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Comparative study of quality parameters of date palm fruits under zero energy cool chamber and at ambient storage condition

R.K. Meena, P. K. Yadav and J. Singh,
S.K. Rajasthan Agricultural University, Bikaner - 334 006

Abstract

The present investigation was carried out during summer season of 2004-05. Freshly harvested date palm fruits of doka stage (when fruits turn their colour from green to yellow or red depending upon variety but still remain hard) were placed under zero energy cool chambers as well as at ambient storage conditions. Periodic observations were recorded on TSS, acidity, ascorbic acid and weight loss of date palm fruits. The retention of ascorbic acid (2.36 %) was observed more under zero energy cool chamber. Similarly weight loss (20 %) was less under ZEEC than room storage (24 %). Acidity (0.27 %) was also less under ZECC, however TSS was higher under room temperature. .

Key words: *TSS, acidity, ascorbic acid, weight loss, zero energy cool chamber.*

Introduction

Date palm is an important fruit crop of the subtropics grown especially in Rajasthan, Punjab, Haryana and Kutch region of Gujarat. The date palmfruits *(Phoenix spp.)* are used to prepare several value added products such as dry dates, wine, vinegar, arak, jam, chutney, beverages, juice, toffees etc. Its fruits are consumed as hard ripe at doka, soft dates (pind khajoor) and dry dates (Chhuhara). It contains high calorific value (3150 calories/kilogram of fresh fruit) 60 - 65 per cent sugar, fair amount of fibre (2.5%), protein (2.0%), fat (2.0%), minerals upto (2.0%) i.e. iron, potassium, calcium, copper, magnesium, calcium, sulphur, phosphorus etc (Singh,2007) . Research work on improvement of quality of fruit in date palm is less in our country. Fruit' being biological entity continues on metabolitical activities and undergoes deterioration in qualities. Furthermore, date-palm fruits experiencing ripening during summer are especially very much prone to loss of qualitative parameters owing to prevailing uncongenial atmospheric condition with high and less humidity. In present endeavor, an attempt was made to see the impact of Zero Energy Cool Chamber (ZECC) and ambient storage on qualitative attributes of the date-palm fruits of Medzool variety.

Material and Methods

The present investigation was carried out at the Department of Horticulture, College of Agriculture, RAU, Bikaner during summer season of 2004-05. Freshly harvested datepalm fruits of Medzool variety on doka stage (when fruits turn their colour from green to yellow or red depending upon variety but still remain hard) were placed under zero energy cool chamber as well as at ambient storage conditions in plastic trays. Periodic observations were recorded on TSS, acidity, ascorbic acid and weight loss of date palm fruits. T.SS. of the fruits was recorded using Hand refracto meter, acidity by titrating fruit juice against N/1O NaOH and ascorbic acid by titrating the juice against 2, 6 Dichlorophenol indophenol dye. The weight loss of the fruits were observed after deducting the retained weight at a particular date of observations from the weight of the fruits kept initially on the first day of observation. As regards to temperature and humidity maintained under zero energy cool chamber (ZECC) and at ambient storage condition, maximum temperature varied from 32.8°C to 38° C and 35.2°C to 40°C respectively. The relative humidity under ZECC varied from 51 - 72 per cent, and it ambient condition, it was 45 - 72 per cent (Table 1).

Table 1. Temperature and humidity conditions at ambient storage and ZECC conditions

Date of observation	Room Temperature			Temperature of ZECC		
	Minimum (°C)	Maximum (°C)	RH (%)	Minimum (°C)	Maximum (°C)	RH (%)
27.07.2005	29.0	40.0	45	27.0	38.0	51
30.07.2005	28.5	39.5	58	26.5	37.0	58
31.07.2005	27.5	36.5	53	25.5	34.5	55
01.08.2005	26.5	38.5	45	24.5	32.8	58
02.08.2005	25.4	35.2	68	24.8	35.2	68
03.08.2005	24.5	36.5	60	25.0	36.0	72
04.08.2005	25.0	36.0	72	26.3	35.2	67

Results and Discussion

Irrespective of storage conditions, TSS increased, acidity and ascorbic acid decreased and weight loss (%) in fruits were recorded(Table 2). However, the fruits stored under ZECC had better retention of TSS, acidity, ascorbic acid and physical weight. Better retention of TSS, acidity and ascorbic acid and weight loss (%) less under zero energy cool chamber owes to the moderating effect of ZECC on temperature and humidity. Under moderate temperature and high humidity conditions reduced rate of degradative process might have been responsible for better retention of qualitative parameters.

TSS increased with the advancement of period irrespective of the storage conditions. However, comparatively higher TSS was observed under ambient storage condition. This could be attributed to the maximum moisture loss during storage resulting in higher concentration of total soluble solids.

A gradual decline in total acid content of the fruits during storage at room temperature as well as under ZECC was recorded. The reduction in acidity with the advancement of storage period may be due to the fact that organic acid may have been utilized rapidly in respiration during storage. This process ultimately decreased the acidity (Govind and Prasad, 1981). The slower decrease in acidity in ZECC could possibly be due to delay in ripening and slower degradation of organic acid as a result of low temperature and high relative humidity prevalent in ZECC.

Table 2. Physiological changes of date palm fruits under different storage condition.

Date of observation/ storage condition	Changes in physiological parameters			
	TSS (%)	Acidity (%)	Ascorbic acid (mg/100 g)	Weight loss %
A) ZECC Storage				
27.07 2005	41.00	0.34	3.59	0
30.07.2005	43.00	0.29	3.25	4
04.08.2005	46.00	0.27	2.37	5
09.08. 2005	50.00	0.27	2.36	20
(B) Room storage				
27.07 2005	41.00	0.34	3.59	0
30.07.2005	44.50	0.34	3.05	6
04.08.2005	50.00	0.32	2.09	10
09.08. 2005	52.00	0.31	2.02	24
CD at 5 %	1.54	0.01	0.08	4.5

The finding is in conformity to the observations as recorded by Gupta *et al.*, (1988) in ZECC storage of ber fruits. Regarding ascorbic acid content, it though declined with the advancement of period irrespective of the storage conditions, comparatively lesser retention of ascorbic acid was noted in the fruits stored under ZECC. The ascorbic acid being sensitive to oxidation losses, its content reduced with the exposure of time concurrent to the advancement of storage period. The better retention of ascorbic acid was noted in the fruits stored under ZECC. The prevalence of low temperature and high humidity minimizing oxidation losses may be one of the possible reasons of better retention of ascorbic acid under ZECC. This finding is similar to those as reported by Naik (1985) during storage of mango under ZECC condition. The fruits stored under ZECC experienced less weight loss in percent as compared to those stored under ambient conditions. The low temperature and high humidity prevalent in cool chamber storage might have decreased the rate of respiration and accordingly brought about less weight loss. Singh and Rana (1992) reported similar observations, while working with ZECC storage of sweet orange cultivar Blood Red Malta fruits.

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