PECTIC CHANGES IN PEARS DURING STORAGE AND RIPENING

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It is common practice in the Western countries to cold store apples and pears after their harvest either as a stop-gap arrangement or to develop certain quality in the fruit which cannot be obtained otherwise. In the course of the storage period, however, some changes take place in the fruit metabolism which have a bearing on the ripening of the fruit after taking them out from the storage. This is particularly so in the case of pears.

With the process of ripening in fruits are associated the changes in the pectic material of the fruit. Carre\(^2\) made extensive studies of the changes in pectic material in apples during storage. She associated ripening in storage with an increase in the soluble pectin and a corresponding decrease in protopectin, the total pectic material remaining constant. She has also presented some evidence to show that the total pectin content tends to increase as apples ripen. These pectic changes are, however, related to the temperature of holding the fruit. Echevin\(^5\) has shown that in pears pectic changes are directly proportional to the temperature of storage. Lutz and Culpepper\(^13\) found a direct correlation between optimum ripening and maximum soluble pectin formation in Keiffer pears at 60° F. Smock, Gerhardt and Plagg\(^3, 15, 7, 14\) have also correlated pectic substances with the storage behaviour of Bartlett pears in artificial atmospheres containing carbon-dioxide atmospheres. Gerhardt\(^8\) has shown the effect of filtration of ethylene from cold storage on some of the physiological changes in Bartlett and Anjou pears.

Thus normal ripening is associated with progressive changes in the physical texture of the fruit, which passes from firmness and crispness to a soft, smooth and buttery consistency. This change is directly associated with the hydrolysis of the insoluble protopectin into soluble pectin and pectic acid. As a part of the cold storage investigations on pears at the Department of Horticulture a study of the chemical changes in fruits was enlarged to include pectic changes in pears.

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METHODS AND MATERIALS

Three varieties of pears, Bartlett, Bosc and Anjou were obtained from the Hood River experiment station orchard. The fruits were packed with oil paper wraps. Sufficient fruit was put into the cold rooms to provide monthly samples during the normal storage period of the variety. One of the rooms was equipped with a Dorex unit cannister having a capacity of 35 c.f.m. providing 6 complete recirculations of air in the room per hour. The makers of this unit claimed that it filters out ethylene from storage atmosphere. The fruit samples under these conditions are hereafter referred to as the carbon treated samples (C.T.). Samples from the room without the air purifying unit are referred to as control samples (C.).

The temperature in each room was maintained at 30°–31° F. throughout the storage period.

At monthly intervals, a 60 fruit sample from each storage treatment was placed in a ripening room maintained at 68–70° F. At intervals of 0, 3, 6, 9, 12 days, 12 pears were sampled for chemical analysis.

A 250 gm. aliquot of the ground material representing all the twelve pears was transferred to sufficient hot 95% isopropyl alcohol to give a final concentration of 80% alcohol and boiled for 15 minutes. After cooling the alcohol insoluble material was separated by filtering, washed 3–4 times with 80% alcohol and then was transferred to a beaker and dried at 45° C. Pectin fractions were estimated using this material by employing the method of Carre. The results of analysis are presented in the Tables I to III.

EXPERIMENTAL RESULTS AND DISCUSSION

Changes during storage.—As shown in the tables the amount of both protopectin and total pectin increased during the period of storage in all the varieties. In Anjous and Bartlettts, the initial increase was followed by a decline towards the latter part of the storage period. According to these data it might be assumed that an actual synthesis of protopectin continues to occur after the fruits are harvested and placed in storage. Anjou pears contained more total and protopectin than either Bartlett or Bosc at all stages of storage. The initial-soluble pectin content in all the varieties was higher than those reported by Gerhardt and Ezell for similar varieties grown in other regions.

The use of activated carbon appears to have had no consistent effect on retarding the rate of pectic changes in any variety during storage. In case of early varieties like Bartlett and Bosc, there are appreciable differences in pectin and total pectin content over longer periods. In Anjous, a late