

# RADIATION OR WAXING EFFECT ON SHELF LIFE OF GUAVA FRUIT

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## ABSTRACT

Red and white guavas were treated with wax emulsion or irradiation (0.25–2.0 kGy) and kept for 12 days at room temperature. Initiation of rot attack occurred after 3 days which increased significantly during further storage. In the waxed fruits rottage, weight loss and vitamin loss were significantly less than controls and irradiated ones. Sensory scores decreased with storage time and they ranged 3.7–4.5, 2.1–3.9 and 2.3–2.7 in waxed, radiated and untreated controls respectively, after 12 days storage. Waxing was found to increase the shelf life of this fruit for 3–4 d while irradiation exhibited no beneficial effects.

**Keywords:** Guava Radiation Waxing Rottage Sensory evaluation  
Extension of shelf life

## 1 INTRODUCTION

Guava is the cheapest fruit and the richest source of vitamin C. This fruit is consumed with integument and is highly perishable. Shelf life extension of fresh fruit with gamma radiation was attempted but with little success<sup>[1,2]</sup>. However waxing has been less tried. Effect of waxing and celeophane on storage life of some other fruits has been reported<sup>[3–5]</sup>. Srivastava *et al*<sup>[6]</sup> observed 50 % increase in storage life of guava at room and 80 % increase in shelf life at low temperatures, while combination of gas storage and skin coating was ineffective. Polyethylene and wax-paper linings were found to increase the shelf life of guava by 6–7 days<sup>[7]</sup>. In view of the economic importance of guava, studies were conducted to evaluate the influence of radiation and waxing on its shelf life.

## 2 MATERIALS AND METHODS

Guava fruits of red and white fresh varieties were picked from the local fruit garden at uniform maturity, sorted, washed and skin dried with tissue papers. They were divided into 2 lots; one of which was dipped in a commercial 20:1 water-wax(Seal-britex 65) for about 30 s at 25 °C and dried on wire trays prior to

storage in paper lined baskets. The fruits in other lot were subjected to gamma irradiation (dose rate 0.04 kGy/min) at Nuclear Institute for Food and Agriculture. The radiation doses applied were 0.25, 0.50, 1.00 and 2.00 kGy. All the fruits was stored at ambient room temperature (25–35 °C, r.h. 82.5–93.9 %). The physico-chemical analyses and sensory properties were evaluated immediately after radiation and during storage at 3 days intervals.

Biochemical analysis for ascorbic acid was conducted by the titration methods using 2,6-dichlorophenol-indophenol<sup>[9]</sup>. Samples were tested organoleptically for color, texture and flavour by trained judges using 9 point hedonic scale of Larmond<sup>[9]</sup>. The data was analysed for statistical significance by the analysis of variance and means separated by the Duncans Multiple Range Test<sup>[10]</sup>.

### 3 EVALUATION OF TREATMENTS AND RESULTS

#### 3.1 Rot attack and weight loss

The fruits were attractive and fresh in the beginning of the experiment and no visual difference was seen upto 2 d but during later storage the changes became clearly distinct. The colour of the samples of both types changed from off-white to dark-white as compared with the fresh fruits. Brownish and blackish patches appeared after 6 d storage in all the fruit samples. No rot attack was observed till the 3rd day and rottage changing in detail with storage period is shown in Fig.1. In addition, its percentage weight losing with storage period is given in Table 1.

Table 1

Effect of waxing or radiation on percentage weight loss of guavas during storage

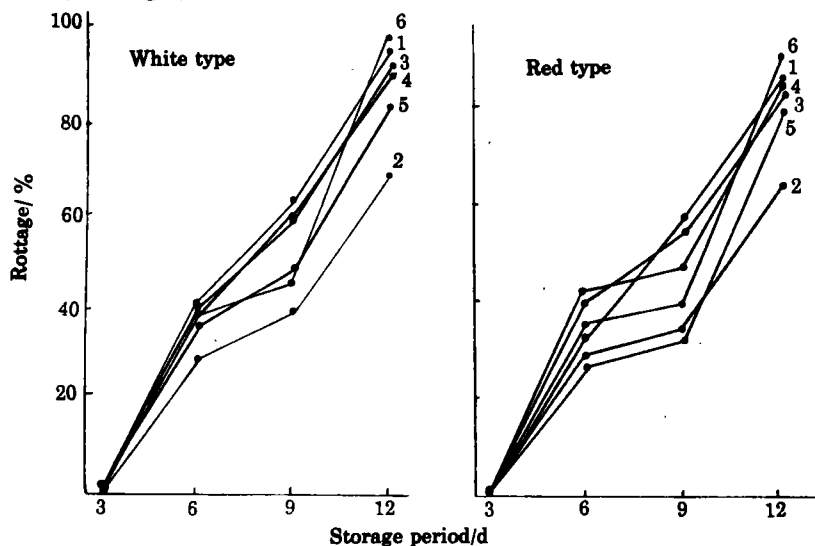
Treatment	White type					Red type				
	Storage		period/d			Storage		period/d		
	3	6	9	12	Mean	3	6	9	12	Mean
1. Control	14.5	24.5	38.5	42.7	30.07 <sup>a</sup>	8.7	17.9	19.5	35.7	20.47 <sup>a</sup>
2. Waxing	9.4	18.3	22.8	25.5	19.01 <sup>b</sup>	4.3	17.9	10.1	21.7	10.89 <sup>b</sup>
3. 0.25 kGy	14.7	25.0	38.3	42.5	30.16 <sup>a</sup>	6.9	13.4	18.6	36.3	18.77 <sup>a</sup>
4. 0.50 kGy	13.5	27.2	40.5	43.6	31.31 <sup>a</sup>	6.4	12.5	17.4	36.0	18.06 <sup>a</sup>
5. 1.0 kGy	14.6	26.8	39.5	43.8	31.21 <sup>a</sup>	7.5	14.3	17.5	37.5	19.21 <sup>a</sup>
6. 2.0 kGy	12.9	27.8	38.5	47.4	31.89 <sup>a</sup>	8.3	15.7	17.8	36.4	19.59 <sup>a</sup>
Mean	13.3 <sup>a</sup>	24.9 <sup>b</sup>	36.4 <sup>c</sup>	40.9 <sup>d</sup>		7.0 <sup>a</sup>	15.3 <sup>b</sup>	16.8 <sup>c</sup>	33.9 <sup>d</sup>	
C.V.	15.2	14.1	18.4	18.9		22.7	15.2	20.2	17.8	

abcd: Values bearing the same letters are statistically not different from one another ( $P < 0.05$ )

#### 3.2 Ascorbic acid

Freshly analysed samples of white and red guava fruits contained 268.2 and 274.3 mg/100g of ascorbic acid respectively. During storage highly significant loss of ascorbic acid occurred in both the varieties. The values of the vitamin decreased to

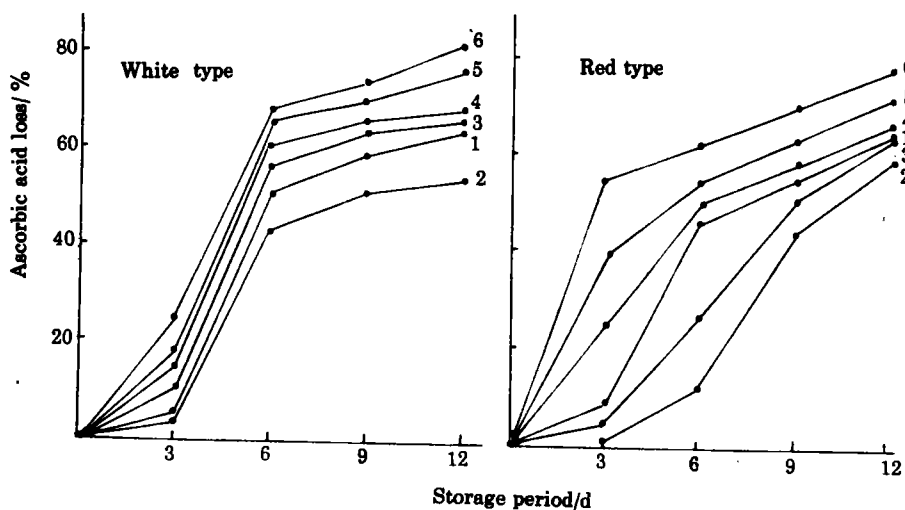
90.3 and 94.6 mg/100g respectively in white and red types during 12 days storage. No significant loss of ascorbic acid was found immediately after irradiation but during later storage significant decreases were observed in all the treatments tested. The ascorbic acid values of waxed fruits were significantly higher than others. Higher doses of irradiation brought significantly higher loss of ascorbic acid than lower doses of irradiation (see Fig.2)



**Fig.1 Radiation or waxing effect on the percent rotting in guava fruit**

The numbers 1–6 in Fig.1,2 share the same meaning: 1. Control 2. Waxed

3. Radiated 0.25 kGy 4. Radiated 0.50 kGy 5. Radiated 1.0 kGy 6. Radiated 2.0 kGy



**Fig.2 Radiation or waxing effect on ascorbic acid loss in guava fruit**

### 3.3 Sensory evaluation

The guava fruits were scored between 7.0–7.4 units when freshly examined for their appearance, texture and taste parameters (Table 2). The red and white waxed

fruits were rated higher (5.0—5.5) than the controls (4.1—4.6) during all the evaluation made. However, the pattern was not regular among the radiated samples. The radiated samples were judged second best to waxed guava fruits. Waxed fruits received the highest scores for external appearance and texture than all other treatments. Control samples were generally not accepted after 6 days of storage (4.76—5.30 scores) while the treated fruits were not liked after 9 days of storage. Among all the irradiated fruits 1.00 kGy treated white and red guava fruits were liked more than all other gamma radiated fruits.

**Table 2**  
**Effect of waxing and radiation on the sensory quality of guava during storage**

Treatment	White type					Red type				
	Storage		period/d			Storage		period/d		
	3	6	9	12	Mean	3	6	9	12	Mean
1. Control	6.3	5.3	3.9	2.7	4.6 <sup>c</sup>	6.3	4.7	2.9	2.3	4.1 <sup>a</sup>
2. Waxing	6.8	5.7	4.9	4.5	5.5 <sup>a</sup>	6.7	5.0	4.2	3.7	4.9 <sup>ab</sup>
3. 0.25 kGy	6.7	5.6	5.2	3.7	5.3 <sup>ab</sup>	6.4	5.0	4.2	3.3	4.7 <sup>abc</sup>
4. 0.50 kGy	7.0	5.7	5.1	3.5	5.4 <sup>ab</sup>	6.3	5.4	4.2	3.2	4.8 <sup>ab</sup>
5. 1.0 kGy	6.8	5.6	4.9	3.9	5.3 <sup>ab</sup>	6.4	5.1	3.4	2.9	4.7 <sup>a</sup>
6. 2.0 kGy	6.8	5.3	4.8	3.3	5.1 <sup>b</sup>	6.7	5.1	3.2	2.1	4.3 <sup>cd</sup>
Mean	6.8 <sup>a</sup>	5.6 <sup>b</sup>	4.8 <sup>c</sup>	3.6 <sup>d</sup>		6.4 <sup>a</sup>	5.1 <sup>b</sup>	3.7 <sup>c</sup>	2.9 <sup>d</sup>	
CV/ %	3.5	3.7	9.8	15.9		3.1	4.3	16.0	20.7	

Values are the averages of 10 judgements. Initial scores: White guava 7.4, Red guava 7.0

Scoring scale: 1—9 (1:extremely disliked; 9: extremely liked) abcd: values bearing the same letters are statistically not different from one another ( $P < 0.05$ )

### 3.4 Results

Waxing was found to increase the shelf life of this fruit for 3—4 days while irradiation exhibited no beneficial effects.

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