



Khirmi chuhara: A phytochemically rich nutritional substitute for tribal farmers

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The Khirmi or Rayan botanically known as *Manilkara hexandra* (Roxb.) Dubard is an economically multipurpose tree of the family Sapotaceae. The tree is medium size, evergreen with spreading growth habit. It bears oval, sweet edible fruit with one or more seeds. It is commercially used as a rootstock for vegetative propagation of sapota in different parts of the country. The fruit is good source of iron, sugars, minerals, protein and carbohydrate etc. The plant can tolerate drought conditions if occurs for some time as well as heavy rainfall conditions. Hot semi- arid zone is characterized by the low annual rainfall (750 mm) and the rainy spells are confined to 3 wet months (July to September) and the remaining parts of the year are dry months. The rains are also erratic and often come in a few storms of short duration which results in great runoff without charging the soil moisture profile resulting into water stress in soil during major parts of the year. Arid and semi-arid regions have peculiar climatological features in which several major agronomical crops fail to sustain. It is very hardy and thrives well on rocky and gravelly soils.

Panchmahal is a tribal populated district of the Gujarat. Climatologically it comes under semi-arid zone. This region is endowed with plenty of scattered khirmi plants in nearby villages and on the fringes of the cultivable land. Fresh fruits produced in these areas are sold locally by the rural people at very cheap rate. Tribal people collect the fruits and it is sold to local traders @ Rs 20 to 30 per kg. Farmers were not adopting any technology for value addition of fresh khirmi fruits. KVK, Panchmahal observed these problems and organized training programme for value addition of khirmi fruit with the collaboration of ICAR-C.H.E.S., Godhra.

A total of 6 genotypes were used for chemical analysis. The experiment was laid out in completely randomized design with 3 replications, observations on fruit quality attributes were observed and data were presented in the table. Fruits were randomly selected for fruit quality attributes. Total soluble solids, Vitamin C, total sugar and carotene were analyzed by the method by AOAC (1980). The mean data were statistically analyzed as per method given by Gomez and Gomez (1984). Ten farm women were trained as panelists to evaluate the product. Each farm women was asked to taste the coded samples and score each product for preference on a five -point scale, ranging from "most preferred" (preference score = 5) to the "least preferred"

(preference score = 1). This process was repeated three times and the results were recorded for statistical analysis. The data statistically calculated as per method given by Snedecor and Cochran (1994).

For sun drying of fruits, the flow chart is as under:

Fresh ripened fruits sorting washing sun drying for one week (42 ° C) cleaning of dried latex from skin of fruits application of castor oil (50 ml/kg fruits) storage in glass jar.

The fruit weight ranged from 3.21-4.40g and it was found to be highest in Thar Rituraj, followed by CHESK-11 and CHESK-13. Khirmi fruits are rich source of total soluble solids, sugars, vitamin C and carotene and these values varied significantly in different genotypes. Total soluble solids and total sugar content of fruits ranged from 22.21 to 24.30° Brix and 15.90 to 13.70 % respectively, in different genotypes.

The highest Total soluble solids (TSS) was recorded in Thar Rituraj (24.30° Brix) followed by CHESK-11 and CHESK-13. Maximum total sugar content was found in Thar Rituraj (15.90%), closely followed by CHESK-11 and CHESK-13. Vitamin C content was found to be highest in CHESK-13 (32.26 mg/ 100g) closely followed by CHESK-14 (30.25) and Thar Rituraj (28.20 mg/ 100g), whereas CHESK-12 recorded the lowest (26.10 mg/ 100g). Ram and Singh (2003), Singh *et al.* (2010) and Singh and Singh, 2012 have also recorded the variation in fruit quality attributes in different *bael*, *chironji* and *jamun* genotypes. Carotene content varied from 4.90-5.90 mg/100g being highest in Thar Rituraj, closely followed by CHESK-13 and CHESK-12. The remarkable variability was observed in relation to fruit quality attributes of tamarind (Lata *et al.*, 2018). Dried fruits after one year recorded 64.20° Brix T.S.S., 45.70 % total sugar and 1.30 % acidity.

The data presented in table 2 revealed that the overall highest grade (3.52) was given up to 4th month of storage by the panel, followed by 6 and 12 months after storage. For appearance, product got maximum score (3.50). The highest score (3.60) for texture of product was given after 2 and 4 months of storage. The preference mean scores for flavor of the product was noted to be maximum (3.40) up to 4th day of storage. The highest score (3.65) for the taste of the product was found on 2nd and 4th month of storage. The similar findings were also reported by Lingappa, *et al.* (1993), Shankaracharya (1998) and Ulrich (1970) in tamarind. The similar findings

also reported by Lata, *et al.* (2006 and 2018) in turmeric and tamarind. Khirni fruits are widely available in western India including Panchmahal.

Tribals and other rural people consume the fruits during fruiting season for a short period of 20- 30 days. Fruits are full of antioxidants but due to its poor storability, spoilage loss is very high, hence efforts were made for its preservation. KVK Panchmahal tried to preserve the fruits through sun

drying with castor oil polishing on the fruit. This is very cost effective and eco friendly technology. It may be used by the tribal, resource poor farmers and other farming community. It needs further popularization of this technology for precision use of this phytochemical rich fruit as a nutritional substitute in off season also. Further efforts may be made for development of small equipments for solar drying so that product may be refined and be expanded throughout the country

Table 1. Fruit quality attributes of Khirni (Fresh fruits).

Genotypes	Fruit weight (g)	TSS (Degree Brix)	Acidity (%)	Total sugar (%)	Vitami C (mg/100 g)	Carotene (mg/100 g)
Thar Rituraj	4.40	24.30	0.37	15.90	28.20	5.90
CHESK-11	4.30	23.40	0.36	15.60	27.10	5.58
CHESK-12	3.40	22.50	0.38	15.00	26.10	5.59
CHES K-13	3.52	23.10	0.33	15.20	32.26	5.80
CHESK-14	3.36	22.21	0.34	13.70	30.25	5.13
CHESK-15	3.21	22.96	0.29	13.98	27.12	4.90
CD(P=0.05)	0.11	1.10	0.10	0.42	0.53	0.31

Table 2. Preference mean scores for dried khirni chuhara

Product during storage	Appearance	Color	Texture	Flavor	Taste	Over all	Grading
After 2 months	3.50	3.50	3.60	3.40	3.65	3.52	I
After 4 months	3.50	3.50	3.60	3.40	3.65	3.52	I
After 6 months	3.40	3.40	3.50	3.30	3.60	3.44	II
After 8 months	3.40	3.40	3.50	3.30	3.50	3.40	II
After 10 months	3.30	3.40	3.50	3.30	3.40	3.38	III
After 12 months	3.30	3.40	3.50	3.30	3.40	3.38	III

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