

# CHANGES IN THE QUALITY AND RECOVERY OF PECTIN FROM FRESH GUAVA DURING ITS REFRIGERATED AND COMMON STORAGE

by

J. S. Pruthi, K. K. Mookerji and Girdhari Lal

Central Food Technological Research Institute, Mysore

## ABSTRACT

The physiological losses in weight and the changes in the total pectin, water-soluble, oxalate-soluble and acid-soluble pectin in guavas picked at 2 stages of maturity (fully developed green and yellow fruits) stored at 47—50°F (relative Humidity 85—90 percent) and at room temperature (20—28°C) have been reported and discussed.

The physiological losses in weight of green guavas stored at room temperature for one and two weeks were 18.8 and 20.2 percent respectively whereas the corresponding losses in weight during refrigerated storage were 3.9, 6.8, 9.9 and 12.0 percent after 1, 2, 3 and 4 weeks' storage of green guavas respectively. The losses in weight of yellow guavas were comparatively higher.

At room temperature, the quality of pectin (as judged from methoxyl content and anhydrouronic acid content) deteriorated very rapidly (within 1 week), more so in the case of yellow fruits. The water soluble and oxalate-soluble pectin increased both in green and yellow fruits, (the increase being greater at room temperature), whereas the acid soluble pectin decreased. From the viewpoint of recovery and quality of pectin, fully developed green or yellow firm guavas could be kept at 47—50°F for 4 weeks. At room temperature, guavas could hardly be kept for a week.

## Introduction

A Fruit Technologist or a Pectin Technologist would normally be interested in purchasing the desired quality fruit at the cheapest possible rate, usually in the glut of the season, store it under suitable conditions and gradually release it to his factory for processing it in convenient batches. But unfortunately, the storage life of Guava<sup>1</sup> at room temperature is very short (hardly a week), and 4 weeks at 47—50°F (R.H. 85—90 percent). Besides, little published information is available on the changes in the quality and recovery of pectin during refrigerated and common storage of guava at different stages of maturity. The present report covers these aspects.

## Experimental

(i) *Raw Material*—Two lots of 15 lbs. each of (i) fully developed green guava fruits and (ii) yellow fully ripe guava fruits of Allahabad variety were stored under the optimum conditions of refrigerated storage ( $1(47-50^{\circ}\text{F}$  and  $85-90\%$  Relative Humidity). Two similar lots of guavas were also stored at room temperature ( $20-28^{\circ}\text{C}$ ) to serve as controls for studies on the changes in the recovery and quality of pectin. Besides, one lot each of the green and yellow fruits was also stored at each of the above two temperatures for the determination of comparative losses in weight in guava during storage at the two temperatures.

(ii) *Methods of Analysis*—Fortnightly estimations were made on the fractionation of the pectin *viz.*, water-soluble, oxalate-soluble and acid-soluble pectin<sup>2</sup>. The different fractions of the guava pectin thus isolated, were examined for methoxyl content <sup>3</sup>(MeO) and anhydrouronic acid<sup>4</sup> content (A.U.A.) as usual. The results are presented in tables 1 and 2.

## Discussion

(i) *Physiological Losses in Weight*—The losses in weight of green guava fruits stored at room temperature ( $20-28^{\circ}\text{C}$ ) were 18.8 and 20.2%, after one and two weeks' storage respectively, whereas the corresponding losses in weight at  $47-50^{\circ}\text{F}$  were 3.9, 6.8, 9.9 and 12.0% after 1, 2, 3 and 4 weeks' storage of green guavas respectively. The physiological losses in weight of yellow fruits at the two temperatures were slightly higher than those in green fruits.

(ii) *Changes in Recovery and Quality of Pectin during Common Storage at Room Temperature*—The results on the changes in recovery and quality of total pectin, water-soluble, oxalate-soluble and acid-soluble pectins from green and yellow fruits stored upto 4 weeks at room temperature ( $20-28^{\circ}\text{C}$ ) are presented in Table 1. The quality of pectic substances (as judged from methoxyl content and anhydrouronic acid content) deteriorated very rapidly, more so in the case of yellow fruits (Table 1). The recovery of total pectin and MeO and A.U.A. content of the pectin recovered from green fruits went down from 1.30 to 0.80%, 10.9% to 7.2% and 88.3 to 80.0% respectively (Table 1). The corresponding values for yellow fruits were 1.35 to 0.70%, 10.4 to 6.3% and 88.56 to 73.0%. The water-soluble and oxalate-soluble pectins in green guava fruits increased from 9.63 to 35.71% and 9.65 to 22.64% of the total pectic substances, whereas the acid-soluble fraction decreased from 80.64 to 41.65% (fig. 1). In the case of yellow fruits, the corresponding values of water-soluble, oxalate-soluble and acid-soluble fractions were 17.70 to 54.05%, 9.23 to 19.0 and 72.4 to 26.95% respectively (Table 1).

(iii) *Changes in the Recovery and Quality of Pectin During Refrigerated Storage at  $47-50^{\circ}\text{F}$* :—During refrigerated storage at  $47-50^{\circ}\text{F}$  and R. H. 85 to 90%, for 4 weeks (Table 2), the changes in the methoxyl content and anhydrouronic acid content of total pectin and the changes in water-soluble, oxalate-soluble and acid-soluble fractions of the pectin substances in green guavas were 10.9 to 9.9%, 88.3 to 84.0%, 9.68 to 23.20%, 9.68 to 23.20% and 80.64 to 53.60% respectively, indicating thereby the better recovery and stability of pectin in green guavas during refrigerated storage than at room temperature (Fig. 1 & 2). Similar changes were noted in yellow fruits also.

TABLE 1

Quality and recovery of pectin during common storage at room temperature (20—28°C) of fresh guavas at two stages of maturity

Physico-Chemical Characteristics of pectin	Green Fruit					Yellow Fruit				
	Storage Periods (Weeks)					Storage Periods (Weeks)				
	Initial	1	2	3	4	Initial	1	2	3	4
Total Pectin (w/w)%	1.30	1.25	1.15	1.00	0.80	1.35	1.25	1.00	0.90	0.70
Methoxyl Content%	10.9	10.0	9.5	8.5	7.2	10.4	10.0	9.5	8.3	6.3
Anhydrouronic acid%	88.3	87.0	85.0	84.0	80.0	88.5	86.1	81.0	80.0	73.0
Water-soluble pectin (W.S.P.) %	0.12	..	0.24	..	0.30	0.23	..	0.31	..	0.40
(W.S.P.) as % of total pectin	9.63	..	20.0	..	35.71	17.70	..	31.0	..	54.05
Methoxyl content %	7.9	..	7.3	..	6.5	7.5	..	7.3	..	7.5
Anhydrouronic acid %	69.5	..	66.0	..	60.0	70.0	..	70.0	..	69.5
Oxalate-soluble pectin (O.S.P.) %	0.12	..	0.15	..	0.19	0.12	..	0.14	..	0.14
(O.S.P.) as % of total pectin	9.65	..	12.5	..	22.64	9.23	..	14.0	..	19.0
Methoxyl content %	8.0	..	8.1	..	7.3	7.5	..	7.3	..	7.3
Anhydrouronic Acid %	70.0	..	70.0	..	70.0	71.0	..	71.0	..	71.0
Acid-soluble pectin (A.S.P.) %	1.0	..	0.81	..	0.35	0.95	..	0.55	..	0.20
(A.S.P.) as % of total pectin	80.64	..	67.5	..	41.65	73.07	..	55.0	..	26.95
Methoxyl content %	10.1	..	8.2	..	7.5	9.8	..	9.3	..	8.3
Anhydrouronic acid %	88.3	..	87.0	..	84.0	88.5	..	86.1	..	81.0

Quality and recovery of pectin during refrigerated storage of fresh guava at 47—50° F (R.H. 85—90%)

Physico-Chemical Characteristics of pectin	Green Fruit							Yellow Fruit						
	Storage Period (Weeks)							Storage Period (Weeks)						
	Initial	1	2	3	4	5	6	Initial	1	2	3	4	5	6
Total Pectin (w/w) %	1.30	1.23	1.12	1.10	1.05	1.0	0.95	1.35	1.30	1.30	1.25	1.12	1.00	0.94
Methoxyl Content %	10.9	10.5	10.5	10.0	9.9	9.7	8.0	10.4	10.4	10.0	9.8	9.6	9.0	8.9
Anhydrouronic Acid %	88.3	88.0	87.0	86.0	84.0	78.7	70.7	88.5	84.1	82.2	78.0	78.2	78.3	78.0
Water soluble pectin (W.S.P.)	0.12	..	0.19	..	0.26	..	0.28	0.23	..	0.29	..	0.30	..	0.29
(W.S.P.) as % of Total pectin	9.68	..	17.44	..	23.20	..	29.8	17.7	..	22.66	..	26.55	..	39.0
Methoxyl Content %	7.9	..	7.7	..	7.0	..	7.0	7.5	..	7.3	..	7.2	..	7.0
Anhydrouronic acid %	69.5	..	69.0	..	69.0	..	60.0	70.0	..	70.0	..	70.0	..	69.0
Oxalate soluble pectin (OSP)	0.12	..	0.19	..	0.26	..	0.27	0.12	..	0.15	..	0.20	..	0.21
(OSP) as % of Total pectin	9.68	..	17.44	..	23.20	..	24.4	9.23	..	11.72	..	17.70	..	21.0
Methoxyl content %	8.0	..	8.5	..	8.3	..	8.0	7.8	..	8.1	..	7.0	..	6.9
Anhydrouronic acid %	70.0	..	70.0	..	70.0	..	69.0	71.0	..	70.0	..	70.0	..	70.0
Acid soluble pectin (ASP) %	1.0	..	0.71	..	0.60	..	0.43	0.95	..	0.84	..	0.63	..	0.40
(ASP) as % of Total pectin	80.64	..	65.12	..	53.60	..	45.8	73.07	..	65.6	..	55.75	..	40.0
Methoxyl content %	10.1	..	10.0	..	9.1	..	8.6	9.8	..	9.7	..	9.0	..	8.6
Anhydrouronic acid %	88.3	..	88.0	..	78.7	..	70.7	88.5	..	86.1	..	82.0	..	79.3

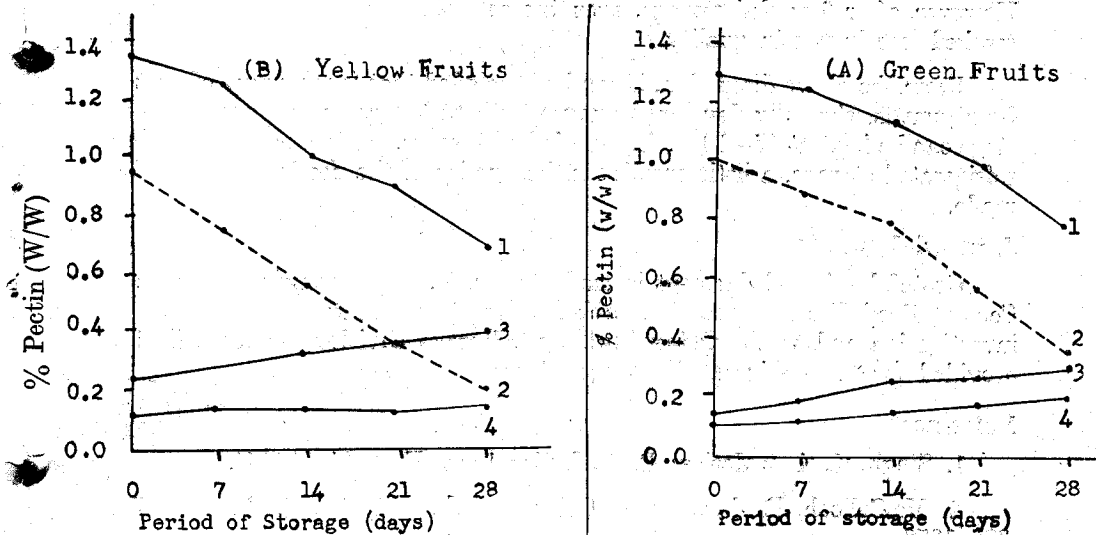


FIG. 1—Changes in Pectic Substances in Fresh Guava during Common Storage at Room Temperature (20—28°C).

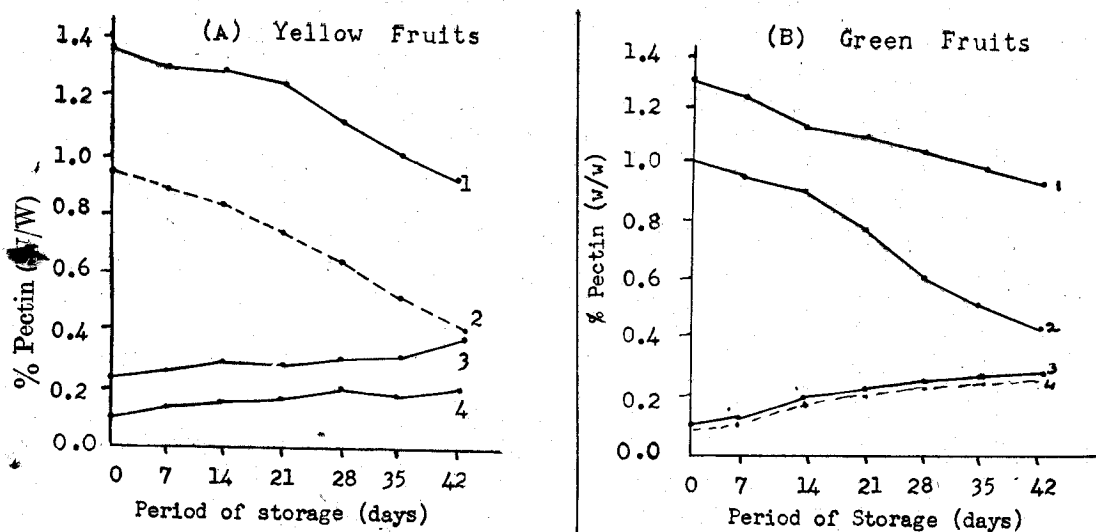


FIG. 2—Changes in Pectic Substances in Fresh Guava during Refrigerated Storage at 47—50°F (R. H. 85—90%)

- References:
1. Total Pectin
  2. Acid Soluble Pectin
  3. Water Soluble Pectin
  4. Oxalate Soluble Pectin

However, after 6 weeks' storage, even the cold stored guavas had undergone marked loss in pectin quality.

From the above discussion, it can be concluded that for recovery of pectin from guavas, the fully developed guavas both at the green stage and yellow stage can be kept at 47—50°F. for a period of 4 weeks. Of course, even during refrigerated storage, a little sacrifice in the quality of the pectin has got to be made.

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