Disorders in Apricot and Papaya Shipments to the New York Market, 1972–1985

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Annual production of apricot (*Prunus armeniaca* L.) in the United States is approximately 110,000 t (20), with California producing 96%. Only 10–12% of the crop is destined for the fresh market, dominated by California with small off-season shipments from Chile and New Zealand (18,19); the remainder is mostly canned or dried.

Papaya (*Carica papaya* L.) production in the United States increased fivefold from 1970 to 1984, when it totaled 55,000 t. Practically all U.S. papayas are produced in Hawaii. This fruit is a relatively recent commercial introduction to the mainland, especially on the East Coast, which also receives papaya shipments from Central and South America and the Caribbean (18–20).

These commodities are often examined at arrival by USDA inspectors on the New York market. Most inspections are conducted on shipments in which the grade is questioned by receivers. This report, a compilation and analysis of data obtained from these certificates, is another in a series of articles (1–16) illustrating problems encountered in marketing fresh produce.

Apricots. USDA personnel inspected 259 shipments of apricots representing 17% of the volume delivered to the New York market during 1972–1985 (Tables 1 and 2). Eight parasitic diseases, eight physiological disorders, and six kinds of injuries were named or described in 132, 267, and 234 occurrences, respectively (Table 3). The disorder reported most often was a brown discoloration of the fruit surface. Bruise damage was second in frequency.

Inspectors reported unidentified decays in more shipments than any single, identified parasitic disease (Table 3). These decays were generally in early stages of development and without characteristic signs for positive identification; many may have been brown rots. Rhizopus rot (*R. stolonifer*), gray mold rot (*Botrytis cinerea*), and blue mold rot (*Penicillium* sp.) were also found in a substantial number of shipments. Brown rot (*Monilinia fructicola, M. laxa*) was identified in only three shipments. A mushy brown rot and a soft rot were reported rarely and were probably yeast infections.

Brown discoloration, arbitrarily categorized as a physiological disorder, was reported in 64.2% of the 204 inspected shipments from California and was distributed in all incidence classes, from the lowest (1–5% in a shipment affected) to the highest (>50% in a shipment affected) (Table 4). This disorder can occur also from fruits rubbing against each other and against packaging material (17). Soft fruit was another disorder reported in a substantial number of shipments in all incidence classes. Other physiological disorders, such as misshapen fruit and shriveling, occurred infrequently. Bruise damage, reported in 44.6% of the California shipments, was due to either impact or compression stresses and was the second most important disorder. Scarring and cuts/punctures were other mechanical injuries reported separately. The most damaging parasitic disease in California apricots was Rhizopus rot, although unidentified decays were reported in more shipments.

Papayas. Some 285 shipments containing 17% of the papaya

Table 1. Volume of apricots and papayas shipped to the New York market, 1972–1985

Year	Number of 45,400-kg units	
	Apricots	Papayas
1972	12	...[a]
1973	13	...
1974	14	...
1975	15	...
1976	13	...
1977	12	...
1978	8	9
1979	15	9
1980	22	10
1981	14	11
1982	8	8
1983	11	3
1984	21	10
1985	13	6
Total	191	66

[a] Volumes too small or not recorded.

Table 2. Shipments of apricots and papayas inspected by the USDA on the New York market, 1972–1985

Year	Apricots		Papayas	
	Shipments (no.)	Packs[a] (no.)	Shipments (no.)	Packs[b] (no.)
1972	15	13,412	1	221
1973	16	12,707	0	0
1974	3	1,202	0	0
1975	25	14,902	6	1,386
1976	11	5,304	5	1,180
1977	1	1,100	8	1,792
1978	10	6,091	6	1,735
1979	11	6,042	3	616
1980	8	4,350	15	6,253
1981	9	3,685	41	13,706
1982	12	5,672	42	14,688
1983	46	15,299	22	8,168
1984	60	31,742	66	23,822
1985	32	10,397	70	37,246
Total	259[c]	131,905	285[d]	110,813

[a] Cartons with 10.9 kg net weight.
[b] Cartons with 4.5 kg net weight.
[c] From five states and three foreign countries.
[d] From Hawaii mainly and five foreign countries.

Table 3. Disorders reported in USDA inspections of 259 apricot shipments on the New York market, 1972–1985

Parasitic diseases	Shipments (no.)	Physiological disorders	Shipments (no.)	Injuries	Shipments (no.)
Unidentified decays	44	Brown discoloration	158	Bruise damage	110
Rhizopus rot	36	Soft fruit	90	Grade defects[a]	64
Gray mold rot	23	Misshapen fruit	7	Scarring	36
Blue mold rot	22	Sunken discoloration	5	Cuts/punctures	18
Brown rot	3	External discoloration	2	Freeze damage	5
Mushy brown rot	2	Shriveling	2	Insect damage	1
Soft rot	1	Growth cracks	2		
Anthracnose	1	Overripe fruit	1		

[a] Russeting, stem punctures, skin breaks, and insect scale marks.

Table 4. Frequency of disorders reported in USDA inspections of 204 California apricot shipments on the New York market, 1972–1985

Disorder	Shipments affected (%)	Number of shipments affected according to incidence class (% fruit)						
		0	1–5	6–10	11–20	21–33	34–50	>50
Brown discoloration	64.2	73	12	36	35	29	15	4
Bruise damage	44.6	113	43	22	23	1	2	0
Soft fruit	30.4	142	21	15	19	2	2	3
Grade defects	27.5	148	42	14	0	0	0	0
Unidentified decays	17.2	169	35	0	0	0	0	0
Rhizopus rot	14.7	174	10	8	11	0	1	0
Scarring	13.2	177	20	7	0	0	0	0
Blue mold rot	8.8	186	12	3	3	0	0	0
Gray mold rot	7.4	189	9	4	2	0	0	0
Cuts/punctures	6.9	190	13	1	0	0	0	0
Misshapen fruit	3.4	197	7	0	0	0	0	0
Brown rot	1.5	201	1	1	1	0	0	0
Sunken discoloration	1.5	201	2	0	1	0	0	0
Shriveling	1.0	202	1	1	0	0	0	0
External discoloration	1.0	202	0	2	0	0	0	0
Growth cracks	1.0	202	0	2	0	0	0	0
Freeze damage	1.0	202	0	1	1	0	0	0
Miscellaneous[a]	2.0	200	3	0	0	0	1	0

[a] Anthracnose, soft rot, insect damage, and overripe fruit.

Table 5. Disorders reported in USDA inspections of 285 papaya shipments on the New York market, 1972–1985

Parasitic diseases	Shipments (no.)	Physiological disorders	Shipments (no.)	Injuries	Shipments (no.)
Anthracnose rot	149	Overripe fruit	122	Bruise damage	49
Anthracnose	31	Soft fruit	54	Scarring	6
Stem-end rot	25	Brown discoloration	18	Cuts/punctures	2
Unidentified decays	17	Sunken discoloration	16	Freeze damage	1
Gray mold rot	15	Shriveling	3		
Rhizopus rot	9	Misshapen fruit	1		
Blossom-end rot	3				
Blue mold rot	3				
Bacterial soft rot	3				
Brown mushy rot	2				

volumes delivered to the New York market were examined by USDA inspectors during 1972–1985 (Tables 1 and 2). Nine parasitic diseases, six physiological disorders, and four kinds of injuries were named or described in 257, 214, and 58 occurrences, respectively (Table 5). Anthracnose rot (*Colletotrichum gloeosporiodes*), overripe fruit, and bruise damage were the disorders reported most frequently in their respective categories.

Anthracnose was the major disorder reported in the 209 inspected shipments from Hawaii (Table 6). The rot stage of anthracnose was found in 62.2% of these shipments, seriously damaging 90%. Anthracnose limited to the rind (chocolate spot) was reported in 12.1% of the inspections. Another damaging disease was stem-end rot (*Diplodia natalensis* and other fungi), reported in 9.6% of the inspected shipments. Other important diseases were gray mold rot (*Botrytis* sp.) and unidentified decays; blossom-end rot (*Alternaria* and *Cladosporium* spp.) and Rhizopus rot occurred less frequently. There were isolated reports of bacterial soft rot, brown mushy rot, and blue mold rot (*Penicillium* sp).

Table 6. Frequency of disorders reported in USDA inspections of 209 Hawaii papaya shipments on the New York market, 1972–1985

Disorder	Shipments affected (%)	Number of shipments affected according to incidence class (% fruit)						
		0	1–5	6–10	11–20	21–33	34–50	>50
Anthracnose rot	62.2	79	14	36	29	30	10	11
Overripe fruit	47.4	110	14	11	28	27	11	8
Soft fruit	16.7	174	4	16	7	7	1	0
Bruise damage	14.8	178	8	11	9	3	0	0
Anthracnose	12.1	182	6	7	7	5	2	0
Stem-end rot	9.6	189	3	6	4	4	1	2
Sunken discoloration	6.7	195	5	4	5	0	0	0
Gray mold rot	4.8	199	0	6	1	2	1	0
Unidentified decays	4.3	200	9	0	0	0	0	0
Brown discoloration	1.9	205	1	1	2	0	0	0
Blossom-end rot	1.4	206	2	0	0	1	0	0
Rhizopus rot	1.4	206	0	2	1	0	0	0
Shriveling	1.4	206	0	1	2	0	0	0
Bacterial soft rot	1.0	207	0	1	0	0	0	1
Brown mushy rot	1.0	207	1	0	1	0	0	0
Blue mold rot	0.5	208	1	0	0	0	0	0

Overripe fruit was noted in nearly one-half of the inspections and was distributed in all incidence classes (Table 6). Soft fruit was reported in 16.7% of the inspected shipments and may or may not be synonymous with overripe fruit. Other physiological disorders reported were sunken discoloration (6.7%), brown discoloration (1.9%), and shriveling (1.4%). The only injury reported in shipments of papaya from Hawaii was bruise damage, but this occurred in 14.8% of the shipments.

Summary. The information presented in this report is not intended to be representative of the arrival condition of all apricot and papaya shipments to the New York market. However, we consider the findings of inspections of about 3,200 packs from 544 shipments to be a reliable index of the problems affecting the quality of these crops. The information in this report emphasizes the need for formulating measures to reduce the severity of these disorders and their incidence during marketing.

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