	Acid value	40.27
10.	Ester value	160.99
11.	R. M. value	3.5