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Histological illustration of fresh and one year old preserved fruits *dhanyaka* (*Coriandrum Sativum* Linn.)

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Abstract
About: *Dhanyaka (Coriandrum sativum* Linn.) belonging to family *Apiaceae*is a common aromatic edible herb grown mostly in black cotton soils of India. It is an annual herb the dried fruits of which are used in medicine. Classical texts of Ayurveda advices to use the fruits of just not immediately after collection, instead should be usedafter ayear. To test the fact behind this science, a comparative pharmacognostic study of fresh and old sample of Dhanyaka (*C. sativum* Linn.) was planned.
Materials and Methods: Fresh fruits of *Dhanyaka (C. sativum* Linn.) were collected from Rona, Gadag district and authenticated. Few fruits were stored in an air tight containers for one year. Both samples were subjected for macro-microscopic and powder microscopic studiesas per the standard methodology.
Results and Discussion: Macroscopically fresh fruits were globular, covered with ridges, dry schizocarp. Old sample showed secondary ridges but were not very prominent. Fresh sample was slightly sweet, more aromatic, ridged and intact compared to that of old sample which was mild aromatic and easily broken. Microscopic findings of fresh sample were the presence of secondary ridges with intact epicarp. The endocarp was paraquetry in arrangement. Vascular bundle was crowning the sclerenchyma region. Significant changes observed among old sample (S_2) was worn out epicarp and imperceptible endocarp. Vascular bundle was not prominent in this sample. Powder microscopy showed presence of a greater number of oil globules and aleurone granules in fresh sample.
Conclusion: The macro-microscopy, powder microscopic studies done for both fresh and old sample of *Dhanyaka* (*Coriandrum sativum* Linn.) showed few structural changes signifying the effect of drug collection, preservation.

Keywords: *Dhanyaka, Coriandrum sativum* Linn. macroscopy, microscopy

Introduction
Man is ever dependent on plants for his basic requirements, preventive as well as curative purpose in disease [1]. Ayurveda has extensively dealt with the use of plants as an effective therapeutic tool against many diseases and also in the form of *food, medicine, shelter, clothing etc* [2]. Drug collection, identification of therapeutic property, preservation are important measures in relation to safety, efficacy and quality of the treatment [3]. Few classical texts of Ayurveda, advices the usage of drugs in fresh condition and described few drugs which are not to be used immediately after collection rather to be used after sometime [4]. Dhanyaka (*Coriandrum sativum* Linn.) belonging to family Apiaceae, the dried fruits arerecommended to be used in old condition ie after one year[5].
Lexicons of Ayurveda specify changes in their taste with respect to their fresh and old condition. They mention *Madhura rasa(sweet)*in fresh form and *Kashaya, Tikta, Katu*in dry state [6]. *Adamalla* commentator of *Sharangadhara* explains that keeping certain drugs for period of one year increases the potency of the drug with respect to efficiency [7]. Duration of preservation changes from drug to drug like it may be a year, ten year or hundred year [8].
Hence withthis background a study has been planned to evaluate the actual pharmacognostic differences between *Dhanyaka (Coriandrum sativum* Linn.), when collected fresh and after keeping for a period of one year. Its main intention is to record macro-microscopic, and physicochemical changes in these two states of the test drug.

Materials and Methods
Drug source
Matured whole fruits of *Dhanyaka (Coriandrum sativum* Linn.) were collected from the Rona, Bijapura district, authenticated and voucher specimen deposited at department of Pharmaceutical Chemistry and Pharmacognosy, SDM Centre for research in Ayurveda and Allied sciences, Udupi (V/No.18060103). Sample (S_1) containing freshly collected fruits subjected for macro-microscopic studies. Few fruits were kept in an air tight container and stored for one year, and at the end of a year named as sample (S_2) same observations were repeated and recorded [9].

Macroscopic evaluation
The external features of the test samples were documented using Canon IXUS digital camera. Organoleptic characters of the sample like colour, smell, taste, size, texture were also documented [10].

Microscopic evaluation
The materials were left in FAA for more than 48 hours. The preserved specimens were cut into thin transverse section using a sharp blade and the sections were stained with safranine. Transverse sections were photographed using

Zeiss AXIO trinocular microscope attached with Zeiss AxioCam camera under bright field light [11].

Powder microscopy

Pinch of *Coriandrum sativum* Linn. powder previously Sieved is put on the slide and mounted in glycerine and powder characters are observed under the Zeiss AXIO trinocular microscope attached with Zeiss Axio Cam camera under bright field light [12].

Observation and Results

Macroscopic characters

S_1 showed that the fruit as globular, dry schizocarp, 3–5 mm (0.12–0.20 in) in diameter. The fruit was oblong, covered with ridges, having inconspicuous ridges in between. When pressed, each fruit separates into two halves or mericarps each containing a seed that was compressed. Each mericarp was deeply concave on the inner or commissural surface. (Figure 1)

S_2 showed similar morphological characters with globose fruit covered with secondary ridges not being differentiated. Primary ridge was wavy and inconspicuous (Figure 2). Organoleptic changes observed among both samples tabulated under Table 1.

Fig 1: Macroscopy of (S_1) *Coriandrum sativum* Linn.

Fig 2: Macroscopy of (S_2) *Coriandrum sativum* Linn.

Microscopic characters

S_1

Secondary ridges were prominently seen with intact epicarp. Secondary fibres were composed of tangentially running fibres and primary ridges running longitudinal. The fibres were intact in the structure. The endocarp is paraquetry in arrangement and is very clearly visible. The testa is yellowish in colour and the anatomical structure is intact. Vascular bundle is crowning the sclerenchyma region, has pink stain colour. (Figure 3)

S_2

Mesocarp at some places is hollow due to cell shrinkage. Secondary ridges are not prominent. Epicarp is not continuous and is vaguely identified. Cells of primary ridges contain sclerenchyma bands that are hollow and their anatomical structure and positioning is not proper. The vascular bundle is not prominent. The endocarp is unclear. The cells of the testa are shrunken. In the endosperm, cells in certain area has aleurone granules and in few regions they are absent. Cells with pigment are also found in few areas. (Figure 4)

Powder microscopy

S_1

Sclerenchyma layer had fusiform cells running wavy but were overlapped with lignified parenchyma cells. Wavy sclerenchyma regions were pitted. Fragments of vittae seen. Testa with underneath which endosperm aleurone grains and oil globules were numerously seen. (Figure 5)

S_2

Epicarp with beaded cell walls found clearly. Endosperm had yellowish pigmented cells, aleurone grains, oil globules. Sclerenchyma had group of fusiform fibres running wavy crossing each other. Mesocarp showed parenchyma cells, which were polygonal, irregular Mesocarp also showed the presence of pigmented cells. (Figure 6)

Discussion

Ayurveda science advocates the proper utility of drug in particular therapeutic condition. Drug collection, preservation, processing will have an efficacy in their quality. The classical texts have carefully mentioned the qualitative differences between drug when collected freshly as well as when it kept for a period of a year [13]. *Dhanyaka(Coriander sativum* Linn.) the dried fruits are steered to be taken in medicine after an year [7]. Hence a study conducted to observe pharmacognostic changes between freshly collected sample and keeping sample after a year.

Macroscopically fresh fruits were globular, covered with ridges, dry schizocarp. Oneyear old sample showed secondary ridges but were not very prominent. Certain organoleptic changes were observed among S_1 and S_2. Fresh sample was slightly sweet, more aromatic, ridged and intact compared to that of old sample which was mild aromatic and easily broken.

Microscopic findings of fresh sample were the presence of secondary ridges with intact epicarp. The endocarp was paraquetry in arrangement. Vascular bundle was crowning the sclerenchyma region. Significant changes observed among old sample (S_2) was worn out epicarp and imperceptible endocarp. Vascular bundle was not prominent in this sample. Powder microscopy showed presence of a greater number of oil globules and aleurone granules in fresh sample.

Conclusion

Dhanyaka (Coriandrum sativum Linn.) the fruits which advised to use in medicine after an year studied macro-microscopically after preserving for a period of an year. Significant macroscopic, microscopic and organoleptic changes have been observed.

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