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QUALITY OF PREPACKAGED McINTOSH APPLES in New York City Retail Stores

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QUALITY OF PREPACKAGED McINTOSH APPLES in New York City Retail Stores

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SUMMARY

The quality of McIntosh apples in retail stores in New York City was seriously impaired by numerous punctures and unsightly bruises within 1 to 3 days after they had been prepackaged in polyethylene bags in a packinghouse 60 miles away.

Seven lots of McIntosh apples were surveyed at progressive steps in their marketing during 1959-60 and 1960-61. Punctures, caused mostly by stems, and large bruises were the most damaging conditions found.

Skin breaks or punctures increased at each stage of marketing. Graded samples picked up at the packing plant showed more punctures than samples of orchard-run fruit; puncturing continued to increase during transport of fruit to stores and while it was on display in the stores.

The pattern of bruising closely followed that of puncturing. Few of the displayed apples inspected after 2 or 3 days in the retail stores were free of noticeable bruising.

A serious consequence of the puncturing and bruising of the fruit was the decay that developed within 1 week after the apples had been prepackaged. About 25 percent of the fruit sampled in retail stores became rotted within that time when held at 70°F.

Several ways to reduce the damage to apples are discussed in this report.

BACKGROUND OF STUDY

The packaging of McIntosh apples in polyethylene bags for retail in the New York City area has become widespread. Some growers and merchants, however, have expressed considerable concern over the inferior condition of the apples retailed in this manner. Excessive bruising, cuts and punctures, overripeness, and decay were the quality-affecting conditions they mentioned most frequently. To assist those segments of the trade interested in marketing a better quality product, a survey on McIntosh apples packaged in polyethylene bags was undertaken during the marketing seasons of 1959-60 and 1960-61. The principal objectives were to determine the exact nature and extent of the loss in quality of the fruit and the causes contributing to this condition, and to consider possible corrective measures.

METHODS OF STUDY

Seven lots of McIntosh apples were surveyed, three in 1959-60 and four more in 1960-61. Lots were sampled in December, January, and March of both seasons and in

November of 1960. The fruit of the March sampling had been stored in a controlled-atmosphere storage. The apples originated from one Connecticut and six New York orchards and were in commercial warehouses for 2 to 6 months before they were packaged.

The fruit was packaged at a packinghouse about 60 miles north of New York City in the apple-growing region of the Hudson Valley. Usually, the grading and packaging were done the day the apples were received at the plant. Apples of U. S. No. 1 grade were packaged in coded 3- or 4-pound polyethylene bags. The bags were packed upright into cells formed by corrugated partitions, 8 (single tier) or 12 (double tier) to a master container.

The packaged fruit was then trucked the same day to a warehouse in New York City, and from there was distributed to local supermarkets by trucks, usually during the following early-morning hours. The size of a coded lot varied from 125 to 400 cartons and ordinarily constituted a day's supply to a distributing warehouse serving 100 to 125 retail chainstores.

Sampling. --Samples from each lot were obtained at the packinghouse and in the city supermarkets and brought to the laboratory for inspection. At the packinghouse, a sample of 3 to 5 field crates of orchard-run apples was collected, in addition to a 3- to 5-carton sample of packaged fruit. At the stores, a 2- to 4-carton sample was collected at time of delivery, followed by daily purchases of coded bags until none remained on display. In lot 7 an additional sample of three cartons was collected at a warehouse.

Inspections. --Representative portions of the packinghouse, warehouse, and retail samples were examined soon after they were picked up. The remaining portions were then held at 70°F. and examined after various intervals during the next 6 days. The examinations of the packaged fruit were timed to compare the different samples at equal intervals from the date of packaging. At each inspection one-quarter to one-half of the bags in a sample were examined, and the amount of decay, punctures, bruises, and other defects was recorded. An index rating of 0 (none) to 4 (severe) was used to evaluate bruise and puncture damage. Firmness was measured with a Magness-Taylor pressure tester. The orchard-run samples were similarly scored after grading out fruit that failed to meet U. S. No. 1 standards.

RESULTS

The retail quality of McIntosh apples in every lot surveyed was seriously impaired by the presence of two defects: Disfiguring punctures and unsightly bruises. These mechanical injuries, furthermore, resulted in considerable decay within 1 week after the fruit was packaged.

Punctures. --The incidence of skin breaks or punctures progressively increased in all lots at each marketing stage (tables 1 and 2). Punctures indexed from 0.1 to 0.4 in orchard-run samples. The higher incidence in the first year probably was related to the harvesting of a comparatively softer apple and possibly to rougher handling. Despite prior grading, most packaged samples picked up at the packing plant showed somewhat more puncturing than the orchard-run samples from which these apples were packed. There was a substantial increase in punctures, 40 to 100 percent, in the transport of packaged samples to stores. While fruit was on store shelves, puncturing continued to increase, averaging 0.9 in purchased retail samples. Furthermore, the punctures in these samples generally were deeper and more ragged. Most of the punctures were caused by stems. In lot 7, for instance, 96 percent of the apples visibly scarred by skin breaks were punctured by stems.

Bruising. --Essentially, the bruising pattern closely followed that of the punctures (tables 3 and 4). Apples indexed 0.5 to 1.3 before grading and from 1.0 to 1.5 after packaging. The greater initial bruise damage the second year in the orchard-run samples

was probably attributable to the effects of Hurricane Donna in 1960 and to the greater distances the fruit of lots 4, 6, and 7 were trucked to the packinghouse. Even so, much of this bruising was under 1/2 inch in diameter and was superficial and unobjectionable. Bruising in the packinghouse samples was confined mostly to areas less than 3/4 inch in diameter.

Fruit sampled on arrival at retail stores (R-O) showed at least a 50 percent increase in the bruise index over that of the packinghouse samples (tables 3 and 4). Bruises measuring more than 1 inch in diameter were more numerous, ranging from 7.6 to 29.2 percent. The good condition of the loads arriving at the distributing warehouses indicated that the 2-hour trip from the packinghouse caused little damage. This observation was supported by the warehouse sampling of lot 7, in which there was practically no change in bruising, although punctures had increased (table 4). Therefore it appeared that much of the additional damage sustained in R-O samples occurred after the apples had been delivered to the distributing warehouses.

After the fruit arrived at the retail stores, the amount of bruising increased (tables 3 and 4). Bruising indexed from 2.1 to 3.0 in the first day purchases (R-1) and was above 2.6 in most of the second and third day purchases (R-2, R-3). Few apples were free of noticeable bruising in these samples, and bruises measuring over 1 inch in diameter were common. Severely bruised tissues frequently leaked from cuts and punctures.

Decay.--The decay found in orchard-run samples ranged from 0.7 to 5.0 percent before grading and packaging. The greater amounts were found in lots sampled late in the marketing seasons. Gray mold and Alternaria rot were the common kinds of decay found in the orchard-run fruit.

Decay was no problem in bagged McIntosh apples until the fourth day after packaging. At the initial examinations only 10 decayed apples were found in 287 bags containing 3,533 apples, and 6 of these were found in retail purchases made on the third day (tables 5 and 6).

During the holding period, decay was negligible in the packinghouse and R-O samples for the first 3 days. Decay development heightened after 4 days and by the end of the sixth day 11.1 percent of the fruit in the packinghouse samples and 18.1 percent of the retail delivery samples were rotted. By comparison, 24.9 percent of the apples in the retail store samples, R-1 to R-3, had developed decay by the end of the holding period (tables 5 and 6).

Practically all the decay that developed during the holding period followed obvious bruise or puncture damage (tables 5 and 6). Blue mold rot caused the decay in 92 percent of the decayed fruit.

Firmness.--The initial firmness in the 1959-60 samples was low and variable; it averaged 9.8 pounds. Firmness decreased moderately during holding (table 1). Firmness in the 1960-61 samples was higher than in the 1959-60 samples, averaging 11.5 pounds initially and 10.2-10.4 pounds after holding. Lot 4 had the firmest apples and this fruit had the least amount of bruising and puncture damage during the sampling period. However, this relationship did not hold for fruit of lot 5, in which considerable bruise and puncture damage occurred despite the comparatively firm fruit in this lot (tables 2 and 4).

DISCUSSION

Bruises and punctures in McIntosh apples can be reduced by using reasonable care in the handling of the fruit from the orchard to the retail store and by protecting the fruit against mechanical injury.

The movement of apples from the tree to the store offers ample opportunities for mechanical injury. Schomer[1] has reported on methods to minimize bruising in the orchard and in the warehouse. While mechanized packaging will cause some damage to the fruit, proper management and supervision can easily contain the injury within tolerable limits, as Evans and Marsh[2] found in some Appalachian apple packinghouses. In the present study, considerable additional damage was done in trucking the fruit to retail stores. The loading of apples with sundry other food items in delivery trucks could have been a factor. Standing the bags upright in master containers could be another; Perkins[3] reported a reduction of bruise damage in an apple shipping test with bags lying on their sides. Brunk and Dominick[4] found bruising, for the most part, to be negligible in McIntosh apples that growers delivered, in bulk, directly to retail stores.

In the retail stores, the mechanical damage already present in apples was aggravated by handling of the fruit by shoppers in self-service departments. A display of obviously good quality fruit should be a logical way of obviating unnecessary handling. Unfortunately, no amount of restraint on the part of the shopper can negate the damage that is already present in the fruit when it arrives at the store. Bruises and punctures were found to be the principal defects of McIntosh apples in a recent survey of retail stores in Massachusetts.[5] In the study on which this report is based, the mechanical injury present in the apples at the retail level was damaging enough to discourage sales and subsequently to result in an undetermined amount of waste.

While the polyethylene bag is an inexpensive and convenient container, it provides apples little protection against bruising. The restriction of movement of apples against each other in packages, including packages for consumers, would result in fewer stem punctures. The protection of apples against mechanical injury through the use of molded pulpboard trays or cell inserts in consumer packages has been demonstrated.[6] Furthermore, such protective measures should reduce the decay that can be expected to follow if apples purchased by customers are not utilized promptly. However, the practicability of any protective measure depends largely upon economic considerations that lie outside the scope of this report.

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1 Schomer, H. A. Bruising of Apples: Where Does It Occur and How Can It Be Minimized? Proc. Wash. State Hort. Assoc. 53: 129-131. 1957.

2 Evans, H. C., and Marsh, R. S. Costs and Mechanical Injury in Handling and Packing Apples. W. Va. Agr. Expt. Sta. Bul. 416, 26 pp. 1958.

3 Perkins, F. A. Discovers Improved Method of Shipping Polypacked Apples. N. J. Agr. 42 (6): 3-5. 1960.

4 Brunk, M. E., and Dominick, B. A., Jr. Experiments Show What Makes Your Apples Sell. Proc. 96th Ann. Mtg. N. Y. State Hort. Soc. 1951.

5 Roberts, O. C. Causes and Effects of Mechanical Injuries to McIntosh Apples. Mass. Agr. Expt. Sta. Bul. 520. 39 pp. (undated.)

6 Perkins, F. A., and Underwood, J. W. Improved Consumer Packages for Maine McIntosh Apples. Maine Agr. Expt. Sta. Bul. 591, 21 pp. 1960.

TABLE 1.--Punctures found in McIntosh apple samples before and after bagging in packing plant and before and after display in New York City retail stores, 1959-60

Sample and lot No.[1]	Bags of apples examined[2]	No. of apples examined	Firmness (pounds pressure)[3]		Percentage of fruit with skin punctures				Total	Puncture index[5]
			Before holding at 70° F.	After holding at 70° F.[4]	1 puncture	2 punctures	3 punctures	4 or more punctures		
					Percent	Percent	Percent	Percent	Percent	
Orchard-run:[6]										
Lot 2	--	357	--	--	19.6	3.1	0.5	0.3	23.5	0.3
Lot 3	--	537	--	--	22.0	5.2	1.5	0	28.7	.4
Packinghouse:										
Lot 1	40	617	8.8	8.7	--	--	--	--	32.7	--
Lot 2	32	423	10.8	9.5	15.6	5.4	1.2	.7	22.9	.3
Lot 3	48	615	9.7	9.5	24.1	6.5	2.1	1.3	34.0	.5
On arrival at retail store (R-0):										
Lot 1	30	466	8.6	8.4	--	--	--	--	33.0	--
Lot 2	32	410	10.8	9.1	14.6	9.3	5.6	2.5	32.0	.6
Lot 3	48	601	9.8	9.7	25.1	11.2	4.5	1.3	42.1	.7
Purchased from retail stores:										
1st day (R-1):										
Lot 1	16	240	8.5	8.3	--	--	--	--	37.1	--
Lot 2	10	127	10.7	9.1	15.7	8.7	7.1	11.0	42.5	1.0
Lot 3	14	175	9.8	9.7	25.7	18.8	2.9	21.7	69.1	1.6
2d and 3d days (R-2,R-3):										
Lot 1	10	159	8.4	8.2	--	--	--	--	50.3	--
Lot 2	14	180	10.9-9.7	9.5-9.2	24.4	9.4	6.7	6.7	47.2	.9
Lot 3	8	99	9.8	9.8	22.2	14.1	15.2	15.2	66.7	1.6

[1] Apples of lots 1 and 3 were from New York; apples of lot 2 were from Connecticut. Lots 1 and 2 had been in cold storage for 3 and 4 months respectively; lot 3 had been in controlled atmosphere storage for 5 months and in cold storage for 24 days.

[2] 4-lb. bags in lots 1 and 2; 3-lb. bags in lot 3.

[3] Firmness of fruit was measured by a mechanical pressure tester on 5 apples from each bag and 2 tests per apple.

[4] Lot 1 samples were held in laboratory for 3 days at 70° F. minus stay in retail stores; samples of other lots were held for 6 days at 70° minus stay in stores.

[5] Based on average number of punctures per individual fruit.

[6] Decayed, undersized, shriveled, green, deformed, severely bruised, field- and insect-scarred apples were excluded.

TABLE 2.--Punctures found in McIntosh apple samples before and after bagging in packing plant and before and after display in New York City retail stores, 1960-61

Sample and lot No.[1]	Bags of apples examined[2]	No. of apples examined	Firmness (pounds pressure)[3]		Percentage of fruit with skin punctures				Total	Puncture Index[5]
			Before holding at 70° F.	After holding at 70° F.[4]	1 puncture	2 punctures	3 punctures	4 or more punctures		
					Percent	Percent	Percent	Percent	Percent	
Orchard-run:[6]										
Lot 4	--	433	--	--	6.9	1.9	0	0	8.8	0.1
Lot 5	--	345	--	--	14.5	2.0	0	0	16.5	.2
Lot 6	--	429	11.5	--	6.3	.9	0	0	7.2	.1
Lot 7	--	323	10.6	--	5.9	0	0.3	0	6.2	.1
Packinghouse:										
Lot 4	48	628	12.5	10.5	9.7	1.4	.2	0	11.3	.1
Lot 5	48	467	11.6	10.5	24.8	4.5	1.1	0.2	30.6	.4
Lot 6	48	528	11.4	10.3	14.2	3.0	1.0	0	18.2	.2
Lot 7	36	406	10.6	9.9	15.0	1.5	1.2	0	17.7	.2
Warehouse:										
Lot 7	36	418	10.2	9.9	20.6	3.8	.7	0	25.1	.3
On arrival at retail store (R-0):										
Lot 4	48	622	12.5	10.2	15.4	1.8	.2	0	17.4	.2
Lot 5	48	462	11.0	10.5	28.6	9.1	3.2	3.0	43.9	.7
Lot 6	36	395	10.9	10.3	15.0	5.3	1.0	0	21.3	.3
Lot 7	24	277	10.2	9.9	19.2	4.3	1.1	.7	25.3	.3
Purchased from retail stores:										
1st day (R-1):										
Lot 4	16	215	12.5	10.7	17.2	2.8	.5	.9	21.4	.3
Lot 5	8	80	10.9	10.6	22.5	16.3	6.2	3.8	48.8	.9
Lot 7	16	190	10.0	9.9	27.9	6.8	2.6	1.1	38.4	.5
2d day (R-2)										
Lot 4	14	186	12.1	10.4	19.9	3.8	1.6	.5	25.8	.3
Lot 5	12	113	10.7	10.3	25.7	15.9	6.2	5.3	53.1	1.0
Lot 6	15	163	10.7	10.2	24.5	8.0	1.2	2.5	36.2	.5
3d day (R-3):										
Lot 5	10	96	--	10.4	30.2	13.5	12.5	9.4	65.6	1.3
Lot 6	8	88	--	10.1	25.0	8.0	3.4	3.4	39.8	.6
Lot 7	10	120	9.9	9.7	27.5	5.0	3.3	4.2	40.0	.6

[1] Apples of lots 4, 6, and 7 were from western New York; apples of lot 5 were from the Hudson Valley. Lots 4, 5, and 6 had been held in cold storage 2, 3, and 4 months respectively; lot 7 had been held 6 months in controlled atmosphere storage and cold storage.
[2] 3-lb. units.
[3] Firmness of packaged fruit was measured by a mechanical pressure tester on 5 apples from each bag and 2 tests per apple.
[4] All samples were held for 6 days at 70° F. minus stay in warehouse or in stores.
[5] Based on average number of punctures per individual fruit.
[6] Decayed, undersized, shriveled, green, deformed, severely bruised, field- and insect-scarred apples were excluded.

TABLE 3.--Bruising found in McIntosh apple samples before and after bagging in packing plant and before and after display in New York City retail stores, 1959-60

Sample and lot No.[1]	Bags of apples examined[2]	No. of apples examined[3]	Percentage of apples bruised, by size of bruise					Bruise index[4]
			Under 1/2"	1/2"-3/4"	3/4"-1"	Over 1"	Total	
			Percent	Percent	Percent	Percent	Percent	
Orchard-run:[5]								
Lot 2	--	278	5.7	8.3	5.4	1.8	21.2	0.5
Lot 3	--	384	12.5	17.2	8.3	.3	38.3	.7
Packinghouse:								
Lot 1	40	415	24.6	19.5	7.9	4.6	56.6	1.1
Lot 2	32	409	20.8	15.9	13.0	2.9	52.6	1.0
Lot 3	48	578	33.4	24.9	7.4	.9	66.6	1.1
On arrival at retail store (R-0):								
Lot 1	30	312	12.5	18.6	19.2	24.7	75.0	2.1
Lot 2	32	382	12.6	18.1	24.6	23.0	78.3	2.1
Lot 3	48	550	28.9	28.5	16.6	7.6	81.6	1.7
Purchased from retail stores:								
1st day (R-1):								
Lot 1	8	151	7.3	11.9	17.2	49.0	85.4	2.8
Lot 2	10	112	12.5	18.8	18.7	33.9	83.9	2.4
Lot 3	14	140	8.6	16.4	26.4	44.3	95.7	3.0
2d and 3d days (R-2, R-3):								
Lot 1	10	79	16.5	20.2	22.8	26.6	86.1	2.3
Lot 2	14	162	9.9	21.6	25.9	34.6	92.0	2.7
Lot 3	8	79	3.8	17.7	24.1	54.4	100.0	3.3

[1] See footnote 1 in table 1.
[2] See footnote 2 in table 1.
[3] In lot 1, punctured apples were not scored for bruising; in lots 2 and 3, decayed punctured apples were not scored for bruising.
[4] Based on bruising averaged for all fruit in a sample. Range is 0-4, where 0 indicates no bruising and 1-4 correspond progressively to the extent of bruising as categorized in the table. The extent of bruising in one fruit was determined by a bruise or bruises in aggregate.
[5] Punctured, decayed, deformed, undersized, shriveled, green, field- and insect-scarred apples were excluded.

TABLE 4.--Bruising found in McIntosh apple samples before and after bagging in packing plant and before and after display in New York City retail stores, 1960-61

Sample and lot No.[1]	Bags of apples examined[2]	No. of apples examined	Percentage of apples bruised, by size of bruise					Bruise index[3]
			Under 1/2"	1/2"-3/4"	3/4"-1"	Over 1"	Total	
			Percent	Percent	Percent	Percent	Percent	
Orchard-run:[4]								
Lot 4	--	433	47.6	15.2	5.3	3.0	71.1	1.1
Lot 5	--	345	42.9	13.6	6.4	3.2	66.1	1.0
Lot 6	--	429	38.5	26.6	9.8	1.6	76.5	1.3
Lot 7	--	323	45.2	19.6	4.3	1.2	70.3	1.0
Packinghouse:								
Lot 4	48	628	47.2	20.2	5.7	1.9	75.0	1.1
Lot 5	48	467	43.0	24.4	7.1	4.3	78.8	1.3
Lot 6	48	528	48.7	21.0	6.1	1.7	77.5	1.2
Lot 7	36	406	36.2	24.9	14.8	6.1	82.0	1.5
Warehouse:								
Lot 7	36	418	35.4	26.8	14.1	5.7	82.0	1.5
On arrival at retail store (R-0):								
Lot 4	48	622	39.5	28.5	11.4	9.0	88.4	1.7
Lot 5	48	462	20.1	24.7	21.9	29.2	95.9	2.5
Lot 6	36	395	33.4	33.9	18.2	8.9	94.4	1.9
Lot 7	24	277	22.4	27.5	22.0	25.6	97.5	2.5
Purchased from retail stores:								
1st day (R-1):								
Lot 4	16	215	33.5	28.8	19.1	14.9	96.3	2.1
Lot 5	8	80	27.5	17.5	23.7	26.3	95.0	2.4
Lot 7	16	190	15.8	21.0	21.1	36.8	94.7	2.7
2d day (R-2):								
Lot 4	14	186	22.0	30.1	21.5	19.4	93.0	2.2
Lot 5	12	113	14.2	16.8	15.0	54.0	100.0	3.1
Lot 6	15	163	20.2	30.7	21.5	24.5	96.9	2.4
3d day:								
Lot 5	10	96	8.3	21.9	21.9	46.9	99.0	3.1
Lot 6	8	88	18.2	19.3	28.4	34.1	100.0	2.8
Lot 7	10	120	12.5	20.0	24.2	39.1	95.8	2.8

[1] See footnote 1 in table 2.
[2] See footnote 2 in table 2.
[3] Based on bruising averaged for all fruit in a sample. Range is 0 to 4, where 0 indicates no bruising and 1-4 correspond progressively to the extent of bruising as categorized in the table. The extent of bruising in one fruit was determined by a bruise or bruises in aggregate.
[4] Decayed, deformed, undersized, shriveled, green, field- and insect-scarred apples were excluded.

TABLE 5.--Decay found in McIntosh apples at time of sampling and after holding at 70° F., and its relationship to punctures and bruises, 1959-60

Lot and sample	Bags of apples examined	No. of apples examined	Percentage of fruit decayed at time of sampling				Bags of apples examined	No. of apples examined	Percentage of fruit decayed after holding[1]			
			Following punctures	Following bruises	Other	Total			Following punctures	Following bruises	Other	Total
			Percent	Percent	Percent	Percent			Percent	Percent	Percent	Percent
Lot 1:												
Packinghouse	15	235	0	0	0	0	15	227	0	0	0	0
Retail store arrival (R-0)	10	156	0	0	0	0	10	156	0.6	0	0.6	1.2
1st day purchases (R-1)	8	124	0	0	0	0	8	119	2.5	0	0	2.5
2d day purchases (R-2)	5	84	1.2	0	0	1.2	5	77	1.3	0	0	1.3
Lot 2:												
Packinghouse	12	152	0	0	0	0	10	135	9.6	0	0	9.6
Retail store arrival (R-0)	12	153	0	0	0.7	0.7	10	130	21.5	0	1.5	23.0
1st day purchases (R-1)	5	67	0	0	0	0	5	60	25.0	5.0	1.7	31.7
2d day purchases (R-2)	5	65	0	0	0	0	5	65	16.9	3.1	0	20.0
3d day purchases (R-3)	2	24	0	0	0	0	2	27	25.9	7.4	0	33.3
Lot 3:												
Packinghouse	16	204	0	0	0	0	16	205	18.0	1.5	0.5	20.0
Retail store arrival (R-0)	16	203	0	0	0	0	16	200	26.0	2.5	0	28.5
1st day purchases (R-1)	7	88	0	0	0	0	7	87	40.2	10.3	0	50.5
2d day purchases (R-2)	4	48	0	0	0	0	4	51	39.2	2.0	0	41.2
Total	117	1,603	<0.1	0	<0.1	0.1	113	1,539	14.5	1.6	0.4	16.4

[1] Lot 1 samples were held in the laboratory for 3 full days at 70° F. minus stay in stores. All other samples were held 6 full days at 70° F. minus stay in stores.

TABLE 6.--Decay found in McIntosh apples at time of sampling and after holding at 70° F., and its relationship to punctures and bruises, 1960-61

Lot and sample	Bags of apples examined	No. of apples examined	Percentage of fruit decayed at time of sampling				Bags of apples examined	No. of apples examined	Percentage of fruit decayed after holding[1]			
			Following punctures	Following bruises	Other	Total			Following punctures	Following bruises	Other	Total
			Percent	Percent	Percent	Percent			Percent	Percent	Percent	Percent
Lot 4:												
Packinghouse	16	211	0	0	0	0	16	211	0.9	0	0	0.9
Retail store arrival (R-0)	16	208	0	0	0	0	16	207	2.4	0	0	2.4
1st day purchases (R-1)	8	106	0	0	0	0	8	109	.9	0	0	.9
2d day purchases (R-2)	7	94	0	0	0	0	7	92	7.6	0	0	7.6
Lot 5:												
Packinghouse	16	153	0.7	0	0	0.7	16	155	9.0	0	0	9.0
Retail store arrival (R-0)	16	150	0	0	0	0	16	156	20.5	0.6	0.6	21.7
1st day purchases (R-1)	4	42	0	0	0	0	4	38	28.9	0	0	28.9
2d day purchases (R-2)	6	54	0	0	0	0	6	59	27.1	0	0	27.1
3d day purchases (R-3)	5	48	0	0	0	0	5	48	31.2	0	4.2	35.4
Lot 6:												
Packinghouse	16	179	0	0	0	0	16	178	5.6	0	0	5.6
Retail store arrival (R-0)	12	131	0	0	0.8	0.8	12	133	8.3	0	0.7	9.0
1st & 2d day purchases (R-1, R-2)	7	75	0	0	0	0	8	88	12.5	0	0	12.5
3d day purchases (R-3)	4	43	2.3	0	0	2.3	4	45	11.1	0	0	11.1
Lot 7:												
Packinghouse	9	99	0	0	0	0	18	201	15.9	4.0	0	19.9
Warehouse	9	105	0	0	0	0	18	209	16.7	1.9	1.0	19.6
Retail store arrival (R-0)	6	74	0	0	0	0	12	132	21.2	4.5	0.8	26.5
1st day purchases (R-1)	8	99	0	0	0	0	8	91	34.1	3.3	2.2	39.6
3d day purchases (R-3)	5	59	8.5	0	0	8.5	5	61	31.1	0	0	31.1
Total	170	1,930	0.4	0	< 0.1	0.4	195	2,213	12.9	1.0	0.4	14.3

[1] All samples were held in the laboratory for 6 full days at 70° F. minus stay in warehouse or stores.