



## Detailed Pharmacognostical Evaluation of Fresh And Processed Fruits Of *Kharjura* (*Phoenix Dactyliferous*)

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### Abstract:

Medicinal plants are widely used by the traditional medical practitioners for curing various diseases in their day-to-day practice. *Kharjura* is one of the widely used drugs in *Ayurveda*. Its fruits are used in various diseases like *Kshaya*, *Daha*, *Raktapitta*, *Murchha*, *Trishna*, *Shrama*, *Jwara*, *Swasa*, *Kasa*, *Madatyaya*, etc. Present study highlights pharmacognostical difference between processed and fresh fruits of *Kharjura*. Pharmacognostical results revealed that the presence of loosely arranged mesocarp, etc in fresh *Kharjura* while spiral vessels, fiber with acicular crystals, saccharine and tannin content, etc. in processed *Kharjura*.

**Key words:** Fresh fruit, Dates, *Kharjura*, *Phoenix dactyliferous* (Roxb.), processed fruit Pharmacognosy.

### INTRODUCTION:

*Kharjura* consists of dried/processed fruit, with seeds removed, of *Phoenix dactylifera* Linn. (Fam. Araceae). It is a medium sized plant, 20-25 m tall, growing singly or forming a clump with several stems from a single root system. The leaves are 4-6 cm long, with spines on the petiole and pinnate, with about 150 leaflets are 30 cm long and 2 cm wide. The full span of the crown ranges from 6-10 m. *Kharjura* contains 20-70 calories each depending on size and species. A number of varieties are available in market ranging from Rs. 40/- per kg to Rs. 800/- per kg. Generally consumers are confused regarding the quality of *Kharjura*. Thus after a survey, the variety of *Kharjura* which was commonly used by the consumers was selected for the study. Fruits are oval, cylindrical 3-7 cm long and 2-7 cm diameter, and when ripe, range from bright red to bright yellow in colour, depending of variety. *Kharjura* from seedling plants are often smaller and of poor quality. Most commercial plantations thus use cutting of heavily cropping cultivars. Plants grown from cutting will fruit 2-3 years earlier than seedling plants<sup>i</sup>. *Kharjura* removes fatigue<sup>ii</sup>, *balya*<sup>iii</sup>, *mutrala*<sup>iv</sup>, *vrishya*<sup>v</sup>, etc. A review article on *Kharjura* is found<sup>vi</sup>, but till date fruits of *Kharjura* in fresh, dried and processed stage are not studied pharmacognostically. Hence, the present study was undertaken to establish certain botanical standards for identification and standardization of *Kharjura*.

### MATERIALS AND METHODS:

#### Collection and preservation of the sample

Samples of fresh and dried *Kharjura* were collected from the local market of Jamnagar.

### **Processing of Dried *Kharjura*** <sup>vii</sup>

Dates are harvested as whole bunches that are lowered to the ground level and shaken into a bin to remove the ripe dates. Pickers use different types of containers and harvesting aids to lower the dates to the ground level.

### **Insect Disinfestation:**

Insect infestation and damage caused by insect feeding on the dates is one of the primary causes of post harvest losses in quality and quantity. To prevent dates from insect infestation they must be fumigated with an approved fumigant followed by packaging in insect proof containers. Methyl bromide at 30g/cubic meter (30 ppm) for 12 to 24 hours at temperatures above 16° C is very effective in insect disinfestation.

Storage below 5°C or in low oxygen atmosphere will prevent insect infestation.

### **Dehydration:**

Dates need to be dehydrated to the optimal moisture content for preserving their quality during subsequent handling and storage.

Dehydration may be done concurrently with ripening. Dehydration can be done using solar energy by spreading the dates on trays that will be exposed to the sun or under plastic tunnels until drying is completed to the desired moisture level. The desired moisture content is 23 to 25%.

### **Hydration:**

Sometimes, hydration is used to soften the texture of some date cultivars. Dates are dipped in hot water or exposed to steam at 60 to 65°C and 100% relative humidity for 4 to 8 hours. Steaming for 10 minutes is enough for some cultivars.

### **Pasteurization:**

Dates may be pasteurized by exposure to 72°C and 100% relative humidity air until their temperature reaches 66°C, where it is kept for one hour.

### **Preparation for Market:**

1. Initial sorting to remove defective dates and foreign materials.
2. Cleaning to remove dust, dirt, and other foreign materials using air pressure and water followed by air drying to remove surface moisture. Damp towels may be used in cleaning the dates.
3. Sorting by quality and size into grades
4. Surface coating with materials (such as vegetable oil, corn syrup or date syrup) may be used to reduce stickiness and/or improve appearance (gloss).
5. In some cases, the dates are pitted and may be stuffed with nuts. Other products include date pieces that are used in cereals and other foods and macerated dates that are used in baked products.
6. Packaging to protect the dates from physical damage and moisture absorption if moisture-proof packaging material is used. Use of insect-proof packaging is highly recommended to prevent re-infestation of the dates with insects during their subsequent storage and handling steps.
7. Cooling to below 10°C (preferably to 0°C) before transportation or storage under the same temperatures (0 to 10°C) and 65-75% relative humidity. Forced-air cooling is the most appropriate cooling method for dates.

### **Date Processing:**

Dates are marketed whole, pitted, cut into small pieces, or macerated (ground or chopped). Whole unpitted or pitted dates may be marketed loose or pressed (compressed into layers using mechanical force).

### **Pharmacognostic studies:**

Morphological characters were studied by observing the fruit as such and also with the help of the dissecting microscope. Free hand thin transverse sections of both fruits were taken for detailed microscopical observation. Sections were observed as such for the presence of any crystals, then were stained with phloroglucinol and Conc. Hydrochloric acid (HCl) to notice the lignified elements and other parts<sup>viii</sup>. Powder characters were studied according to the guidelines Ayurvedic Pharmacopoeia of India<sup>ix</sup>. The histo-chemical tests were carried out as per the standard guidelines<sup>x</sup>.

## **RESULTS AND DISCUSSION:**

### **Macroscopy of Fresh *Kharjura*:**

Fruit a drupe, oblong; 2 to 3 cm long, smooth, yellow coloured; pulp fleshy; odour, not distinct; taste sweet.

### **Transverse section of fresh *Kharjura***

Diagrammatic transverse section of fresh *Kharjura* showed outer epicarp followed by mesocarp and fibrous endocarp.

Epicarp thick and hard, made up of single layered epidermal cells with thick cuticle filled with suberine content.

Mesocarp occupies wide range in the fruit differentiated in to upper tangentially compactly arranged parenchyma cells without any saccharin and tannin content. Inner large rounded to oval shaped parenchyma cells with large amount of saccharine and tannin content.

Beneath the epidermis at the zone of mesocarp compactly arranged two layered continuous ring of pitted stone cells with wide lumen.

Inner mesocarp consists number of vascular bundles, they are open and collateral. Xylem made up of one or prominent structure with xylem fibers, phloem surrounds the xylem made of phloem fibers and sieve elements.

Some of the mesocarp cells rarely contain silica deposition and oil globules. Plate 1 (A1-A9).

### **Powder microscopy of fresh *Kharjura*:**

Diagnostic powder microscopy of dried *Kharjura* showed that Stone cells, Oil globules, Tannin, Loosely arranged mesocarp, Fragment of annular vessel, Fragment of endocarp, Fragment of epicarp, Lignified fibers, Lignified stone cells and Fragment of trachieds. Plate 2 (A1- A9).

### **Macroscopy of processed *Kharjura*:**

Organoleptic characters of processed *Kharjura* dark brown in color, sweet in taste, sweet odour and sticky to touch.

### **Transverse section of processed *Kharjura***

Diagrammatic transverse section of processed *Kharjura* showed outer epicarp followed by mesocarp and fibrous endocarp.

Epicarp thick and hard, made up of single layered epidermal cells with thin cuticle filled with suberine content.

Mesocarp occupies wide range in the fruit differentiated in to upper tangentially compactly arranged parenchyma cells with some saccharin and tannin content. Inner large rounded to oval shaped parenchyma cells with large amount of saccharine and tannin content as compare to the fresh.

Beneath the epidermis at the zone of mesocarp compactly arranged two-three layered pitted stone cells with narrow lumen.

Inner mesocarp consists number of vascular bundles, they are open and collateral. Xylem made up of one or prominent structure with xylem fibers, phloem surrounds the xylem made of phloem fibres and sieve elements. Some of the mesocarp cells rarely contain silica deposition and large oil globules. Plate 1 (B1-B9).

### **Powder microscopy of processed *Kharjura*:**

Diagnostic powder microscopy of Powder microscopy of processed *Kharjura* showed that Fragment of spiral vessel, Tannin content, Mesocarp cells, Fiber with acicular crystals, Fragment of epicarp cells, Saccharine content, Lignified stone cells, Annular vessel and Epicarp cells. Plate 2 (B1-B9).

### **Histochemical Evaluation**

Both the sections were subjected to histochemical evaluation i.e. presence and absence of tannin, lignin, calcium oxalate etc. Results were depicted in Table no. 1.

### **Discussion:**

The fresh *Kharjura* showed yellow colour while the processed showed dark brown colour. Both the varieties were sweet in taste. The fresh *Kharjura* does not had characteristic smell, but processed *Kharjura* with sweet odour.

In fresh *Kharjura*, mesocarp occupies wide space in the fruit differentiated in to upper tangentially compactly arranged parenchyma cells without any saccharin and tannin content, while in processed *Kharjura* saccharin and tannin contents were found. In fresh *Kharjura* pitted stone cells with wide lumen were found arranged in two layers. While in processed *Kharjura*, pitted stone cells with narrow lumen were found arranged in two-three layers. Vascular bundles were found open and collateral in both the varieties.

The squashed fresh *Kharjura* showed stone cells, fragment of endocarp, lignified fibers and fragments of trachieds, which were not seen in the processed *Kharjura*. The squashed processed *Kharjura* showed epicarp cells, saccharine content, acicular crystals and spiral vessel, which were absent in the fresh samples.

Both the samples showed similar squashed characters like tannin content, mesocarp cells, annular vessels, epicarp cells, saccharine content, lignified stone cells, etc.

Histochemical evaluation showed that similar observation but in dried *Kharjura* lignified material is more as compared to fresh sample. Thus processed *Kharjura* can be used for dietary and medicinal purposes as the feasibility of consumers.

### **CONCLUSION:**

Pharmacognostical evaluation revealed clear differentiation between the fresh and processed samples of *Kharjura*. Fresh of *Kharjura* are not suitable for the preparations because of the unseasoned conditions. Where, the processed and preserved *Kharjura* can be used in any season and also useful in formulation. The results obtained, can be taken as a standard reference for further research work.

**Plate 1: T.S. Of Kharjura**

**Fresh Kharjura**

**Processed Kharjura**



A.1

A.2

A.3

B.1

B.2

B.3



A.4

A.5

A.6

B.4

B.5

B.6



A.7

A.8

A.9

B.7

B.8

B.9

**Plate 2: Powder Of Kharjura**

**Fresh Kharjura**

**Processed Kharjura**



A.1

A.2

A.3

B.1

B.2

B.3



A.4

A.5

A.6

B.4

B.5

B.6



- <sup>i</sup> Morton JF, Miami FL. Date In: Fruits of warm climates, Purdue University Center for new crops and plant products; 1987:5-11.
- <sup>ii</sup> Acharya Vidyadhar Shukla and Prof. Ravi Dutt Tripathi: *Charaka Samhita, Sutra sthana, 4/40, Shramahara varg*, Chaukhambha Sanskrit Sansthan, Reprint: 2010.
- <sup>iii</sup> Bapalal Vaidhya: *Nighantu Adarsh*, Part-2, Page No. 1038, Gujarat Pustakalay Sahayak Sahakari Mandal Ltd.; Reprint: 1999.
- <sup>iv</sup> Bapalal Vaidhya: *Nighantu Adarsh*, Part-2, Page No. 1038, Gujarat Pustakalay Sahayak Sahakari Mandal Ltd.; Reprint: 1999.
- <sup>v</sup> Bapalal Vaidhya: *Nighantu Adarsh*, Part-2, Page No. 1038, Gujarat Pustakalay Sahayak Sahakari Mandal Ltd.; Reprint: 1999.
- <sup>vi</sup> Ahmad et al IJRAP, 4(3), May-June 2013
- <sup>vii</sup> Adel A. Kader and Awad M. Hussein: Harvesting and Postharvest Handling of Dates, International Center for Agricultural Research in the Dry Areas.
- <sup>viii</sup> Khandelwal KR.: Practical Pharmacognosy,; Nirali Prakashan, Pune; 19th edition 2008.
- <sup>ix</sup> Anonymous: The Ayurvedic Pharmacopoeia of India, Part-I, Vol.-IV, Govt. of India, Ministry of Health and Family Welfare, Department of I.S.M. & H, New Delhi; 1<sup>st</sup> edition 1999. Appendix 2.
- <sup>x</sup> Krishnamurthy KV.: Methods in the plant histochemistry, Vishwanadhan Pvt. Limited, Madras; 1<sup>st</sup> edition 1988.

**Table. 1:Histochemical evaluation of *Kharjura* samples:**

Sr. No.	Reagent	Observation	Characteristics	Results	
				Fresh	Dried
1.	Phloroglucinol + Conc. HCl	<b>Red</b>	Lignified cells	++	+++
2.	Iodine	<b>Blue</b>	Starch grains	++	++
3.	Phloroglucinol + Conc. HCl	<b>Dissolved</b>	Ca Ox - crystals	++	++
4.	FeCl <sub>3</sub> solution	<b>Dark blue</b>	Tannin cells	++	++