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The Fruit Industry of Argentina

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For many years Argentina has supported a growing livestock and cereal industry, but the serious cultivation of fruit is a comparatively recent development. In fact, commercial fruit growing is associated with the relatively recent expansion of the Argentine railway system. From 1900 to 1930 railway mileage increased from about 10,000 to 25,000 miles.

Since Government authorities originally took little interest in determining the possibilities of growing various crops in the new and undeveloped regions, it fell largely to the railroads to do the necessary pioneering work. They established nurseries and experimental stations at different points and employed specialists and scientists to conduct research and extension work. Along with other things, the question of fruit growing on a commercial basis was explored, and it is because of these investigations that large-scale operations were attempted. These reflect the size of the country itself and the tremendous holdings of the individual.

Because of its wide range of latitude, Argentina is capable of growing practically all kinds of fruits. In the northern and eastern parts of the country, citrus and subtropical fruits do very well, while deciduous fruits are grown chiefly in the southern, western, and eastern areas. While commercial fruit growing has been developed in several widely scattered zones, export supplies are produced largely in the arid or semiarid regions where soil and climatic conditions are most suitable for these specialized crops. The growing of cultivated crops in the arid regions has been restricted by the amount of available water. It was not until large dams were constructed and sufficient water made available that planting of trees took place on a commercial scale.

Since there are no areas given over to the production of one special kind of fruit, with the possible exception of citrus, it is rather difficult to describe the various districts without resorting to a certain amount of repetition. There is no Santa Clara Valley growing pears almost exclusively, or Wenatchee or Shenandoah Valley specializing in apples. In the deciduous areas, each grower produces a general variety of apples, pears, stone fruits - whatever kinds or species strike his fancy or appear to be best suited to his particular location. The same holds for citrus, except in the Delta and Atlantic districts, where both deciduous and citrus may be produced.

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FRUIT-GROWING REGIONS OF ARGENTINA



KEY TO PRODUCING REGIONS DESIGNATED IN ORDER OF THEIR IMPORTANCE

Deciduous Areas

1. BUENOS AIRES (Nonirrigated)
 - a. Delta Islands - San Nicolas
 - Height above sea level..... 95 feet
 - Annual rainfall..... 35 inches
 - Distance from Buenos Aires..... 100 to 150 miles (3-5 hrs.)
 - b. Atlantic District
 - Height above sea level..... 33 feet
 - Annual rainfall..... 37 inches
 - Distance from Buenos Aires..... 30 to 235 miles (1-9 hrs.)
2. CUYO REGION (Irrigated)
 - a. Mendoza
 - Height above sea level..... 2350 feet
 - Annual rainfall..... 8 inches
 - Distance from Buenos Aires..... 625 miles (20-24 hrs.)
 - b. San Juan
 - Height above sea level..... 2175 feet
 - Annual rainfall..... 3.4 inches
 - Distance from Buenos Aires..... 760 miles (24-26 hrs.)
3. RIO NEGRO - NEUQUEN (Irrigated)
 - Height above sea level..... 870 feet
 - Annual rainfall..... 6.3 inches
 - Distance from Buenos Aires..... 670-750 miles (25-26 hrs.)

Citrus Areas

- A. CORRIENTES (Nonirrigated)
 - Height above sea level..... 177 feet
 - Annual rainfall..... 50 inches
 - Distance from Buenos Aires..... 670 miles (36 hrs.)
- B. ENTRE RIOS (Nonirrigated)
 - Height above sea level..... 78 feet
 - Annual rainfall..... 41 inches
 - Distance from Buenos Aires..... 340 miles (18 hrs.)
- C. MISIONES (Nonirrigated)
 - Height above sea level..... 452 feet
 - Annual rainfall..... 60 inches
 - Distance from Buenos Aires..... 675 miles (36 hrs.)
- D. NORTHERN AREA
 1. Tucuman (Nonirrigated)
 - Height above sea level..... 1450 feet
 - Annual rainfall..... 38 inches
 - Distance from Buenos Aires..... 720 miles (24 hrs.)
 2. Jujuy - Salta (nonirrigated)
 - Height above sea level..... 4000 feet
 - Annual rainfall..... 26-38 inches
 - Distance from Buenos Aires..... 900-980 miles (35-40 hrs.)
- E. PARANA DELTA
 - (see I.)

FIGURE 1.

TABLE 1.—Number of fruit trees and vines in Argentina and declared production, 1937

KIND	NUMBER OF TREES			PRODUCTION 1,000 short tons
	NONBEARING	BEARING	TOTAL	
Pome fruits:	Thousands	Thousands	Thousands	
Apples	2,543	4,082	6,625	49.5
Pears	1,931	3,130	5,061	43.8
Quinces	1,036	2,006	3,042	16.6
Total	5,510	9,218	14,728	109.9
Stone fruits:				
Peaches	5,534	8,510	14,044	69.5
Plums	914	1,157	2,071	14.4
Apricots	335	421	756	7.0
Sweet cherries	185	321	506	3.7
Sour cherries	18	35	53	0.3
Nectarines	1	1	2	(1)
Total	6,987	10,445	17,432	94.9
Citrus fruits:				
Sweet oranges	5,347	3,879	9,226	123.1
Mandarins	1,915	1,871	3,786	29.8
Lemons	446	274	720	6.5
Grapefruit	86	71	157	2.8
Bitter oranges	63	24	87	0.8
Limes	13	17	30	0.3
Shaddocks	4	2	6	(1)
Kumquats	10	9	19	(1)
Others	112	31	143	0.4
Total	7,996	6,178	14,174	163.7
Miscellaneous fruits:				
Bananas	286	333	619	2.3
Figs	104	188	292	2.1
Japanese medlars ...	1	3	4	(2)
Tamarinds	74	453	527	0.9
Pomegranates	38	71	109	0.4
Persimmons	3	13	16	0.2
Alligator pears	6	4	10	0.1
Guavas	9	10	19	0.1
Chirimoyas	4	3	7	(1)
Mangoes	1	(2)	1	(1)
Total	526	1,078	1,604	6.1
Total tree fruits:	21,019	26,919	47,938	374.6
	NUMBER OF VINES			
Grapes:				
Wine	5,231	445,098	450,329	1,266.1
Table	1,824	34,904	36,728	162.3
Raisin	180	2,605	2,785	11.6
Total	7,235	482,607	489,842	1,440.0

¹ Less than 50 short tons.

² Less than 500 trees.

Argentine National Agricultural Census, June 30, 1937.

From 1922 to 1926 orchards were established on a commercial basis, but it was not until 1932 or 1933 that shipments began to reach significant proportions. Early successes in the Río Negro Valley stimulated interest in other areas and caused the subsequent development of the industry to its present state. Much of the planting has been made on the basis of trial and error. Certain orchards and districts will be maintained; others are already doomed to failure. That is the history of fruit growing in any new country.

According to the 1937 census, Argentina produced a total of 1,815,000 short tons of fruit, including grapes. Since that time, however, production has increased considerably. A large part of the plantings established in the irrigated zones had not come into full production when these figures were compiled. In fact, it was not until 1935 that a surplus in certain fruits began to develop. From 1937 to 1939 pear loadings

increased from 2,029,000 boxes to 3,264,000 boxes, while apples increased from 1,817,000 boxes to 2,342,000 during the same period. Other fruits, such as peaches, plums, oranges, and lemons, showed even greater increases, with similar trends developing for practically all types of fruits. The number of nonbearing trees in 1937 was 21,019,000 against 26,919,000 bearing trees.

With a total of 26,919,000 bearing trees in 1937, producing 375,000 short tons of fruit, it is reasonable to assume that a total of 47,938,000 trees in a few years' time will be capable of producing in the neighborhood of 660,000 tons.

PRODUCTION AND MARKETING OF DECIDUOUS FRUITS

The progress made in the production of tree fruits in Argentina during the past decade is one of the outstanding features of the world fruit picture. Within 10 years the country changed from a net importer of fruits to a net exporter. Argentine fruit was virtually unknown on world markets prior to 1935. Before the present war dislocated the trade, however, Argentine fruit, especially apples, pears, and grapes, were firmly established on European and American markets. Grapes have been produced commercially in Argentina since the days of the earliest settlers. Tree fruits, however, such as apples, pears, peaches, and plums, are products of the late twenties and early thirties.

As late as 1931 Argentina was importing on an average of about three-fourths of a million bushels of apples annually from the United States. In order to protect her own rapidly expanding industry, however, drastic measures designed to restrict imports were introduced. These measures proved so effective that imports the following year were reduced by 75 percent, and since then have been progressively smaller, amounting to only 50,000 boxes in 1940. In 1933 Argentina undertook to develop markets abroad and exported about 11,000 boxes, principally to Brazil and the United Kingdom. Each succeeding season shipments increased, reaching a total in 1939 of 593,000 boxes to some 12 to 15 different countries.

For pears, progress has been even more significant. Freight loadings for all districts rose from 444,000 boxes in 1932 to 3,264,000 boxes in 1939. Exports in turn increased from 63,000 boxes in 1933 to 1,417,000 boxes in 1939. The development of other fruits has been in proportion. The grape industry increased so rapidly that a crisis of overproduction was reached in 1933 and a rather drastic readjustment was necessary. Exports, however, rose consistently from 5,975 short tons in 1930 to 10,087 tons in 1939.



FIGURE 2.—View of a young apple planting on the Estancia Villa Maria.

TABLE 2.—Exports of apples from Argentina, by country of destination, 1933-40¹

COUNTRY	1933	1934	1935	1936	1937	1938	1939	1940
	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes
Germany	50	250	8,250	800	14,300	34,400	201,900	0
Brazil	3,800	2,300	5,750	43,750	54,200	52,400	90,600	125,502
Sweden	0	0	1,150	28,800	38,500	41,000	62,500	11,508
United Kingdom:	5,650	3,900	17,300	18,300	30,400	7,750	56,650	32,357
France	0	700	1,550	59,350	37,400	20,800	52,700	2
Netherlands ..	0	0	0	10,200	9,450	0	55,700	13,078
Switzerland ..	0	0	29,450	3,300	3,800	4,200	15,600	33,933
Uruguay	250	50	650	1,350	2,200	3,600	4,750	760
Paraguay	850	450	250	200	1,750	2,700	2,350	2,473
Norway	0	0	0	2,950	750	650	3,350	50
Italy	0	300	1,500	1,500	13,200	5,900	2,100	4,015
Spain	350	1,200	7,700	22,750	50	0	0	0
United States:	0	0	0	0	0	0	0	20,360
Others	0	100	1,400	7,800	64,600	35,700	44,950	60
Total	10,950	9,250	74,950	201,050	270,600	209,100	593,150	244,098

¹ In boxes of 44 pounds.
1933-38, Argentine General Bureau of Statistics; 1939, Boletín Informativo, Argentine Ministry of Agriculture.

TABLE 3.—Imports of apples into Argentina, by country of origin, 1935-40¹

COUNTRY	1935	1936	1937	1938	1939	1940
	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes
United States ...	197,800	129,250	127,000	66,200	120,000	50,550
Canada	15,600	5,650	13,350	30,950	8,450	52,400
New Zealand	7,100	-	-	5,200	-	-
Chile	-	-	-	150	-	-
Total	220,500	134,900	140,350	102,500	128,450	102,950

¹ In boxes of 44 pounds.
Boletín Informativo, Argentine Ministry of Agriculture, June 1940.

Quantity and Variety of Production

Apples

The most rapid development in apple production has occurred in the irrigated districts, particularly in the Río Negro Valley.

TABLE 4.—Number of trees and declared production of apples in Argentina, 1937

REGION	NUMBER OF TREES ¹			PRODUCTION
	NONBEARING	BEARING	TOTAL	
	: Thousands	: Thousands	: Thousands	: 1,000 boxes ²
Río Negro Valley ..	651	590	1,241	742.6
Mendoza	281	411	692	171.4
Buenos Aires	1,143	2,563	3,706	1,037.4
San Juan	65	130	195	51.7
Others	404	388	792	245.4
Total	2,544	4,082	6,626	2,248.5

¹ Estimated plantings since 1937, about 500,000 trees.

² Of 44 pounds.

Argentine National Agricultural Census, June 30, 1937.

In 1932 shipments from the Río Negro district amounted to but 135,000 boxes as against 1,327,000 boxes in 1939. The Cuyo (Mendoza) area in 1932 shipped 42,000 as against 222,000 boxes in 1939. Statistics for the other districts are unavailable

prior to 1936, but shipments from the Delta district show an increase of about 31 percent from 1936 to 1939. The Province of Buenos Aires, which to date has not figured prominently in the apple picture, is expected to become an important producing region in the near future. Large plantings were established in the late thirties and are just beginning to come into bearing.

TABLE 5.—Freight loadings of apples in Argentina, by producing regions, 1932-39¹

YEAR	RÍO NEGRO VALLEY	CUYO REGION	PARANÁ DELTA ²	TOTAL
	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1932	135	42	-	-
1933	190	-	-	-
1934	197	70	-	-
1935	474	77	-	-
1936	589	235	606	1,430
1937	1,025	119	673	1,817
1938	1,175	304	782	2,261
1939	1,327	222	793	2,342

¹ In boxes of 44 pounds.

² No statistics for Province of Buenos Aires except for the Delta.

Traffic departments of the Southern, Pacific, and Western Railway Companies.

TABLE 6.—Forecasted production of apples in the Río Negro Valley, Argentina, by varieties, 1941, 1943, and 1945

VARIETY	NUMBER OF TREES, 1935	FORECASTED PRODUCTION ¹		
		1941	1943	1945
	Thousands	1,000 boxes	1,000 boxes	1,000 boxes
Delicious	235.1	704.6	841.1	917.0
Rome Beauty	147.8	450.4	539.1	578.3
Red Delicious	119.2	201.1	366.5	451.1
Jonathan	95.8	304.7	347.3	374.2
King David	94.3	244.1	321.1	361.7
Glengyle Red	28.5	95.9	109.1	113.7
Stayman Winesap ...	10.1	37.2	39.6	40.6
Gravenstein	6.1	22.7	24.8	25.3
Winter Banana	4.6	16.6	18.3	18.6
Monroe's Favorite ..	3.4	13.2	13.6	13.7
Huidobro	3.4	12.3	13.8	13.9
Black Jonathan	1.7	1.9	4.4	6.0
Reinette du Canada :	1.7	5.2	6.0	6.5
Calville Rouge	0.9	1.9	2.7	3.3
Calville	0.9	3.0	3.3	3.5
Cleopatra	0.7	1.9	2.4	2.7
Winesap	0.6	1.2	1.8	2.3
Hoover	0.5	2.1	2.2	2.3
Cox Orange Pippin ..	0.3	1.4	1.4	1.4
Granny Smith	0.2	0.9	0.9	1.0
Spitzenberg	0.2	0.7	0.8	0.8
Golden Delicious ..	0.2	0.5	0.7	0.7
Black Winesap	0.2	0.4	0.5	0.6
Others	20.9	46.9	55.4	59.8
Total	777.3	2,170.8	2,716.8	2,999.0

¹ In boxes of 44 pounds.

Argentine Fruit Distributors, Buenos Aires.

The Government has made no attempt to make production forecasts, but the Argentine Fruit Distributors, a shipping organization heavily interested in the Río Negro Valley, has predicted a crop of just under 3 million boxes by 1945. This is an increase of about 38 percent above the forecasted 1941 crop. This forecast is based

upon tree population, acreage, and past performance records. The number of trees by variety, for the country as a whole, is unavailable, but the breakdown as shown in table 6, for the Río Negro district, is more or less typical of the other sections. Delicious is the predominating variety in all districts, followed by Rome Beauty, Jonathan, King David, Glengyle Red, Stayman Winesap, etc.

Pears

The production of pears has expanded more rapidly and has been on a larger scale than that of apples.

TABLE 7.—Number of trees and declared production of pears in Argentina, by Provinces, 1937

PROVINCE	NUMBER OF TREES			PRODUCTION <i>Short tons</i>
	NONBEARING	BEARING	TOTAL	
Río Negro	685,534	1,071,932	1,757,466	25,210
Mendoza	511,547	989,327	1,500,874	10,076
Buenos Aires	392,247	637,969	1,030,216	4,007
Córdoba	60,877	136,258	197,135	1,229
Others	280,281	294,740	575,021	3,270
Total	1,930,486	3,130,226	5,060,712	43,792

Argentine National Agricultural Census, June 30, 1937.

In 1932 pear loadings for the entire country were estimated at 444,000 boxes, the irrigated districts accounting for 266,000 of the total. In 1939, when records from the Delta region were available, freight loadings reached a total of 3,264,000 boxes, with the irrigated districts contributing 3,185,000 boxes.

TABLE 8.—Freight loadings of pears in Argentina, by producing regions, 1932-39¹

YEAR	RÍO NEGRO VALLEY	CUYO REGION	PARANÁ DELTA	TOTAL
	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>
1932	202	164	2 78	444
1933	288	304	2 78	670
1934	402	414	2 78	894
1935	674	412	2 87	1,173
1936	1,002	583	117	1,702
1937	1,616	332	81	2,029
1938	1,748	805	83	2,636
1939	2,302	883	79	3,264

¹ In boxes of 44 pounds.

² Estimated.

Traffic departments of the Southern, Pacific, and Western Railway Companies.

The greatest development has occurred in the Río Negro Valley, which has an estimated total of about 2 million pear trees. The region began to attract local attention in 1932 but did not gain international recognition until 1935, the year substantial shipments began arriving on European markets. Freight loadings increased from 202,000 boxes in 1932 to 2,302,000 in 1939. Exports increased in proportion to production, in 1933 and 1934 averaging around 74,000 boxes and rising sharply in 1935 to 256,000 boxes. By 1939 exports reached a total of 1,417,000 boxes.

The Williams (Bartlett) has been the predominating variety, contributing about 75 percent of the total tonnage. Recent plantings of late winter varieties are

expected to bring about a more equable distribution of production throughout the season in the near future. It is estimated that, by 1945, 50 percent of the pears produced in the Río Negro will consist of Williams, with some 25 or 30 later maturing varieties making up the balance.

TABLE 9.—Exports of pears from Argentina, by country of destination, 1933-40¹

COUNTRY	1933	1934	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
United Kingdom:	23,904:	19,064:	85,600:	196,067:	191,414:	266,904:	331,332:	50,060
Brazil	35,980:	56,839:	120,951:	126,179:	153,594:	198,733:	239,131:	214,366
France	1,428:	715:	21:	69,079:	147,982:	236,687:	320,370:	0
Spain	1,160:	3,015:	4,691:	41,514:	0:	0:	0:	0
Sweden	0:	2:	1,933:	31,290:	55,124:	119,683:	217,782:	41,200
United States :	0:	20:	3,765:	14,487:	73,751:	42,861:	96,831:	262,458
Netherlands ..:	0:	711:	3,850:	17,181:	4,290:	16,613:	121,418:	28,958
Belgium	0:	0:	750:	6,692:	12,201:	14,413:	37,025:	8,150
Switzerland ..:	128:	510:	13,036:	11,409:	5,180:	0:	14,491:	13,536
Italy	0:	414:	3:	0:	3,001:	11,705:	3,150:	9,081
Africa	0:	0:	1,295:	5,689:	8,851:	4,779:	7,622:	0
Germany	455:	2,740:	2,140:	0:	0:	750:	0:	0
Paraguay	188:	538:	3:	90:	1,054:	3,111:	2,121:	1,975
Others	77:	66:	17,968:	241:	1,702:	6,852:	25,902:	11,826
Total	63,320:	84,634:	256,006:	519,918:	658,144:	923,091:	1,417,173:	641,609

¹ In boxes of 44 pounds.

1933-34, Argentine General Bureau of Statistics; 1935-40, Boletín Informativo, Argentine Ministry of Agriculture.

TABLE 10.—Forecasted production of pears in the Río Negro Valley, Argentina, by varieties, 1941, 1943, 1945

VARIETY	NUMBER OF TREES, 1935	FORECASTED PRODUCTION ¹		
		1941	1943	1945
	<i>Thousands</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>
Williams	956.9	3,038.2	3,325.8	3,486.9
Passe Crassane ...:	190.2	299.4	534.4	732.0
Areberg	110.0	177.2	331.6	431.7
Anjou	104.8	142.4	309.9	449.6
Manzanita	80.7	154.9	225.0	274.4
Flemish Beauty ...:	41.6	79.9	127.2	159.3
Comice	33.5	52.1	101.8	141.3
Angouleme	31.4	55.5	80.9	99.3
Winter Nelis	24.9	41.3	78.7	106.4
Alencon	19.1	43.5	72.7	91.5
Winter Bartlett ..:	18.3	43.1	59.7	67.0
Diel	17.2	36.6	55.3	64.6
Bosc	14.8	31.1	54.9	68.3
Packham's	14.2	35.2	48.5	56.7
Hiver	7.9	19.7	27.6	31.9
Bonne Louise	4.3	15.1	18.1	18.5
P. Barry	3.3	9.6	13.6	15.3
Cura	3.1	11.4	12.2	12.2
Malines	1.6	2.8	4.8	6.9
Franco Russe	1.6	3.4	5.1	6.6
Hardy	1.5	3.5	5.3	6.3
Amanlis	1.1	5.1	5.3	5.4
Kieffer's	0.9	4.4	4.5	4.5
Clapp's Favorite ..:	0.8	1.9	2.8	3.2
Esperens	0.3	1.1	1.4	1.5
Others	64.2	131.6	196.3	243.5
Total	1,748.4	4,440.0	5,703.4	6,586.8

¹ In boxes of 44 pounds.

Argentine Fruit Distributors, Buenos Aires.

Pear trees in the Cuyo region are almost as numerous as in the Rio Negro, but with a slightly larger percentage of nonbearing age. Crops are less certain than in the Río Negro, and the appearance of the fruit leaves something to be desired. Plantings are practically stationary; in fact, they are being discouraged. Pears from the Mendoza district are apt to figure less prominently in the fresh fruit trade, with larger quantities going to the processing plants.

Pear production in the Atlantic and Delta regions is not significant. The quality of the fruit does not compare with that produced in the irrigated zones. Compared with other tree fruits, pears rank well down on the list.

Quinces

Quince production in Argentina is an important industry. About 3 million trees are producing about 17,000 tons annually. While plantings are distributed generally throughout the various fruit-growing regions, the heaviest concentration is in the Delta region. The fruit is produced for the manufacture of quince preserve, or quince paste, a product which vies in popularity with marmalade on the Englishman's table. Blight, which is a limiting factor in the production of quinces in the United States, has not yet appeared in Argentina.

Stone fruits

The production of stone fruits, particularly peaches, plums, apricots, and cherries, is rapidly increasing in importance. In 1937 the total plantings for the country as a whole amounted to approximately 17½ million trees. In more recent years plantings have increased rather rapidly, especially in the Mendoza and Delta districts.

Peaches rank first in order of importance; in fact, they greatly exceed the combined number of all other stone-fruit trees. The most important producing region is in the Province of Buenos Aires around San Nicolás and the Delta islands, with the Province of Mendoza a close second. Peaches in the Mendoza area represent about 75 percent of all tree fruits, including apples, pears, and quinces.

Plums are also produced most abundantly in the Province of Buenos Aires and are used principally in the manufacture of byproducts. Seventy-two percent of the trees are of bearing age. The second most important producing area is the Mendoza district, where plums are grown for both fresh and processing purposes. Practically all plums exported from Argentina in the fresh state are produced in the Mendoza area. Less than 50 percent of the plum trees in Mendoza have reached bearing age. While production in the Buenos Aires area is expected to remain fairly constant, a sharp increase during the next few years in the Mendoza district is expected.

The production of apricots is also heaviest in the Province of Buenos Aires, followed by Mendoza where there is a fairly large percentage of immature trees. Production in both Mendoza and San Juan is expected to rise sharply in the near future.

Cherries are produced on a rather limited scale and are consumed within the country, where demand appears to balance supply. The bulk of the sweet cherries is produced in the irrigated regions where climatic conditions are considered most favorable. The Province of Buenos Aires, however, produces the bulk of the sour cherries.

TABLE 11.—Number of trees and declared production of stone fruits in Argentina, by Provinces, 1937

KIND AND PROVINCE	NUMBER OF TREES			PRODUCTION 1,000 short tons
	NONBEARING	BEARING	TOTAL	
Peaches:	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	
Buenos Aires	2,041	3,485	5,526	19.7
Mendoza	1,200	1,664	2,864	18.8
Santa Fé	791	897	1,688	6.4
Córdoba	419	793	1,212	4.5
Río Negro	88	121	209	3.4
Entre Ríos	350	417	767	2.4
Others	645	1,133	1,778	14.3
Total	5,534	8,510	14,044	69.5
Plums:				
Buenos Aires	209	538	747	8.7
Mendoza	409	355	764	3.3
Santa Fé	60	62	122	0.1
Río Negro	55	31	86	0.1
Entre Ríos	22	31	53	0.3
Others	159	140	299	1.9
Total	914	1,157	2,071	14.4
Apricots:				
Buenos Aires	64	112	176	3.4
Mendoza	108	101	209	1.2
San Juan	33	47	80	0.4
Córdoba	38	69	107	0.4
Santa Fé	49	42	91	0.3
Others	43	50	99	1.3
Total	335	421	752	7.0
Cherries, sweet:				
Mendoza	98	194	292	3.0
Río Negro	9	21	30	0.3
Buenos Aires	44	74	118	0.3
Others	34	32	66	0.1
Total	185	321	506	3.7
Cherries, sour:				
Buenos Aires	4	9	13	0.1
Neuquén	3	5	8	(1)
Chubut	2	3	5	(1)
Río Negro	1	2	3	(1)
Córdoba	4	6	10	(1)
Others	4	10	14	(1)
Total	18	35	53	0.3

¹ Less than 500 short tons.
Argentine National Agricultural Census, June 30, 1937.

Some very excellent, modern, and well-equipped canning and drying plants have been constructed in the principal fruit-producing areas.

Melons

Melons are grown commercially in various parts of Argentina, but the industry is most heavily concentrated in the Provinces of San Juan, Mendoza, and Santiago del Estero. While it is an industry of considerable importance, practically the entire production is consumed within the country. Very small quantities are exported to Brazil and the United States.

In the Mendoza district, an effort was made to stimulate real interest in melon growing. Growers were furnished with good seed introduced from various melon-producing countries, together with proper cultural directions. The industry today, however, is in a rather pathetic state. Growers have allowed the seed to become badly mixed and to run out. A carload of melons is a curiosity. It contains specimens

of all colors, shapes, and sizes. The country is quite capable of growing good melons; but since there is no discriminating market, growers can dispose of almost anything at a remunerative price.

It is difficult to purchase a melon that is not a disappointment. During the early part of the season the fruit is flat, flavorless, tough, and rubbery. Honeydews shipped later in the season are better, but still leave much to be desired. A few melons of the Spanish type are exported to the United States, but there is little possibility of extending this business to any significant extent.

Grapes

Grapes are produced in practically all of the fruit-producing districts of Argentina. To the Latin race, wine is an almost indispensable part of the daily diet. In establishing their homes in the new country, therefore, it was only natural for the immigrants to establish vineyards in Argentina as a part of their economy.

Early development was slow but a successful beginning was made in the Cuyo region, which has since developed into the principal vineyard region. Following the completion of the railroad from Buenos Aires in 1885, a rapid expansion of the industry took place, which continued uninterrupted until a few years ago, when prices declined drastically.

Wine is still the leading vine product in Mendoza and San Juan, but table grapes have become increasingly important, especially for the export trade. The Río Negro Valley also was formerly an important wine-grape region. Recently, however, there has been a definite tendency toward curtailment of production, since the Cuyo region is recognized as infinitely superior as a wine-producing country. Most sections produce sufficient wine for local use, but distribution on a national scale is confined to the Mendoza-San Juan districts.

TABLE 12.—Number of vines, area, and production of grapes in Argentina, by districts, 1937

TYPE OF GRAPES AND DISTRICTS	NUMBER OF VINES			AREA	PRODUCTION
	NONBEARING	BEARING	TOTAL		
					1,000
Wine:	Thousands	Thousands	Thousands	Acres	short tons
San Juan	351	50,795	51,146	45,031	228.8
Mendoza	1,104	354,728	355,832	182,120	934.2
All others	3,776	39,575	43,351	32,662	103.1
Total	5,231	445,098	450,329	259,813	1,266.1
Table:					
San Juan	265	12,787	13,052	12,671	81.6
Mendoza	399	18,631	19,030	12,123	68.3
All others	1,160	3,486	4,646	4,613	12.4
Total	1,824	34,904	36,728	29,407	162.3
Raisin:					
San Juan	24	1,243	1,267	1,307	6.6
Mendoza	9	578	587	309	2.0
All others	147	784	931	1,132	3.0
Total	180	2,605	2,785	2,748	11.6

Argentine National Agricultural Census, June 30, 1937.

From the standpoint of quality, Argentine wine has many superiors. It is generally recognized, even within the country itself, that European and Chilean wines are superior. Of the 150 million gallons of Argentine wine manufactured annually, the

Cuyo produces about 95 percent. Both high- and low-grade wines are made, but the bulk of the output consists of a low-grade, strong, red wine, which is consumed largely in the lower-income groups.

For further discussion of the grape industry, see section The Production and Marketing of Grapes, pages 76-87.

Deciduous Fruit Regions

Fruit growing on a commercial scale has been developed in six zones, ranging from about 30 to 1,000 miles from Buenos Aires. These districts are shown in figure 1 and are classified as follows:

<i>Region and Province</i>	<i>District</i>
Río Negro Valley (pears and apples):	
Río Negro	Cinco Saltos, Cipolletti, Allen, Coronel Juan F. Gómez, Cervantes, Villa Regina, etc.
Neuquén	Neuquén, Plottier, etc.
Chubut	Rawson, Trelew, Gaiman, etc.
Cuyo Region (deciduous fruits):	
Mendoza	Tunuyán, San Martín, Tupungato, Maipú, San Carlos, San Rafael, General Alvear, etc.
San Juan	Calingasta, Iglesia, Jashal, 25 de Mayo, Angaco, Caucete, Carpintería, Pocito, etc.
Delta Region (deciduous and citrus fruits):	
Northern Buenos Aires and Southern Entre Ríos San Nicolás, San Pedro, Delta of the Paraná.	
Atlantic Region (deciduous fruits):	
Buenos Aires	Quilmes, Castelli, Dolores, Gral. Madariaga, Juancho, Macedo, Cobo, etc.
Mesopotamia (citrus fruits):	
Entre Ríos	Concordia, Colón, Paraná, etc.
Corrientes	Monte Caseros, Paso de los Libres, Chavarría, Saladas, Bella Vista, Ooya, Esquina, etc.
Misiones	El Dorado, Pindapoy, Posadas, etc.
Northern Region (citrus fruits):	
Tucumán	Taff Viejo, Simoca, Bella Vista, Monteros, Los Sarmientos, Famallí, San Pablo, etc.
Salta	Camposanto, Güemes, etc.
Jujuy	Calilegua, Ledesma, etc.

The Río Negro Valley is the most important district devoted to the commercial production of apples and pears. The Cuyo region, which embraces two large Provinces (Mendoza and San Juan) is second in importance for apples and pears from the standpoint of quality production. Tree fruits, especially pomaceous, are not proving very successful in Cuyo. The region is best adapted to grapes and some stone fruits, the latter being used largely for canning and drying. The Delta and Buenos Aires regions are important from a quantitative standpoint. Fruit from these districts, however, is not to be compared with that from Río Negro and Cuyo in selection or appearance. While it does not enter export channels, it represents a considerable tonnage on the local markets and must be recognized from a distributive and sales point of view. The citrus areas at the moment are concerned chiefly in supplying the home market and replacing imports.

Río Negro Valley

The Río Negro-Neuquén is an irrigated district devoted largely to the growing of apples and pears. It is located from 650 to 750 miles from Buenos Aires and is reached by the Ferrocarril Sud (Great Southern Railway). Commercially, it is known as the Upper Río Negro Valley and embraces parts of the valleys formed by the rivers Negro, Neuquén, and Limay. The Neuquén, whose source is in the foothills of the Andes, flows southeast, then east. The Limay, which is fed by the waters of Lake Nahuel Huapí, flows northeast, thence east. These rivers flow across barren, arid wastes, cutting their way through narrow desert valleys.



FIGURE 3.—A view of the Limay River east of Cipolletti.

The narrowness of the valleys restricts the amount of tillable land. The Upper Río Negro Valley ranges from 1 to $6\frac{1}{2}$ miles in width. It stretches out, however, to a length of about 70 miles. Sharp, almost perpendicular cliffs rise from both sides of the floor to arid stony tablelands 250 feet above. The character and depth of the soil peculiar to this region can be determined as a result of these cuts.

The Upper Río Negro Valley, in many respects, is almost the counterpart of a dozen or more valleys in the arid or semiarid regions of the western part of the United States. Were one to transplant it to certain parts of southern Idaho, Utah, Oregon, or Washington, the residents, undoubtedly, would feel quite at home, insofar as the general outline, climate, and topography of the country are concerned.

Small towns are strung out along the valley and resemble in appearance the American frontier towns of



FIGURE 4.—Topography and natural desert vegetation of the Río Negro Valley.

some 40 or 50 years ago. Unpaved roads, adobe buildings, and the old familiar hitching racks for horses are common to each. Cipolletti is the principal town in the valley and is nearest to the confluence of the Neuquén and Limay Rivers. It is a little over 700 miles from Buenos Aires, or a railway journey of some 25 hours.

The valley has a relatively equable climate and an elevation about 900 feet above sea level. The average annual rainfall is about 7 inches, and the mean annual temperature 57° to 61° F. The days become rather warm, but the nights are cool, a combination ideal for the coloring and finishing of fruit.

Soil and climatic conditions of the Neuquén Valley are about the same as those of the Río Negro. It is rather cool and dry, has a fertile soil, and thus provides ideal conditions for both apples and pears. The topsoil of this valley is largely volcanic and for the most part quite fertile, ranging in depth from 3 to 28 feet. In some sections gravel and hardpan lie fairly close to the surface. Orchards planted here are already showing the undesirable effects of these conditions. The hardpan is also causing certain irrigation and drainage difficulties. In some orchards, a high water table has developed, causing a considerable loss of trees. The accumulation of alkali salts has also become serious in some districts, resulting in the abandonment of orchards.

While the Río Negro has excellent climatic conditions, it is not a thermal belt, and frosts, winds, and occasional hailstorms occur to add to the speculation of fruit growing. It enjoys many natural advantages, but also has its drawbacks, which are destined to become more pronounced as the industry grows older.

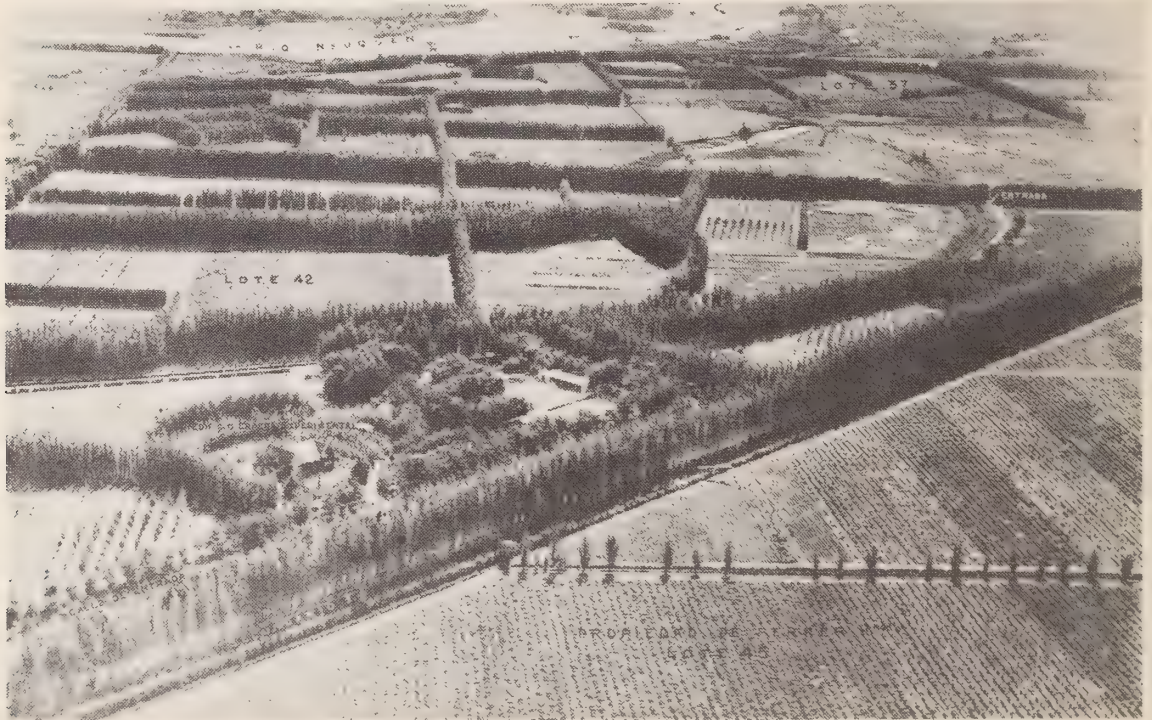


FIGURE 5.—Panorama of the Neuquén Valley, showing the experiment station in the left foreground. (Courtesy of Great Southern Railway.)

In the Río Negro, the question of water offers no problem. All of the land that is suitable for cultivation is under irrigation, and sufficient water has been made available to insure an adequate supply for immediate requirements. The irrigation system now used was started before the World War but was not completed until 1927-28. Small ditches were originally built to divert water from the streams for the irrigation of alfalfa fields and vineyards. It was soon discovered, however, that the scattered fruit trees that had been planted by the settlers responded vigorously when given an ample supply of water. This led to the conclusion that orcharding on a commercial scale could be made profitable; and the foundation was laid for the present industry.

The Neuquén River, carrying with it heavy deposits of silt, resembles the upper reaches of the Missouri in full flood. The Limay, which carries a good head of water, is much clearer. The dam across the Neuquén at Contralmirante Cordero is said to have a normal flow of water of between 2,119 and 2,472 cubic feet a second. Of the available flow, it is estimated that only between 1,554 and 1,730 cubic feet are being utilized.



FIGURE 6.—One of the secondary irrigation canals that supply an abundance of water to the Río Negro Valley.

The volume of water carried by the streams flowing through this region is sufficiently large to provide a substantial increase in the amount of irrigated land, but present irrigation facilities do not permit any great expansion. Furthermore, the topography of the country is such that the amount of land suitable for irrigation is restricted. To cultivate the plateaus, pumping water would be required, which would be not only very expensive but impractical. Expansion of farming operations, therefore, is possible from the standpoint of water supply but not of usable land. Farther down the valley are areas suitable for planting, but transportation facilities are such that planting would not be justified, since it would mean trucking the fruit as far as a hundred miles to the nearest loading station.

According to irrigation authorities, 136,000 acres are under irrigation in the valley, on 121,000 of which water rights are being paid. Other sources of information state that 84,000 acres are under cultivation, 27,000 of which are planted to fruit, 17,000 to vines, and 40,000 to other crops.

The flood system of irrigation is the type most generally employed, but in some instances the water is directed into deep furrows, which are plowed out close to either side of each tree row and also into two or three furrows between rows. After one area has been thoroughly flooded the water is turned into another block. Frequent

rather than deep irrigation seems to be the general practice. From 8 to 10 flood irrigations are made during the season.



FIGURE 7.—Main canal diverting water from the Neuquén River at Contralmirante Cordero. Note windbreak at right. (Courtesy of Great Southern Railway.)

Water is both plentiful and cheap, and in some instances the tendency is to over-irrigate. This practice is not only wasteful but harmful to the land. The cost of water is 6 pesos a hectare a year, or about 70 cents an acre.

TABLE 13.—Number of fruit trees and vines and declared production in the Río Negro region, Argentina, 1937

KIND	NUMBER OF TREES			PRODUCTION
	NONBEARING	BEARING	TOTAL	
				1,000
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>short tons</i>
Pears	770	1,156	1,926	26.6
Apples	651	590	1,241	16.3
Peaches	111	148	259	3.9
Quinces	51	91	142	1.6
Plums	66	41	107	0.6
Apricots	6	9	15	0.3
Sweet cherries ...	13	24	37	0.3
Sour cherries	4	7	11	(1)
Total	1,672	2,066	3,738	49.6
Grapes:				
Wine	2,031	23,785	25,816	52.2
Table	124	939	1,063	2.4

¹ Less than 500 short tons.

Argentine National Agricultural Census, June 30, 1937.

As a result of over-irrigation, certain orchards are producing a very vigorous, succulent type of wood growth. Furthermore, the excess application of water tends to develop certain physiological disorders and to impair the storage and keeping quality of the fruit. In certain areas, the Fuerte General Roca in particular, the presence of alkali salts (salitre) is very much in evidence. Owing to poor drainage and heavy use of water, a high water table has developed, resulting in the loss of many trees and in some instances the abandonment of entire orchards.



FIGURE 8.—Overirrigation causes severe loss of trees and in some cases the abandonment of the orchard.

Cuyo (Mendoza-San Juan) Region

This region includes the Provinces of San Juan and Mendoza and lies along the western boundary of Argentina at the base of the Andean range. From an elevation of about 2,000 or 2,500 feet, the land rises to almost unbelievable heights, culminating in the snow-capped, majestic peaks of Mount Aconcagua and Mount Tupungato, with elevations of 23,400 feet and 22,000 feet, respectively. The eastern slope of the range in the latitude of this district is practically bare of all vegetation. Only a sparse covering of desert growth manages to survive. The steep, bare, sun-baked, rugged slopes are badly eroded by wind and rain.

At the base of this mighty mountain range, the country flattens out and stretches eastward into arid, desert wastes. Rivers rising in the mountains carry a heavy load of sediment, which is deposited on the desert, forming rich alluvial fans. Without irrigation, these alluvial deposits support only a stunted, sparse growth of typical desert plants, such as cacti and creosote bush, but under irrigation they produce splendid fruit crops.

The climate of Mendoza is somewhat variable, depending upon locality. In the west it is dry and cool; in the northeast it is also dry but much hotter. The mean average rainfall is about 10 inches. There is a fairly wide seasonal variation in temperature, but the average is between 50° and 62° F.

While Mendoza is the vineyard of the Argentine, it also produces apples, pears, stone fruits, and melons in certain specialized areas. Water is the chief limiting factor. Late spring frosts, severe hailstorms, and sometimes showers during the grape-harvesting season make fruit growing here a rather hazardous occupation.

Weather conditions during the 1939-40 growing season were of a most unusual character. Early spring frosts seriously reduced the size of tree-fruit crops, while severe hailstorms and rains at critical periods during the growing season further curtailed or seriously impaired the quality of the fruit.



FIGURE 9.—Airplane view of the Mendoza area.

San Rafael, the most important apple and pear district, is about 100 miles from the city of Mendoza and is separated from it by an expanse of desert. It is farther from the mountains than Mendoza and is watered by different streams. Tunuyán and Tupungato are also in a zone somewhat different in character from that of most of Mendoza. Since they are more or less distinctive, they are treated separately.

TABLE 14.—Number of fruit trees and vines and declared production in the Cuyo region, Argentina, 1937

KIND	NUMBER OF TREES OR VINES			PRODUCTION
	NONBEARING	BEARING	TOTAL	
				<i>1,000</i>
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>short tons</i>
Peaches	1,383	1,918	3,301	22.0
Pears	554	1,035	1,589	10.5
Apples	346	541	887	4.9
Plums	462	381	843	3.6
Quinces	155	176	331	1.3
Sweet Cherries ...	106	197	303	3.1
Sour Cherries	1	(1)	1	(2)
Apricots	141	148	289	1.5
Total	3,148	4,396	7,544	46.9
Grapes:				
Wine	1,455	405,523	406,978	1,163.0
Table	664	31,418	32,082	149.9

¹ Less than 500 trees.

² Less than 500 short tons.

Argentine National Agricultural Census, June 30, 1937.

San Rafael

San Rafael, in Mendoza, is the most important tree-fruit area in the Cuyo region, and it is in this section that the most intensive development in the Province has taken place.

The cultivated areas occupy the large alluvial fans formed by the rivers, which are most easily irrigated. Extensive tablelands, which rise on all sides, contain, perhaps, some of the best and deepest soil, but water is unavailable and no high-line

ditches are being contemplated or are likely to be constructed for years to come. The soil and general character of the landscape are in many respects similar to those of the Santa Clara and San Joaquin Valleys of California.

The experimental station and nursery maintained by the Buenos Aires Pacifico Railway at Rama Caída has been largely instrumental in furthering the commercial development of fruit growing in this area. San Rafael growers are largely of Italian and Spanish origin. There are also a few Germans and quite a large English community who have taken up fruit growing as their major occupation. The railway has maintained a staff of well-trained agricultural and horticultural experts to carry on a very effective piece of extension work among the growers. While there are many large holdings in the district, the majority of places are operated by the owners themselves rather than by native help employed by absentee owners.

San Rafael has a climate better adapted to tree fruits than are those districts farther to the north; however, it has its limitations. The most serious are late spring frosts, severe hailstorms, and a not too abundant supply of water. Some sections have proven especially unsuitably located because of hail.

Hailstorms, originating in the Andes, rush through certain passes, causing great destruction to all vegetation in their paths. In 1940 hail not only destroyed the crop in many orchards but also defoliated the trees. In several orchards visited the fruit and leaves were cut from the trees, and the bark on the branches and limbs was beaten so badly that it will be necessary to cut them back to the trunk, leaving nothing but stubs from which to develop an entirely new framework.

The soil of this district is volcanic, of light, sandy loam character, becoming quite gravelly in some places. It varies in depth from a yard or less to 10 yards. The soil is very fertile; and, where there is a good depth and sufficient water, trees respond vigorously. The soil contains a sufficient supply of calcium, phosphoric acid, and potash, but is deficient in nitrogen and humus.

The zone is irrigated by water supplied by the rivers Diamante and Atuel, which originate from natural reservoirs and glaciers in the Andes. Since the snow pack varies in depth from year to year, there is no stability of water supply.

There is sufficient water available in the headwaters to provide irrigation for an almost unlimited acreage, but its use would require the construction of a



FIGURE 10.—A young Williams pear orchard near San Rafael. Note the windbreak of poplars in the background.

number of dams in the mountains to form storage reservoirs. Like many California streams, the rivers are deep during certain periods of the year and are almost dry in others.

Water is diverted from the rivers by means of dams and carried through canals. Since the dams do not store water, the canals are dependent upon the natural flow of the rivers; and, as no records are kept of the snow pack, there is no way of gaging the volume of water the



FIGURE 11.—One of the many small dams used to divert water from natural streams in Mendoza.

rivers are capable of supplying throughout the irrigation period. At present (1940-41) there is a distinct water shortage, and users are very much concerned over the future supply. The water table varies considerably according to the locality, but in most places it has dropped during recent years. In the lower parts, it is from 32 to 56 feet below the surface.

There is an act before Congress to build dams at the headwaters of the Atuel and Diamante Rivers, which will impound sufficient water to cover seasonal requirements. Water rights are definite and eventual: that is, they cover the amount now being supplied, or the actual acreage under irrigation, and the amount the owner is entitled to, if and when the water supply is made available through the construction of dams or reservoirs.

	<i>Definite acres</i>	<i>Eventual acres</i>	<i>Potential total acres</i>
Diamante	141,717	100,090	241,807
Atuel	189,731	136,575	326,306
	331,448	236,665	568,113

Each canal in the zone is autonomous. It has a supervisor and three delegates who administer the upkeep of the canal and ditches and the distribution of the water. The assessment per hectare ($2\frac{1}{2}$ acres) depends upon the cost of maintaining the canal. The average yearly cost for general farming purposes at present is about 5 pesos, although one of the railway-company properties pays as little as 3.05 pesos a hectare (37 cents an acre) a year. Clearing the land and getting it ready for irrigation costs about 25 pesos a hectare, or about \$3 an acre. This is where desert vegetation is rather scant, as it is in most places.

Almost all types of deciduous fruits are grown in San Rafael, but many plantings have been made without due regard to adaptability. Original plantings consisted

chiefly of pears, some apples, and a few stone fruits. San Rafael is quite important for Williams (Bartlett) pears. Ordinarily, they are earlier than those produced in the Rio Negro region but perhaps less desirable from a marketing point of view because of appearance. While they are good keepers and stand shipment well, they are inclined to be less smooth, somewhat pebbly, and slightly misshapen.

The quality of the apples produced is largely a matter of locality. Some orchards produce very fine fruit. Delicious, Jonathan, Cox Orange Pippin, Winter Banana, and a few Yellow Newtowns are the principal varieties.

The section around Rama Caida seems especially well adapted to both apples and pears. The soil is fertile and deep (from 8 to 10 feet). The area appears to have once been a basin, which has been filled in by deposits of rich fertile soil, apparently of volcanic origin. Some very excellent Delicious and Newtowns were observed by the writer. King David and Jonathan were also of fine quality. Of the pear varieties, Williams predominated (90 percent), but Winter Nelis, Aremberg, and Anjous showed much promise.

El Escorial, a large estancia in the Rincon del Atuel district, has one of the best orchards in the section. Pears, apples, and peaches are the principal fruits produced. The trees are only 5 to 6 years old but are producing good crops, the Delicious and Jonathan apples being especially good. This orchard produces Delicious that are more characteristic of the variety than are any others seen in the district.

The planting of stone fruits is being encouraged, and more peaches and plums are being planted each year. Because of the drying and canning plants that have recently been constructed, it is believed that stone fruits will become more profitable, whereas the outlook for pomaceous fruits is less encouraging. Canning and drying varieties of both peaches and plums are being recommended rather than varieties for shipping as table fruit.

Holdings in San Rafael vary in size from 25 or 35 acres to 1,500 acres. The large holdings (estancias) are owned by people living in the cities, largely Buenos Aires. In fact, most of the large wholesalers in Buenos Aires own and operate extensive orchards in this district. It is customary in preparing land for planting to establish groups of colonists. They receive free use of the land for a term of 5 years in return for clearing, leveling, and preparing the land for trees.

The cost of bringing an orchard into bearing is estimated at from 1,800 to 2,000 pesos a hectare (\$215 to \$245 an acre), and the cost of maintenance is reckoned at about 200 pesos, or \$24 an acre, a year. Most of the large places and many of the smaller ones are run by local farm laborers, who receive a wage of from 60 to 75 pesos a hectare a year, and in addition, from 5 to 10 percent of the crop.

Tunuyan, Tupungato, and San Martin

The Tunuyán, Tupungato, and San Martín districts are more or less distinctive and produce fruit under conditions somewhat different from San Rafael. The location of San Martín is more characteristic of the producing districts of Mendoza and is best adapted to stone fruits. Tunuyán and Tupungato, however, are small valleylike regions lying on the fringe of the Andes, which specialize largely in apples and pears. These districts are noted for their ability to produce fruit of high color and finish and fine flavor.

There are many large plantings in this section owned by commercial interests, largely wholesale jobbers living in Buenos Aires. The smaller places worked by the orchard owner receive better attention and produce some fine-quality fruit. There is a good cold-storage plant at San Martín used primarily for precooling grapes but also for storing other fruit awaiting shipment to market. The section also is becoming important as a dried-fruit center, especially for stone fruits.

Tunuyán is situated about 50 miles due south of the city of Mendoza. It lies in a pocket in the shadow of the Andes. The upper end of the valley runs up into the lower foothills of the Andes, while the lower end spreads out into a rather wide alluvial fan.

Air drainage in the Tunuyán is poor. The lower end of the district is even worse than the upper end, which has a higher elevation. The cold air coming down from the foothills settles in the valley, causing heavy frost damage. It is an ideal frost pocket. One large orchard visited contained some of the finest trees for their age that the writer had ever seen. It was explained, however, that the 1940 crop was the first the trees had borne in 7 years. Each year the trees had produced a good bloom, which was injured by frost. The apple orchards in this district are similar to the earlier plantings in the Wenatchee Valley, and the pear orchards bear a very close resemblance to the younger plantings in the Santa Clara Valley.

The Tupungato Valley is 44 miles southwest of the city of Mendoza across a broken range of arid, cacti-covered foothills in the Andes. Tupungato is a typical mountain valley with an elevation of some 4,000 feet above sea level. Climatically speaking, it has certain advantages, but these are frequently offset by rather serious hazards, such as frost and severe hailstorms. The valley is largely in the hands of a few wealthy land-owners, who paid little or nothing for the land and will neither sell it nor plant it.

One orchard visited was owned by a German who settled in the valley 7 years ago. His was one of the best cared for orchards in the district, and in appearance might have been transplanted from the Yakima or Hood River Valley. The road leading into the orchard was lined on both sides with large sweet cherry trees. The trees were



FIGURE 12.—A young apple and pear orchard in the Tupungato district. This area lies at the base of the Andes.

well pruned, were of good size, and carried a good crop of fruit. A good stand of alfalfa was growing under and between the trees, and the branches of the trees were propped as they are in the northwestern valleys of the United States. The place is small, 75 acres, with about 40 acres planted to fruit. The varieties grown are

Delicious and Jonathan. On a block of 2,200 7-year old trees, 7,700 packed boxes were harvested in 1939, which graded 55 percent Extra Fancy, 35 percent Fancy, and 10 percent Choice. The orchard under normal conditions has packed from 70 to 75 percent Extra Fancy fruit.

The soil in the Tunuyán, Tupungato, and San Martín districts is rich, and similar in character and fertility to other parts of the country. Trees grow rapidly, often producing an excessive amount of wood growth. The combination of soil and climate produces fruit of fine quality, but where wood growth is excessive the fruit yield is reduced.

Tunuyán is an irrigated district, and the water supply so far has been sufficient to take care of immediate requirements. When water has been short, satisfactory artesian wells have been drilled. With a liberal supply of water, there is a tendency toward overirrigation, which has produced a drainage problem under certain conditions. Tupungato is well supplied with water from mountain springs, while in San Martín production is dependent entirely upon water diverted from streams.

The principal pear varieties grown in the three districts are Williams, Hardy, Anjou, Winter Nelis, and Aremborg. Many of the Williams are misshapen and inclined to be somewhat rough or pebbly. The carrying quality of the fruit is reputed to be very good. Hardys seem to do exceptionally well in this section, and many beautiful specimens were observed. Anjous and Nelis are also quite promising varieties. The tendency in this section is to reduce the plantings of Williams and to increase late winter varieties.

The principal apple varieties are Delicious, King David, Jonathan, and Rome Beauty. The Rome seems to be well adapted to this section and is becoming quite popular. Many of the trees of other varieties are being grafted over to the Rome.

San Juan

The Province of San Juan, which constitutes the northern part of the Cuyo region, possesses a somewhat drier and hotter climate; consequently, the diversity of crops is more or less limited. Its cultivated area is devoted almost entirely to grapes; and, while many wine grapes are produced, it is generally recognized as superior to other districts in the production of excellent table-grape varieties. Some tree fruits are produced, but not in commercial quantities.



FIGURE 13.—View of the San Juan area showing grapes and tree fruits, with the Andes in the background. (Courtesy of José Manuel Gómez, agricultural engineer, San Juan Ministry of Agriculture.)

The climate of San Juan is rather hot. In the west close to the mountains it is somewhat cooler than in the east and in certain western pocketlike valleys, surrounded by arid hills.

San Juan is less fortunate with regard to water than is Mendoza. The average annual rainfall is only 2 or 3 inches a year. Furthermore, water for irrigation is less plentiful and less dependable. It comes entirely from the San Juan River, which in years of light snow pack provides an inadequate supply. Mendoza has several rivers from which water is supplied, in addition to artesian wells in certain districts.

San Juan, like Mendoza, has its climatic drawbacks, such as late spring frosts, hail, and hot summer winds, called zondas, which can cause much damage. The winters are sometimes quite cold, and, although this is an advantage as far as insect-pest and disease control are concerned, it works a hardship on the people who live in poorly constructed adobe houses or frequently in shelters constructed of cane and sacking plastered over with mud.



FIGURE 14.—Irrigation dam, San Juan, diverting water from an Andes-fed stream. (Courtesy of José Manuel Gómez, agricultural engineer, San Juan Ministry of Agriculture.)

San Juan is not considered a good district for either apples or pears, and is regarded as quite unsuitable for cherries. Apples have a definite tendency toward delayed defoliation. In some years this has also occurred in peaches, and in exceptional cases in grapes.

The growing season is long, with an abundance of sunlight, and provides in most respects an ideal climate for growing vines. San Juan is considered the best zone in the country for apricots, and everything possible is being done to foster the apricot industry. Early varieties of peaches and plums have done well, and increased plantings are being recommended.

Delta Region

The writer has inspected orchards under many conditions, but never before from a motor boat gliding along between the narrow banks of countless streams lined on either side with fruit trees, their heavily laden branches often dipping into the stream. If the Florida Everglades or the Louisiana bayous of the Mississippi were lined with fruit orchards, they would resemble the waterways of this Delta region.

The Paraná is one of the great rivers of the world, longer and larger than the Mississippi. The Río de la Plata, or River Plate, a broad, shallow estuary, receives the waters of the Paraná and the Uruguay. The lower Paraná is very broad, and at its mouth a great delta has been formed, consisting of a large group of islands. See insert in figure 1.

The Delta has an equable climate, temperate and damp throughout the year. As it is surrounded by water, there are no sudden or extreme changes of temperature, and it is possible to grow citrus there as well as deciduous fruits.

The district is a network of streams and canals. It is very low and flat and covered with a dense, almost tropical growth. Trees, shrubs, and water plants including beautiful clumps of pampas and various kinds of wild flowers and flowering reeds, line the banks of the streams. Willow trees and water oaks, festooned with long waving drapes of Spanish moss, are numerous.



FIGURE 15.—Along a waterway in the Paraná Delta.

Government inspectors and farm advisers patrol the area in motorboats, which are the only means of transportation. From one of the fast Government boats the writer made observations and inspected orchards over about one-third of the 625 miles of canals and streams on which these river properties front.

The islands are subject to frequent inundation and sometimes remain submerged for weeks at a time. The houses are therefore built upon stilts. The average size of the farms is from 25 to 30 acres. Orchardng seems to be the chief occupation of the islanders, with oranges, apples, lemons, pears, plums, persimmons all planted together. The trees are set very close, and here perhaps correctly so. They cannot grow large, and their life is short. They are planted right up to the water's edge.

Some of the channels are not more than 30 or 40 feet across; others are much wider, perhaps 100 feet or more. The natural channels are from 10 to 12 feet deep and drop sharply from the banks. This makes fast river traffic possible and allows boats to navigate even the narrowest passages. At each farm landing stages are built and a cut is made in the bank for the "parking" or garaging of the owner's boats. The garages, which are also used to protect produce that is ready to be transported down the river, are open on the sides but covered with a thatched roof. Fruit-packing sheds are built adjacent to or in connection with these loading basins. Individual holdings in the Delta are small, but the aggregate tonnage originating from this district creates an important marketing problem. Most growers own their own motorboats in which the products from the farm are transported to the loading basins at Tigre, which is the distributing point for all fruit and produce grown in the Delta. The sides of the basins are lined with long sheds where the boats loaded with baskets of apples, pears, quinces, oranges, and lemons are unloaded and the fruit weighed and accounted for. The fruit is then loaded into wagons and trucks and carried into Buenos Aires, where further distribution takes place.

The cost of transportation is about 20 centavos, or 6 cents per basket of about 33 pounds up to a distance of 30 miles. Beyond this distance the cost increases. Although plantings extend up the river 50 miles from the terminus at Tigre, the products are all brought together there and then reshipped on river steamers and marketed at points as far north as Córdoba, Rosario, etc.



FIGURE 16.—The Tigre, terminus or distributing point for produce grown in the Delta.

The soil of the Delta is sandy; otherwise fruit growing would be next to impossible under existing conditions. The islands vary from about 3 to 6 feet above water, but during flood tide the trees along the banks are inundated. They are very shallow-rooted, as is to be expected. During some seasons of the year when the islands are flooded, the loss of trees is considerable.

The production of peaches and plums is not heavy. Apples are not considered especially important; but from the orchards visited and the volume observed on loading platforms, in boats, and at the Tigre, this production would appear to be quite a substantial industry. Pears did not seem to be extensively planted, but most growers produced quite a few quinces. Citrus fruits, especially lemons, oranges, and mandarins, are being set out in increased quantities.

TABLE 15.—Shipments of fruit from the Argentine Delta region, 1936-40

KIND	UNIT	1936	1937	1938	1939	1940
Deciduous:						
Apples	Box	697,542	774,746	900,998	913,523	276,352
Plums	Ton	12,274	11,257	14,414	11,072	1,539
Peaches	Ton	10,548	3,169	6,784	13,207	298
Quinces	Ton	6,350	6,423	7,412	7,498	3,728
Pears	Box	134,669	93,386	95,040	90,781	33,467
Persimmons	Ton	434	239	370	342	40
Citrus:						
Lemons	Box	52,608	100,480	73,696	120,132	127,072
Mandarins	Box	27,240	23,280	30,690	28,440	12,600
Bitter oranges:	Box	11,809	5,472	18,656	27,104	8,736
Sweet oranges :	Box	45,984	21,440	56,928	64,672	33,888
Navel oranges :	Box	25,728	29,472	46,464	56,448	20,896

Boletín Informativo, Argentine Ministry of Agriculture.

It is estimated that 80 percent of the apple trees of the Delta are in production. The life of an apple tree there is said to be from 25 to 30 years, but in reality it is not usually more than 15 years. The average yield is estimated at about $\frac{2}{3}$ boxes, tree run.

There are three groups of growers recognized in this district: small, medium-sized, and large. Small growers are those who are either financially unable to look after their orchards properly or who do not have the fruit-growing temperament. Their orchards look like jungles. Trees are planted at random, irrespective of species, variety, or location. Weeds, swamp grasses, reeds, etc., grow rampant and are often more than head tall. They provide excellent cover for pests. The medium-sized growers take fairly good care of their orchards and try to carry out some kind of orchard program. On their holdings the underbrush is at least cleared away, and the places have some semblance of orchards. Their fruit, though not of first-class quality, has a commercial market value. The large places are owned by people residing in Buenos Aires who either grow fruit as a hobby or have processing plants through which the fruit is marketed.

The Estancia Noel is one of the best places visited by the writer and falls in the third category. It is about 30 miles from Tigre and consists of 2,700 acres, 750 of which are planted to fruit as follows: 35,000 peach trees, 22,000 in bearing; 20,000 apples, 2 to 3 years of age, Delicious, Jonathan, King David, and Rome Beauty, 2,000 young pear trees, Williams; 30,000 quince trees. The crop in 1941 was light, because of frost, but 2 years before



FIGURE 17.—A 3-year-old apple orchard in the Paraná Delta. Note drainage ditches and heavy mulch. The owner is one of the large operators.

about 528 tons of fruit were harvested. Peaches are set $16\frac{1}{2}$ by $16\frac{1}{2}$ feet apart, a few 20 by 20; apples are planted 20 by 20, and pears $16\frac{1}{2}$ by $16\frac{1}{2}$. Citrus fruits and figs are also extensively grown. Something like 3,000 lemon, 3,000 orange, and 8,000 fig trees have been set out. Clean cultivation and the production of intercrops is the system commonly employed. These intercrops consist largely of celery, beans, potatoes, cabbage, corn, and peas. The crops of this estancia are grown entirely for processing in the owner's own plant in Buenos Aires, which is one of the largest in the country.

At best fruit produced in the Delta would grade a poor utility. While it is sound, it is covered with scab, blotch, sooty fungus, and other blemishes. "Good canning stock" would probably best describe it. The fruit is packed almost exclusively in baskets holding about 33 pounds. The baskets are crowned and faced and make quite a good appearance.

At one large place, the owner was wrapping a very poor-quality lot of fruit in standard boxes. Cost of production or packing was of no concern. For an orchard of 2,000 trees just coming into bearing, the owner had constructed a packing house

capable of packing 4,000 boxes a day. One full-sized Cutler rotary bin grader was already installed, and a cold-storage plant with a capacity of 5,000 boxes had been erected. It will be many years before this investment is justified, if ever. The fruit, although of extremely poor quality, was being wrapped, packed, and marked "Fancy." It is marketed on the Buenos Aires and other nearby markets.

Fruit from the Delta district will never enter overseas markets, but it offers some pretty stiff competition on the home market to fruit shipped in from the irrigated districts. This competition is expected to increase as time goes on.

Atlantic region

The Atlantic region, located in the Province of Buenos Aires, is one of the more recently developed Argentine fruit regions. A number of large plantings have been established, which have not yet come into bearing. Most of the trees are still but 2 or 3 years of age, while the oldest are only 8 to 10. The district is not irrigated, but the annual precipitation of 35½ inches is sufficient to assure the maturing of the crop.

Plantings are on a much larger scale than is common in most parts of the country. This is because the farms are very large and in the hands of well-to-do owners, who have not found it necessary to subdivide them. Each working unit covers about 15 acres. Instead of poplars, eucalyptus trees are used as windbreaks and seem well adapted to this region, trees only 3 years old attaining a height of from 12 to 15 feet.

On an estancia about 35 miles northwest of Buenos Aires, a very interesting plantation was observed. The estancia covered more than 5,000 acres with 750 acres planted to fruit. While a few pears, peaches, figs, and other fruits were produced, the planting was essentially given over to apples, 50 percent of the trees being Delicious, 20 percent Jonathan, and the rest divided between Glengyle Red, Yellow Newtown, Cleopatra, Granny Smith, Stayman Winesap, King David. The trees, for the most part, were imported from Australia; hence the names Glengyle Red, Cleopatra, etc.

The district is very flat and is admirably adapted to livestock farming and dairying. Fruit growing is a new venture and is not an established or proven industry. The soil is fertile and easily worked, a bit heavy in spots, but on the whole quite loose and friable. Climatic conditions are not considered especially conducive to the production of quality fruit. High color and smooth finish, two essential market requisites, are difficult to obtain.

Orchard pests and disease, especially the latter, are abundant and on the increase. Intensive cultivation, which is rapidly depleting the soil of humus, is generally practiced. Close planting is also common in this district. These close planting distances, which have been recommended by agencies interested in selling trees, make spraying and other orchard practices extremely difficult as the trees reach bearing age. Many growers are already confronted with the problem of tree removal, which is difficult, especially where the spacing is such that the elimination of alternate rows leaves the trees too far apart.

Deciduous-Fruit Production and Production Practices

The work of developing a commercialized fruit-growing industry for Argentina has been in relatively few hands. From observation of conditions in the various widely

scattered areas, it is evident that fundamental practices are pretty much the same throughout. While there is some diversity of opinion as to cover cropping versus clean tillage, commercial fertilizers versus green manures, short versus long pruning, these differences are not sufficiently great to be regarded as characteristic of certain districts. Recommendations made by the leaders of the industry have been pretty generally accepted by the growers irrespective of their location and of differences in growing conditions.

It is difficult for a visitor to get a proper impression of the extent of the fruit development in most districts, owing to the system under which cultivated plots are laid out and the extensive use of hedges and tall rows of poplars, which are planted to serve as windbreaks, as in the Río Negro Valley (fig. 5). Strong prevailing winds from the south and southwest blow during the spring months and often throughout the harvest season. To protect the orchards against wind damage, they are laid out in blocks of 3 acres, which are surrounded on all four sides by rows of Lombardy poplar trees planted very close together. These rows of poplars are planted 330 feet apart, and a small opening is left in one corner of the windbreak to enable free access from one block of trees to another. By using smaller areas, leveling is less expensive and requires less moving of topsoil.

The selection of improved varieties and the physical handling and packing of the fruit has been patterned after the practices followed in the United States. It is evident, however, that the methods of laying out the orchards, the planting distances employed, and the cultural methods practiced are characteristic of European rather than of American horticulture. The Argentine fruit grower has been in a position to profit by the mistakes made in older, established fruit regions, but there are certain fundamental principles he has apparently overlooked, such as spacing, fertilization, and orchard-soil management.

Nurseries and source of nursery stock

Most of the early apple plantings made in Argentina consisted of trees introduced from Australia. Australian trees are numerous in the Atlantic district, especially in the Province of Buenos Aires. In the irrigated districts of Río Negro and Mendoza, however, growers originally propagated most of their own stock, as the Australian stock was not considered suitable for Argentine conditions.

The railroads as well as private nursery firms undertook to establish their own nurseries and furnish trees to the growers. Many trees were also brought in from the United States, especially from nurseries in the State of Washington. These trees, however, were used largely for foundation stock and were grown for scion and budwood in propagating the Argentine stock. Many different stocks have been used, but growers are finding French crab stock best suited to their conditions. A large number of apple trees a few years ago were worked on Northern Spy roots, but they have likewise proven unsatisfactory and their use has been discontinued.

Among the private nurseries, the Los Álamos Nursery at Cipolletti, in the Río Negro Valley, is outstanding. The property consists of 163 acres; but only 75 acres (500,000 plants) have been used for nursery stock. Only recommended varieties of commercial importance are produced, which reduces the selection but standardizes the plantings.

The cost of land runs in the neighborhood of \$120 to \$145 an acre, but occasionally as high as \$180 an acre is paid by Los Álamos Nursery. Putting the land in shape for planting costs an additional \$70 an acre. From two to three crops of nursery stock are grown, and then the land is set out as an orchard and sold. Though it is sometimes necessary to grow as many as three crops of trees, the owners prefer not to sell more than two. For orchard use, the land fetches about \$60 an acre. Only 1-year-old trees that average between 4 and 6 feet in height and are well over $\frac{1}{2}$ inch in diameter are sold. About 50 percent of the trees grown in this nursery are sold to growers in other Provinces.

In 1939 the owners of Los Álamos burned more than 40,000 trees rather than carry them over into a second year. This nursery supplies about 80 percent of the trees sold in the Rio Negro Valley. The approximate growing cost is 15 cents a tree. The selling price depends upon the quantity sold. In small lots the price is a peso (30 cents) a tree. In quantities of 1,000 or more, 1-year-old trees sell for 70 centavos, and 2-year-old trees for 90 centavos. These prices apply to both apples and pears.

From 1923 to 1925 the entire output of 100,000 trees annually was sold to the Southern Railway, which in turn sold them to the growers. Peak sales were reached in 1930-32, during which period 500,000 fruit trees were sold annually. In 1934 sales dropped to 150,000. In 1939 total sales amounted to 100,000 trees, of which 70,000 were apple trees, 15,000 were pear, and 15,000 were peach and plum. The nursery expected to sell about 100,000 trees during 1940.



FIGURE 18.—Land prepared for planting, Los Álamos nursery, Rio Negro Valley.



FIGURE 19.—An excellent stand of yearling peach trees, Los Álamos Nursery, Rio Negro Valley.

It is generally necessary to give long terms to growers, since payment is dependent upon fruit production. During the early planting boom no security was demanded; hence, some trees sold 10 years ago are still unpaid for. Today credits are established up to a term of 2, 3, and 4 years, but they are secured by a lien on the crop or a mortgage on the property. The nursery claims to have about \$84,000 on the books, for which there is little hope of recovery.

The majority of growers or prospective planters are not quality-conscious. Their selection of stock is based upon price. Los Álamos Nursery will not sell anything but a first-class tree. There are other nurseries, however, that are willing to sell culls at low prices. Some nurseries have been very careless about their stock and not only sell poor stock but also mix the varieties. Where good nursery practices are followed, however, it is possible to grow strong, healthy, vigorous stock, capable of growing into splendid trees.

Nurseries generally are growing only about 50 percent of their production capacity, as the demand for fruit stock has been more than satisfied. They are gradually going into the propagation of ornamentals, for which there is a growing demand. Except for the importation of some seed from Europe, largely Germany, the nurseries are propagating all of their fruit stock. The only trees imported are a few new varieties that are put out for trial and from which buds or grafts are taken if they are found satisfactory. There is no demand for stock imported from the United States, nor is there likely to be for a long time to come, if ever.

Growers do not do any of their propagating, although every orchardist is quite proficient in grafting. Very few of the older orchards are bearing crops on the original stock. As new varieties were introduced they were grafted over. New plantings are established from stock purchased through privately owned or railway-operated nurseries.

Planting methods and distances

The planting systems employed in Argentina are the same as those found in any fruit-growing country where standard trees are used. Trees are set out according to the square, triangular, or quincunx plan. There seems to be no particular preference, although the majority of plantings are laid out on the square. Spacing practices, however, seem to be of local origin. Dwarf-tree spacing distances have been adopted for developing orchards consisting of standard trees propagated on Northern Spy, French Crab, or quince roots. Compared with practices recommended and followed in the United States, the methods used in Argentina are quite unorthodox.

The Argentine producer is interested primarily in immediate returns; hence he disregards the formative and transition periods in a tree's life. Early and heavy bearing is the chief object and is best accomplished by crowding. In the irrigated districts, where trees make a rapid growth, an apple or pear orchard 20 years of age is spoken of as old and as having about served its period of usefulness. As a matter of fact, they are old. The close spacing and the drastic pruning required to keep them in reasonable bounds make them old, tired trees when, in reality, they should be just reaching their prime of life.

In the Río Negro Valley, standard trees are used, grafted onto French or seedling stock. Because of the fertility of the soil and the abundance of water, young trees

make a rapid growth. In many young orchards visited a terminal growth of from 6 to 9 feet was not at all an uncommon sight. One-year old whips are set out and planted from 16 to 26 feet apart on the square. The experiment station at Cinco Saltos has agreed that 17 feet is too close, and the recommendations now call for 20 by 20 to 26 by 26 feet, depending upon the fertility and depth of the soil. These distances apply to all varieties. In some instances a spacing of 33 by 33 feet is recommended,



FIGURE 20.—Blossomtime in The Rio Negro Valley. Close planting and heavy pruning is the common practice. (Courtesy of Great Southern Railway.)

but when such extreme distances are employed fillers are used, mostly of the King David and Rome Beauty varieties, which are supposed to be removed at the age of 7 years. Trees in the irrigated district naturally come into bearing early, but because of severe feeding competition brought about by close planting, they are forced into bearing at a very early age.

The Rome Beauty begins cropping 3 years after planting, and King David the fourth year after planting. Trees 7 years old produce an average of 6 packed boxes per tree. On a 10-year-old King David tree, it is not uncommon to harvest up to 32 field boxes, but in the following year only from 5 to 6. the average grower is reluctant to thin; hence the tendency of the trees toward biennial bearing.

In some orchards the rows are spaced 23 feet apart with the trees 20 feet apart in the row. One young orchard visited consisted of 138 acres, 50 planted to apples and 88 to pears. The apples were planted 20 by 20 feet and the pears 23 by 26 and 26 by 26. In an older planting on the same farm, pears had been spaced 17 by 17, 20 by 20, and 23 by 23 feet. This orchard contained an excellent stand of 7-year-old Red Delicious, which were producing an average of 6 to 8 boxes per tree. The trees were carrying a beautiful crop of well-distributed fruit, but were already



FIGURE 21.—One year's growth measuring close to 8 feet, on a 2-year-old Delicious tree in the Rio Negro Valley.

beginning to crowd. In many orchards 10 to 12 years of age the branches were extending to and even beyond the center line of the adjoining rows. The branches were attempting to occupy four times the space allotted to them. One orchard presented a difficult pruning problem. Peach trees had been planted 17 feet apart each way and had made a heavy growth. They were already crowding badly when apples were planted between the rows. There is, of course, but one solution to such a problem, but it is frequently not the one sought.

According to the point of view expressed by several leaders of the industry, it is not the intention to maintain any orchard longer than 20 or 30 years. Even in the 20-year-old commercial orchards, however, it is difficult to draw conclusions regarding performance, since they have never been allowed to develop normally. As new varieties were introduced, the original trees were cut back and grafted over to the improved types. There are practically no old orchards to serve as a guide, but it is doubtful whether present plantings will continue to produce profitable, merchantable crops for 30 years under the planting and cultural practices employed.

An argument advanced in favor of close planting and short-lived trees is that it enables the industry to keep abreast of the times and always have available the most popular market varieties.

The spraying problem under close planting is becoming increasingly difficult each year. The irrigated districts are more or less isolated from other producing districts, and insect pests and diseases have not yet become economically serious. Their numbers are increasing, however, and it is predicted that, if effective control is to be secured, drastic tree removal must be accomplished. Isolation is no protection. As the industry develops, pests and diseases will raise an important economic problem because of the close planting.

Packing-house records in the Río Negro Valley already reflect a steady decline in the percentage of Extra Fancy and Fancy fruit produced in the older orchards. Young trees, up to 7, 8, or even 10 years of age, are producing a high percentage of high-grade fruit, but as they grow older the quality declines, especially of the fruit produced on the inside branches. In the Río Negro Valley today, the best fruit is being harvested from trees from 7 or 8 years of age.

Orchards throughout the Cuyo district (San Rafael, Tunuyán, and Tupungato) are already creating some difficult problems. No thought apparently was given to a planting plan; hence not only varieties but species are badly mixed. In many orchards it is not uncommon to see a few Delicious, a few Jonathans, a few King Davids, and others scattered more or less promiscuously throughout the orchard. This method of planting, no doubt, takes care of pollination problems, but it has certainly not facilitated spraying or harvesting operations. The trees invariably are planted much too close together, and while there is some talk of thinning, nothing is done as long as the trees continue to bear some fruit. Most orchards are laid out on the square system with the trees spaced 17 to 20 feet apart. Because of the virgin, fertile soil and the type of stock used, these distances are quite impractical. In a very few years these trees compete with each other. In some instances the result of close planting has made itself felt even before the orchards have come into bearing. Most of the orchards in this district are all too young to impress upon the grower the seriousness of the system employed. The time is not far distant, however, when some drastic action will have to be taken if the production of high-quality fruit is to be continued.

In the Atlantic district, the prevailing distance is 20 by 20 feet. As this is a nonirrigated district, trees are less vigorous growers; however, in orchards where pruning is not drastic, trees are crowding badly after from 8 to 12 years.

In the country as a whole, trees of all kinds are planted much too close together. Competition for nourishment is keen, and in little or no time the struggle for existence is on. The only logical conclusion that one can draw is a comparatively short-lived tree and short-lived ability to produce a high percentage of good-quality fruit. Tree removal before it is too late is a problem confronting every grower and one that will prove most difficult of solution because of the prevailing mental attitude. It is believed, therefore, that the planting distances employed will adversely affect future production with respect to both quality and quantity.

Principal varieties

Those responsible for the development of commercial fruit growing in Argentina are to be congratulated on their choice of varieties. They studied the requirements of the market and based their selection upon those varieties that proved to be in greatest demand and that commanded the best prices. Special attention has been given to the introduction of sports or the more recently developed color strains. When the Red Delicious was introduced, it was immediately purchased and planted in large numbers. Furthermore, old Delicious trees were promptly top-worked or grafted over to the new strain. The same has occurred in the case of Jonathan, Rome Beauty, and other varieties. When the percentage of Williams became excessive, a selection of pear varieties was made, based largely upon preference of the European market. The same careful selection has occurred in stone fruits.

A brief description of the varieties of commercial importance is given below.

Apples

The Argentine public knows and likes the Delicious; hence this has become the most heavily planted variety in the country, being more than twice as numerous as the Rome Beauty, the second best selling variety. The Red Delicious is rapidly displacing the original Stark's Delicious.

Red Delicious comes into bearing early and is a heavy cropper under Argentine conditions. When properly thinned, it compares in shape, size, and appearance with the Delicious grown in Washington. The five points on the calyx end are perhaps less prominent and more irregular than are those on Wenatchee and Yakima apples; but on the whole the Argentine Delicious is more like the apples of the Northwest than are the apples of other districts in the United States.

The Red Delicious attains a very high, almost black, red color, and has an excellent finish. In Argentina 1939-40 was a poor growing season; consequently, the ordinary Delicious failed to color up properly. It is harvested at the same time as the Red Delicious, irrespective of color or maturity. The Red Delicious is used as the measuring stick for determining suitable harvesting dates. This variety grown under proper conditions has a very promising future.

The Rome Beauty is the second leading variety from the standpoint of both tree population and production. It comes into bearing early and is capable of producing

some beautiful fruit. It colors well, has a smooth, satinlike finish, and in shape is quite characteristic of the variety.

The King David variety is third in importance. For size, color, finish, and general appearance, it is unexcelled anywhere. Unfortunately, it is not sufficiently appreciated by the general public. It comes into bearing very early, but because of its tendency to bear heavily it is inclined to set crops only in alternate years. This could be overcome by better management. The variety is well received in the Scandinavian markets because of its moderate size and high color.

The Glengyle Red is the Australian version of the American Red Rome, which has proven especially adaptable to Argentine conditions. It is somewhat oblate in shape, highly colored, with good finish and a tendency toward large sizes. It is harvested toward the end of March, or about a month later than the varieties previously mentioned, with the exception of Rome Beauty.

The Stayman Winesap was quite heavily planted in Argentina, but is proving less popular than the other varieties. It grows well but has the tendency to produce oversized fruit and is susceptible to splitting and cracking.

Many other apple varieties have been planted in order to meet special market demands. Cox's Orange Pippin and Granny Smith are intended primarily for the English market. The Argentine Cox has characteristics similar to those of the Pacific Northwest Cox, which is hardly suitable for the English trade. Granny Smith does well and plantings are on the increase. The Golden Delicious is not much thought of, although it behaves very well under Argentine conditions. The fruit is well-shaped, of good size, smooth skin, and bright finish. In fact, it compares quite favorably with the variety as grown in Washington State. The Yellow Newtown Pippin is a variety that does not lend itself to wide adaptation, but it grows quite well in certain sections of Argentina, under certain specialized conditions. In the San Rafael and Tunuyán districts, some very excellent fruit was observed. It is not being planted commercially, however.

Pears

The Williams is by far the predominating variety of pear and has been heavily planted in the Río Negro and Mendoza districts. In the Río Negro Valley it develops its true characteristics as to shape and smoothness of skin. In the Mendoza area the pears are somewhat rougher in appearance, the surface being pebbly and frequently misshapen. Pears from this district possess slightly better shipping and keeping quality. Trees bear heavily, and it has been proven a profitable variety.

The Anjou is not extensively grown and most trees are still quite young. It seems to do very well, especially in the Río Negro, where it ranks fourth in the number of trees. The pears are smooth and well-shaped and compare favorably with Anjou produced on the Pacific Coast.

The Aremberg (Glo Morceau) has been quite heavily planted, but while superior to that produced in certain other countries, it leaves much to be desired. A large percentage of the fruit is irregular in shape, making a rather unsatisfactory presentation. It is not an especially popular variety on export markets.

Some splendid specimens of Bosc were observed in the Río Negro. The fruit is large and well-shaped and carries a golden russeting. The variety from a production

point of view has possibilities, but it is not being heavily planted because of unsatisfactory marketing conditions.

The Doyenne du Comice is difficult to grow and has a tendency to be a shy bearer. For these reasons, plantings are not recommended. The variety, as produced in the United States, requires very careful handling on account of its susceptibility to blemish.

The Passe Crassane variety, grown extensively in France, Holland, and Belgium, has been quite heavily planted in Argentina. It seems to do quite well under Argentine conditions. It grows smooth, is well-shaped, and sizes up well.

Packham's Triumph is grown chiefly in Australia and has proven very popular on the British market. Under Argentine conditions it grows exceedingly well, being superior in appearance to the Australian product. It is a good bearer and possesses splendid qualities. It is also an excellent shipper.

The Winter Bartlett is being more heavily planted and has shown considerable possibilities. It is smooth, well-shaped, and of good size, and it stores and carries well.

The Winter Nelis pear attains perfection under Argentine conditions. In the Río Negro, many trees were observed producing fruit that would compare favorably with some of the best Nelis produced in California. Young trees do not produce as much russetting as is desirable, but as the trees grow older this characteristic seems to be well developed. The trees bear irregularly. This variety, however, has great promise.

Plums

Anna Spath, which ripens a few days ahead of the President, is the leading export variety of plum. It is a fairly good shipper and is well liked on the New York market. It is a small, dark plum, and is classed as one of the cheaper varieties. The trees come into bearing early and produce heavily. The fruit, which runs heavily to small sizes, mostly 5 x 6 and 6 x 6, is packed in 4-basket crates with a net weight of 20 pounds. These plums are produced principally in Mendoza, with a few coming from Río Negro.

The President is the second largest export variety of plum. It is grown almost exclusively in the Province of Mendoza. The trees bear well, and additional plantings are being encouraged. The fruit is of good size and appearance. It is a good shipper usually commands good prices, and is considered a profitable variety. It is exported largely to the United States. The fruit is wrapped individually and packed in 20-pound bags.

Ponds Seedling is produced principally in Mendoza and to some extent in the Río Negro. It is the most popular variety on the Buenos Aires market. Quite a few are exported to New York, where the fruit is fairly well received. The trees are good producers and some additional plantings are being made. The fruit grows large and is a good shipper. It is packed in 4-basket crates weighing 20 pounds net.

Coes Golden Drop is produced in small quantities and exported to New York, where it is fairly popular. It is a medium-priced plum. The variety does well in the Mendoza area.

Petite Agen is a small drying plum, which has been quite heavily planted around San Rafael. Small quantities have been shipped to New York, where the fruit has met with a fair reception.

Santa Rosa, Burbank, Wickson, Gaviota, and Kelsey are produced largely in the Delta district, and on a small scale. Santa Rosa and Burbank are the most popular, but there are no large commercial plantings. They produce quite well under local conditions. The Santa Rosa is preferred for export, while the Burbank is used entirely for home consumption. Gaviota, Wickson, and Kelsey have not proven very popular in Argentina, and very few orchards are in existence today. The Kelsey is unpopular because it is poorly colored. The volume of all these varieties is insignificant.

The Victoria is grown chiefly in the Province of Mendoza, where several large plantings exist. It behaves well and produces good crops. The fruit is sold mostly on the Argentine market.

Orchard culture and cover crops

Cultural practices in Argentina vary according to district and the ideas of the individual grower. In the irrigated sections, cover cropping supplemented with clean cultivation is the usual practice, while in the nonirrigated districts, continuous, clean cultivation is the rule.

In the Río Negro Valley the general practice is to grow alfalfa between the trees during the early life of the orchard. For the first 3 years the alfalfa is usually cut and allowed to lie, but sometimes it is removed and fed. After 3 years the orchards are plowed and planted to some low-growing, clean-cultivated crop, such as beans or potatoes. Sometimes corn is planted. It is also a common practice to sow barley or beans in the fall, turning the



FIGURE 22.—Three-year-old Red Rome trees on the Estancia Villa María, showing intensive clean cultivation and method of pruning.

crop under in the spring. Growers, however, are not in agreement as to the cultural practices that should be followed. Some believe that the use of alfalfa is having a detrimental effect upon the trees, feeding heavily on the soil, and depriving the trees of their proper nourishment. Alfalfa grows very rank in most places, the soil being well inoculated with bacteria. In a few places, alfalfa fields have gone out as a result of the high water table through excess irrigation and poor drainage. Some advocate that alfalfa should not be grown in the orchards but should be applied as hay and then turned under.

Some growers believe that continuous, clean cultivation is most desirable, but the crowding of the trees and the intensive methods of cultivation employed have frequently destroyed the already short supply of organic matter. No soil, regardless of how fertile it may be originally, is inexhaustible. Unless some drastic action is taken with regard to tree removal and the adoption of a better soil-management program, it is predicted that the productiveness of the valley will soon show a sharp decline.



FIGURE 23.—Two-year-old Deliculous trees in the Rio Negro Valley. New growth measures from 5 to 9 feet. Note the windbreaks of Lombardy poplars. Alfalfa is used as a cover crop.

In the Mendoza area, most growers advocate and practice clean cultivation, though a few are raising green-manuring crops. The horticultural adviser for the zone is recommending less clean cultivation and more cover cropping. Barley, which is supposed to be turned under, is recommended for the first year or two.

It is difficult to get growers to put in crops, and if they do the tendency is to harvest them rather than to turn them under. The soils are being rapidly depleted of organic matter because of continuous, clean cultivation. Some few growers are using alfalfa in their orchards, but most growers are in disagreement on the point. Those opposed to alfalfa argue that it removes too much fertility and nitrogen from the land and that if alfalfa must be used to supply organic matter it should be spread over the land as hay and then plowed under.

In the Atlantic or nonirrigated region, clean cultivation is practiced intensively. Special orchard implements are used in getting close to the trees and in some orchards the work is so thoroughly done that not a weed or spear of grass is seen. Fields are cross-cultivated to drag down ridges, leaving the ground perfectly flat. Intensive clean cultivation is recommended because of the prevalence of disease. It is thought that cover crops or sod would make control difficult. Continued clean cultivation is already showing its effect upon the trees. It will not be long before barnyard or green manures will have to be used to maintain the fertility and the physical properties of the soil.

Fertilization

The need for fertilization has not as yet become a major problem in Argentina. In some areas the soil, while not especially fertile, is rich enough to develop a vigorous young tree. This is especially true of the irrigated districts. Judging by the growth that young trees make, fertility of the soil is not a limiting factor.

As the trees grow older, however, and competition for food becomes keener, the question of proper orchard soil management is expected to develop into a real problem.

In the Río Negro some growers use a complete fertilizer; others use guano and other mixtures of high nitrogen content. In other orchards potash is the only fertilizer used. Most growers realize the necessity of producing highly colored fruit; therefore potash is used quite freely.



FIGURE 24.—A cover crop of alfalfa in a young orchard.

In Mendoza no commercial fertilizers are used, fertility being usually supplied through the use of green-manure crops. Barnyard manure is used if an when available, but it is difficult to obtain. In some sections the heavy natural growth of weeds and grass provides an abundance of fiber to plow under. Where alfalfa is used as an intercrop, it is removed and fed to livestock.

In the Atlantic district, where cultivation is thorough, the trees are already showing a nitrate deficiency.

Pruning

In the Río Negro Valley, as in all fruit-growing districts, opinion varies as to the most desirable system of pruning. There is one practice, however, upon which all growers are pretty well agreed and that is the heading of the trees. Practically all orchards have been headed very low. Strong yearling whips are planted. These are headed to within a few inches to a foot from the ground. As a result of this cut, the several branches that are formed are allowed to develop into main framework branches. The vase or open center is the system most generally followed.

As many as a dozen main limbs are allowed to develop, which compete with each other as the tree grows older. Considerable propping, wiring and tying is necessary. Little or no attention has been paid to spacing the limbs and lateral branches along a central shaft. Weak crotches and direction of limbs have received no attention. In Delicious trees especially, many weak crotches and poorly formed framework branches are quite common. As the trees develop and begin to set heavy crops, splitting of the framework branches away from the trunk is inevitable.

Some years ago short pruning was the general practice, although today long pruning is being advocated. It is difficult, however, to reconcile long pruning with the type of planting system in vogue. There is no point in growing standard trees or developing large bearing surfaces when there is not sufficient space for growth. Already there is a serious overlapping and interlacing of branches, frequently making it

difficult to distinguish to which tree the limbs belong. Many orchards are so thick, with the branches so intertwined, that it is quite impossible to distinguish the tree rows without getting under the overhanging limbs. These conditions apply largely to the older orchards but will be true of the younger plantings also in a few years.

To confine the spread of the trees to the space that has been allotted to them requires heavy pruning by cutting back into old wood. This practice, of course, would result in removing considerable bearing surface, which in turn would mean lower yields. Modern pruning practices are developing problems that are by no means easy to solve.

One orchard visited had the main framework branches originating from below the ground level. The trees resembled currant or gooseberry bushes that had been prepared for layer propagation. This illustrates the type of heading employed. Spraying, cultivation, and harvesting operations are rendered difficult under existing orchard conditions and will not improve as time goes on. The trees should be cut back considerably or growing problems will become acute.

In the Mendoza area there is also considerable disagreement as to the approved method of pruning. Long pruning is recommended by the experiment station and extension authorities, but most growers are inclined to prune heavily, cutting back terminal growth each year. Each grower seems to have his own ideas about the training and development of a tree; so it cannot be said that any particular system is in vogue. Most trees are very low-headed, about 18 inches, and carry an abundance of framework limbs. The open center, or inverted cone, is the most common system of training.



FIGURE 25.—An orchard in the Rio Negro Valley, showing the low heading and development of many framework branches.



FIGURE 26.—A typical Rio Negro orchard 12 years old. Trees are planted 26 feet apart. Note the crowding and interlacing of branches.

In the Atlantic region, pruning is carried out along lines similar to those found in Mendoza. Strong 1-year-old whips are used largely for planting in the districts described above, while in the Atlantic region 2-year-old trees are planted. These trees are headed in the nursery row with the framework limbs developed at from 15 to 18 inches from the ground. Pruning for the first few years is very severe, terminal growth being reduced to just a few buds. This continued, heavy heading has already produced something of a problem. The foliage is very heavy and dense and is discouraging the development of fruiting wood lower down on the branches.

Heavy cutting is recommended for the first 10 years, followed by more moderate pruning. Long pruning is not considered advisable under existing conditions. Summer pruning is practiced for the first 4 years, after which cutting during the summer is confined to the removal of water sprouts and superfluous leaders and lateral branches.

Insect-Pest and Disease Control

The National Government has established sanitary offices in the principal producing regions for the purpose of keeping pests in check. The men in charge of these offices are conscientious, hard-working individuals, but they are greatly handicapped by lack of funds.

The arid, or irrigated, producing regions of Argentina have some advantage over competitive coastal regions and have not as yet experienced serious outbreaks of pests. Being fairly new districts, pests have not had time to become firmly established, but it is reasonable to assume that as time goes on control measures will become increasingly difficult in the irrigated areas. Production costs will increase, and the competition offered by the Atlantic coast producers will become keener.

Insect and disease pests in the Río Negro are not yet economically serious. Since the district is more or less isolated from other producing sections, it is believed by various authorities that the area is comparatively safe from invasion. Furthermore, the technical fieldmen watch pest developments very closely and take precautions to see that pests are held in check. Owing to the arid climate, fungous diseases are of no importance, with the exception of powdery mildew, which in some places is becoming quite troublesome.

Scab is unknown in the Río Negro Valley. Codling moth, however, is established; and, although it has been subject to control, it seems to be on the increase. Packing-house managers state that more worms than usual appeared in the 1940 season. The red spider is giving considerable trouble in certain districts. Many trees have a decidedly yellow cast, indicating the severity of the infection. Leafhoppers are also showing up in increased numbers.

The insect pest most in evidence, and the one which seems to be causing the greatest damage, is the bagworm (*Thyridopteryx ephemeraeformis*), locally called the basket moth. This insect attacks pears and apples but does the greatest damage to shade trees (windbreaks), which in many cases are almost completely defoliated. By spraying thoroughly with arsenate of lead early in the season, the insect is easily controlled. Injury has been negligible in orchards that received the recommended spray treatments.

As the orchards become older, it is believed that insect pests will become increasingly important and more difficult to control. Though spraying is compulsory,

TABLE 16.—*Spray schedules suggested for the Rio Negro Valley*

APPLES			
PESTS	TIME OF APPLICATION	SPRAYING MATERIAL	REMARKS
San José scale, ... woolly aphis, red spider, clover mite.	: Shortly before : budding.	: Emulsions of 4 to 6 : percent, according to : brand.	: If there is a severe infec- : tion of the San José scale, : treatment with polysulfide : of calcium at 7° Baumé : should be made in winter. : This treatment should be : made at least 1 month prior : to the oil treatment.
Apple mildew	: When a pink color : is noticeable at : the tip of the : buds.	: Sulphur, which may be mois- : tened from 1 to 2.5 per- : cent, according to brand.	: Jonathan and Rome Beauty : varieties especially.
Apple mildew	: (1) When three- : fourths of the : petals fall.	: Same as above, plus arse- : nate of lead, from 300 to : 400 grams per 100 quarts : of water.	: Only arsenate of lead should : be used for the varieties : free of apple mildew.
	: (2) 12 to 15 days : after (1).	: Sulphur, moistened, and : arsenate of lead as above.	: If traps for the codling : moth are available, the : arsenate treatment should : be modified accordingly.
	: (3) 25 to 30 days : after (2).	: Same as above.	: If abundant rains occur, : sprayings should be re- : peated.
	: (4) 3 weeks after : (3).	: Arsenate of lead as above.	
Red spider.....	: (5) Same as (4).	: Cura-Frugal oil or summer : oil at 1 percent.	: This spraying may be com- : bined with (4), adding the : oil to the arsenate.
Woolly aphis	: (6) Beginning the : first part of : April.	: 150 to 200 grams of sul- : phate of nicotine and 2 : pounds of yellow soap per : 100 quarts of water.	: Repeat the sprayings when- : ever the woolly aphis re- : appears.

PEARS			
San José scale, ... red spider, and clover mite.	: Prior to the bud- : ding of the trees	: Oil emulsions from 4 to 6 : percent according to : brand.	: If there is a great infection : of the San José scale, : treatment with polysulfide : of calcium at 7° Baumé in : midwinter.
Codling moth	: (1) When three- : fourths of the : petals fall.	: Arsenate of lead at the : rate of 300 to 400 grams : to every 100 quarts of : water.	: If traps for the codling : moth are used, adopt a pro- : gram in accordance with the : data furnished by them.
	: (2) 2 weeks after : (1).	: Same as above.	: In case of an attack by the : pear leaf blister mite, : spray with polysulfide of : the Ministry of Agriculture : diluted in water at 3 per- : cent or with powdered poly- : sulfide at three-fourths : of 1 percent.
	: (3) From 4 to 5 : weeks after (2).	: Same as above	
	: (4) From 8 to 10 : weeks after (1).	: Same as above.	: Especially for winter pears. : If there are heavy rains, : it is necessary to repeat : the spraying.
Small spider	: On the same date : as the third ap- : plication for : codling moth.	: Cura Frugal oil or summer : oil at 1 percent.	: This spraying may be com- : bined with the last two for : codling moth, adding the : oil to the arsenate.

it is difficult to make growers spray in years of low returns. So far they have met with no severe financial losses, but when profits diminish production costs will have to be reduced. The average number of sprays for the valley at present is between four and five. In some orchards but three applications are required, including the dormant spray. In varieties susceptible to powdery mildew, additional applications are made.

In the Río Negro there are one thousand fruit growers. Six inspectors are employed the year round, but during the packing season six more are taken on. In 1939, because of an unusually large crop, it was necessary to employ 14 additional inspectors. Each year, or more often if required, each orchard is inspected for sanitary conditions. If pests are found, the farmer is asked to carry out the necessary control measures. If he fails to do so, the Government undertakes the work at the grower's expense, and the law compels payment. As a rule, however, the growers carry out the orders issued from the Inspection Office. Since conditions in the Río Negro are very similar to those in the Wenatchee Valley in Washington, it is believed that insect pests, particularly the codling moth, will become increasingly difficult to hold in check.



FIGURE 27.—Spraying a 4-year-old apple orchard, Río Negro Valley.

From four to six sprays are generally recommended for both apples and pears, including one or two against red spider, which is a serious pest. Codling moth as yet has not become of serious economic importance; but, in view of the planting system employed, as the industry becomes older it is reasonable to assume that worm damage will increase and control measures will become increasingly difficult.

Spray Schedule Commonly Used in Río Negro

	<i>Spray</i>	<i>Approximate date of application</i>
Red spider	Dormant	
Codling moth	Calyx	October 8
Codling moth	First Cover	October 23-26
Red spider	Second Cover	November 6-9
Red spider	Third Cover	December 27-30

In the Mendoza area pests, so far, are only moderately important, despite the fact that most of the spraying is done on a rather inefficient basis. San José scale is quite prevalent and should be controlled. The leafhopper is of comparatively recent introduction but is becoming increasingly serious. Red spider is also on the increase. Codling moth so far has been kept well under control. The bagworm, however, is especially serious in this region, not in orchards but on the poplars planted as windbreaks. It may be assumed that unless proper action is taken pests will become more numerous and more difficult to control.

Spraying dates are based upon emergence or flight of moths and upon appearance of pests. Codling moths are trapped as they are in the United States, and their life histories are followed closely. A spray service has been developed that gives the grower timely information. Spray-notice cards are mailed, but there is no rural free delivery and many farmers do not go to the post office regularly. Furthermore, the average worker is illiterate and cannot read, much less understand, the notices. The most effective means of getting the information to the grower is by radio. The orchard owners usually live in the cities, and it is largely to them that the information is directed. In any event, Government and railway fieldmen have to make many trips to explain to the farm laborers just what is required.

In the eastern or nonirrigated producing districts, conditions seem to be admirably adapted to the development of all insect pests and diseases. In the Delta, fungous diseases flourish and apparently experience little discouragement. Insect pests of all kinds, including mosquitoes, multiply freely in the damp, humid climate. The Oriental peach moth has become quite firmly established in the Delta region and is causing much injury to both trees and fruits. By the looks of the harvested product, spraying, if it is done at all, is done after infection or infestation by the diseases and pests. Owing to the crowding of the trees and the rank stands of undergrowth, spraying is by no means an easy practice.

In the Province of Buenos Aires, effective spray treatment is one of the primary requisites if the industry is to become a success. While many growers spray, it would appear by the quality of the fruit produced that the treatment is ineffective against the pests involved. Climatic conditions favor the development of pests and diseases, particularly fungous diseases, and growers so far have failed to bring about their commercial control. Even the fruit produced in the better cared for orchards would not satisfy the requirements of a discriminating market.

Thinning

The practice of thinning fruit is being advocated and encouraged in Argentina as much as possible, but many growers are not responsive. These growers believe in getting all the fruit they can and see no logic in removing any that has set. Some of the better orchardists, however, follow a good thinning program and are producing excellent fruit. In a few orchards apples of the Delicious variety are spaced from 10 to 12 inches apart, but in the 1940 season, because of the spotted nature of the crop, thinning was not as carefully carried out. It is more difficult to thin when the crop is light, and, furthermore, it was believed that the branches, even though too heavily loaded in certain places, would be compensated by the branches that were carrying no fruit.

Growers who do not thin have developed rather ingenious ways of propping and tying the branches to prevent breakage; however, because of biennial bearing, which is already developing in certain orchards, and poor tree formation, the practice of thinning may become more generally necessary.

Harvesting Dates and Methods

The approximate harvesting dates for the most important varieties of apples in the Río Negro are shown in the following tabulation:

Apples

Variety	Date
Gravenstein	January 1 ¹
Jonathan	February 9
King David	do.
Red Delicious	February 15
Cox Orange Pippin	do.
Winter Banana	do.
Delicious	February 20
Huidobro	March 6
Glengyle Red	March 10
Stayman Winesap	do.
Rome Beauty	March 14
Yellow Newtown Pippin	April 6
Granny Smith	April 10

Pears

Variety	Date
Williams (Bartlett)	January 12
Clapp's Favorite	January 15
Bonne Louise	January 28
Flemish Beauty	January 30
Hardy	February 2
Manzanita	February 8
Anjou	do.
Angouleme	February 17
Diel	do.
Comice	February 21
Bosc	do.
Packham's Triumph	do.
Aremberg	March 6
Winter Bartlett	do.
Winter Nelis	March 20
Passe Crassane	March 31

¹ None packed in 1939; estimated date.

The above figures are based on the 1939 harvest and may be considered approximately accurate for normal seasons. The San Rafael district is a week to 10 days earlier and Tunuyán and Tupungato are the same as Río Negro.

The tendency in the Río Negro, and for Argentina in general, is toward early picking. Formerly Williams pears were harvested about January 20. Each year the season has been advanced a few days, with the 1940 harvest commencing as early as January 7. As a result of this trend, the early shipments are arriving on the market immature and showing considerable shrivel. Pears on the Buenos Aires market in January 1940 indicated very plainly that they had been harvested too green. Complaints have also been made about early shipments received on the New York market. Unfavorable growing conditions may have been partly responsible, but they were not wholly to blame for the unsatisfactory quality of the fruit.

Delicious, Jonathan, and King David are harvested at about the same time as the Williams pears. In some instances Delicious are gathered before King David. Ordinary Delicious, which in 1940 were very poorly colored, were being picked at the same time as Red Delicious, which were highly colored. Like growers in other parts of the world, when a few apples or pears begin to fall Argentine growers insist that the harvesting season is at hand. There is also the urge



FIGURE 28.—A harvesting scene in a 10-year-old apple orchard in the Río Negro Valley.

to catch the early market, regardless of the adverse effect the marketing of early inferior fruit has upon the later movement of better quality fruit.

The actual harvesting methods employed are very similar to those in the United States, except that more care seems to be exercised in moving the ladders about in the trees and in separating the stem from the spur. Apples and pears are actually picked, not pulled. The fruit is placed in picking bags and emptied carefully into field boxes. Low-sprung, well-sprung wagons carry the boxes to a loading point, where they are placed on trucks and carried to the packing house. Upon examination of fruit in the field boxes at the packing houses, it was surprising to see how few came in without stems. This was especially true of the Delicious, where the stem plays such an important part in the appearance and sales value of the fruit. In general, it appears that Río Negro growers are more particular about picking than are United States growers.



FIGURE 29.—Rushing apples from orchard to packing house in the Río Negro Valley. (Courtesy of Great Southern Railway.)

Harvesting methods in Mendoza are similar to those practiced in the Río Negro and in the United States. The equipment used, such as picking bags and buckets, is similar, as are the wagons used in transporting fruit from orchard to packing house. Mendoza pickers are taught to remove the fruit carefully from the trees and to see that stems are not pulled out or broken. One sees very few leaves and spurs coming into the packing houses.

The general tendency throughout the Mendoza section is to harvest the fruit while it is still immature. This was particularly apparent in 1940, which was an extremely

hazardous growing season. Many of the crops were severely injured by hail, and in those orchards that escaped, growers could not refrain from picking early in order to save their crop from possible hail damage or loss.

Many growers complain about the failure of their apples to color properly. It is evident, however, that it is possible to get good color if the fruit is allowed to hang long enough. Delicious were very short on color in 1940, but that was because they were being harvested about a month earlier than usual. Jonathans were generally inclined to run somewhat short of color that season, but the failure to color was largely due to the fact that they also were being harvested prematurely. When Red Delicious take on a fairly good, over-all red color, it is assumed that the variety is ready for harvesting; consequently, all Delicious, red or ordinary, are taken from the trees, whether they are mature or not.

Plums do very well in the Mendoza district and are being exported to the United States. It appears, however, that heretofore plums have been harvested too green. Growers are now making an effort not to harvest the fruit until it has reached the proper state of maturity.

Packing and Packing Facilities

During the early life of the Argentine fruit industry, efforts were directed entirely along production lines with little serious thought devoted to the handling, grading, packing, and transportation of the fruit to market. Because of ignorance of market requirements and transportation problems, the initial results were not satisfactory. A sharp rebuke from the trade made shippers realize that something must be done if exports were to be developed. As a result of the combined efforts of the railways, Government agencies, steamship companies, and other interested parties, conditions have been greatly improved.



FIGURE 30.—Typical packing scene before modern American equipment began to be used in the Río Negro Valley (1929). (Courtesy of Argentine Fruit Distributors.)

In 1928, the need of centralized packing houses in the Río Negro Valley became apparent, whereupon the Argentine Fruit Distributors, a subsidiary of the Southern Railway, undertook to provide the necessary facilities. Four packing houses were located at Cinco Saltos, Cipolletti, Allen, and Juan F. Gómez, and later a fifth was built at Villa Regina. These sheds are covered with corrugated iron and are extensible. They are modeled along American lines and provide for plenty of lighting and the installation of equipment.

Three sheds are equipped with six modern Cutler rotary bin machines, and two sheds have three machines each, of the same make. Americans were engaged to manage the sheds for the first few years and to instruct the local people in the grading, packing, and handling of fruit. The Argentine Fruit Distributors had in their employ an experienced man from the United States Pacific coast to look after these sheds. He has been in Argentina through 12 packing seasons and is thoroughly conversant with all phases of the industry.



FIGURE 31.—Exterior of one of five similar sheds operated by the Argentine Fruit Distributors in the Río Negro Valley. The construction is simple, inexpensive, efficient, and easy to enlarge. (Courtesy of Great Southern Railway.)

Many other packing houses have since sprung up in competition with those of the Argentine Fruit Distributors. Though they are well-constructed houses, they are not so conveniently arranged or so well equipped. It would seem that there are now sufficient houses to take care of the present requirements of the valley. The houses equipped with six machines are capable of putting through 10,000 packed boxes a day. As many as 11,075 boxes have been packed in 11 hours. In one 73-hour period something over 60,000 boxes were packed.

The packed fruit is immediately loaded into ventilated cars. They are loaded on the stagger system, 8 boxes across and 6 boxes high, the capacity of each car being about 900 boxes. There are no precooling or storage plants at shipping points; hence the fruit is dispatched to Buenos Aires or Bahía Blanca as rapidly as possible.

In 1937 the Argentine Fruit Distributors constructed an additional packing house at San Rafael, along lines similar to those in the Río Negro. This house was badly needed and has been of great assistance to the community. In addition, a number of smaller packing plants have been built in both the Río Negro and the Mendoza districts by individual owners or by large wholesale and exporting firms operating out of Buenos Aires. Packing facilities also have been provided in the Atlantic region. These are mostly small, grower-owned sheds but equipped with some sort of machinery. One large individually owned house, which will take care of the output of the orchard for many years to come, has been constructed in the Delta.



FIGURE 32.—Interior of a packing house in the Río Negro. Note conveyors, rotary bin grading machinery, and other mechanical labor-saving devices common to American packing houses. (Courtesy of Great Southern Railway.)

In all districts, however, the actual packing of the fruit leaves something to be desired. The tendency is to put up a rather loose, highly crowned pack, forcing the fruit into position when lidding, rather than placing the fruit firmly into position as it is packed. The Buenos Aires market demands a heavy-weight package, but the industry is making a mistake by catering to this requirement. To give the additional weight of fruit it is necessary to force an additional tier into the boxes. This results in considerable bruising, which the trade objects to. To correct this fault, boxes with extra heavy sides were introduced. The 1940 box shook was cut one-half inch thick. The thicker sides, however, cannot prevent bruising. It is impossible to crowd successfully a bushel and a fifth of apples into a container designed to hold a bushel. In one packing house the boxes carry an extremely high crown. In fact, the fruit is crowned from side to side as well as from end to end, and the box has a hog-backed appearance, the center row of apples running longitudinally being much higher than the rows on either side. Although these apples are packed in boxes with $\frac{1}{2}$ inch sides, the pressure causes the sides to bulge to such an extent that it is impossible to stack them more than four boxes high. They turn and rock as though they

TABLE 17.—Containers used in Argentina in packing fruit for export

FRUIT AND CONTAINER	INSIDE MEASUREMENTS	WEIGHT OF FRUIT-	
		GROSS	NET
	<i>Inches</i>	<i>Pounds</i>	<i>Pounds</i>
Apples: ¹			
Standard box	10-1/2 by 11-1/2 by 18	48 to 50	41 to 44
Half box (standard)	5-1/4 by 11-1/2 by 18	24 to 25	21 to 22
Pears: ¹			
Standard box	8-1/2 by 11-1/2 by 18	48 to 50	41 to 44
Half box (standard)	4-1/2 by 11-1/2 by 18	25 to 26	22 to 23
Trays: ²	2-1/8 by 11-1/2 by 18-3/4	18 to 19	14 to 15
Grapes: ³			
B. A. P. pack	4-1/2 by 11-3/4 by 17-3/4	23	20
Cuyo pack	4-7/8 by 13-3/8 by 23-3/4	22	18
South African pack	5-1/2 by 11-3/4 by 16-7/8	13	10
Tray	4 by 13-3/4 by 19-3/4	26	22
Stone fruits ^{4 5}	11-1/2 by 18 by 8-1/2	26 to 50	22 to 24
Oranges and Grapefruit,			
standard box	11-1/2 by 11-1/2 by 24	79 to 85	70 to 77
Lemons, standard box	10 by 13 by 25-1/2	79 to 85	70 to 77
Tangerines, ⁶ standard box	5-3/4 by 11-3/4 by 24	40	35
Melons: ⁴			
Large box	8 by 16 by 22-7/8	50	44
Small box	6-3/4 by 13-3/4 by 20	31	26

¹ The ends of the boxes must be 3/4 inch thick, sides 3/8 to 1/2 inch, cleats 3/8 by 3/4 inch.

² Ends 3/8 inch thick, cleats 3/8 by 3/4 inch.

³ In all grape packages, ends must be 5/8 inch thick, cleats 9/16 by 3/4.

⁴ Ends 3/4 inch thick, cleats 3/8 by 3/4 inch.

⁵ The depth of the box varies in accordance with the number of layers, but must not exceed 8-1/2 inches, inside measurement.

⁶ Ends and center piece (divider) in all citrus containers must be 3/4 inch thick, cleats 3/8 by 3/4 inch.

were stacked top to bottom instead of on their sides, and cannot possibly arrive at their destination in other than an extremely bruised condition.

Several individual packing houses have been erected in the Mendoza area on properties owned by large Buenos Aires wholesalers, and they would be a credit to any community. They are equipped with modern Cutler rotary bin grading machines, and the latest lidding, strapping, and conveyor accessories. The pack itself can stand much improvement; but, considering the limited experience the packers have had with box packing and the fact that local labor is used, the results on the whole are quite commendable.

Cost of Production

Detailed or itemized growing costs in Argentina are unobtainable for either apples or pears. The total cost of production, however, has been more or less established.

In the Río Negro Valley the actual growing costs of producing a box of Williams pears is reckoned at from 50 to 60 centavos (12 to 15 cents). These costs are exclusive of overhead, interest on investment, etc., but growers contend that if they can secure 1 peso (30 cents) per field box, delivered at the packing house, they can operate at a profit. For late winter pears the costs run somewhat higher and growers estimate that they must obtain 1.50 pesos (45 cents) per box to make a profit.

TABLE 18.—Packing-house costs for the operation of the San Rafael plant, 1939

ITEM	COST	
	Pesos	Cents
LABOR		
Men:		
Tally clerks	per hour	0.50 : 14.88
Skilled laborers	do	.50 : 14.88
Semiskilled laborers	do	.45 : 13.40
Ordinary laborers	do	.40 : 11.90
Mechanics	per day	6.45 : 192.04
Packing-house foreman	do	6.00 : 178.64
Office clerk	do	6.65 : 197.99
Car loaders	per car ¹	5.00 : 148.87
Women:		
Sorters ²	per hour	.35 : 10.42
Packers	per box	.30 to .60 : 8.93 to 17.86
Total labor (packing cost in month of normal output)	do	.30 : 8.93
Season average, including preparation of shed, etc. ³	do	.38 : 11.31
PACKAGE		
Material (shook):		
Standard pear box ⁴40 : 11.90
Standard apple box ⁵44 : 13.10
Half box (standard)27 : 8.04
5-kilogram tray18 : 5.36
Construction:		
Labor	per standard box	.03 : .89
Nails	do	.03 : .89
Waste	do	.045 : 1.34
Stacking and moving	do	.01 : .30
Insurance	do	.01 : .30
Total	do	.125 : 3.72
Labor	per half box	.015 : .44
Nails	do	.02 : .60
Waste	do	.025 : .74
Stacking and moving	do	.005 : .15
Insurance	do	.005 : .15
Total	do	.070 : 2.08
OTHER EXPENSES		
Collars	per package	.035 : 1.04
Single corrugated pads	do	.03 : .89
Labels	do	.015 : .44
Liners	do	.02 : .60
Rent of shed	do	.05 : 1.49
Wiring	do	.03 : .89
Use of field boxes	do	.04 : 1.19
Unloading and cartage at Buenos Aires	do	.13 : 3.87
Freight on material	do	.05 : 1.49
Wraps	do	.24 : 7.15
Total other expenses	do	.64 : 19.05

¹ 900 to 1,000 boxes.

² When the movement of fruit increases, the sorters receive up to 45 centavos (11.3 cents) an hour.

³ Without overhead charges, such as administration, fieldmen, cars, power, light, and other general expenses.

⁴ In 1940 the cost per box advanced to 0.515 peso (15½ cents) because the boxes were made with one-half-inch sides.

⁵ In 1940, 0.575 peso (17 cents). See footnote 4.

From data furnished by the Argentine Fruit Distributors.

Growing costs for apples are higher than for pears, averaging between 75 centavos and 1.50 pesos a box, depending upon average tree production. For trees producing 3 boxes of fruit, the cost is about 1.20, possibly 1.50, but for trees producing 5 or more boxes, the cost is estimated to be about 75 centavos (23 cents) a box. This last figure is considered the average growing cost even though yields are as high as 10 or more boxes per tree.

The average growing cost for fruit in the Río Negro is estimated at 1 peso a box. Present packing charges, including administration, boxes, liners, packing, labor, etc., is reckoned at 1.75 pesos, or about 53 cents. Apples, so far, have been profitable, since buyers have been paying around 10 centavos per kilogram (1-1/3 cents a pound) for fruit on the trees. At this figure growers are said to make a profit. The buyer who buys and packs the fruit must stand all packing costs. These costs usually amount to 1.70 to 1.80 a box and include labor, container, materials, cartage, and loading on cars.

Labor is very cheap, judged by United States standards. Pickers and those engaged in the harvest receive from 2.50 to 3 pesos (75 to 90 cents) a day. The hours are from sunrise to sunset, with several short breaks through the day.

Packers are paid 8 centavos a box for the first 70 boxes packed, and 10 centavos a box thereafter. Some packers are capable of earning up to 100 pesos (\$30) a week, which is considered a very good wage.

Graders or sorters receive 50 centavos (15 cents) an hour; truckers, 45 to 55; strappers and lidders, 60; other help, from 40 to 60, depending upon the type of work performed. Overseers or packing bosses receive 60 pesos, or about \$18 a week.

Prices Paid to Growers

The selling price of fruit, especially apples, has shown a steady decline in recent years, while production has been increasing. In 1937 the average prices received by growers, in pesos per box, for fruit picked and delivered to packing houses in the Río Negro Valley were as follows:

Apples - Red Delicious 6.18 (\$2.04); Delicious 4.83 (\$1.59); Black Jonathan 3.51 (\$1.16); Rome Beauty 3.38 (\$1.14); Jonathan 2.43 (80 cents); King David 2.43 (80 cents).

Pears - Anjou 3.34 (\$1.10); Winter Nellis 2.46 (81 cents); Beurre d'Arenberg 2.31 (76 cents); Williams 0.75 to 1.00 (25 to 33 cents).

In 1938 the prices had declined to the following:

Apples - Red Delicious 4 (\$1.30); Delicious 3 to 3.50 (98 cents to \$1.14); all other varieties 3 (98 cents).

Pears - Williams 60 to 70 centavos (20 to 23 cents); winter pears, all varieties, 2 pesos (65 cents).

In 1939 there was a large crop and the prices paid were lower than in 1938.

In 1940, with a crop 50 percent less than the 1939 crop, prices ruled as follows:

Apples - Red Delicious 4 pesos; Delicious 3 to 3.50; all other varieties 2.00 to 2.50, mostly 2.20 to 2.40

Pears - Williams 1.20; all other varieties 1.50.

Transportation Facilities and Charges

Transportation facilities in Argentina are the most extensive and the best of any found in the South American countries. In addition to the 25,000 miles of railways, there is considerable river traffic. There are three large and one smaller British-owned and operated railway systems serving the country. The three are the Central Argentine, the Buenos Aires Great Southern, and the Buenos Aires Pacífico. The smaller road is the Entre Rios or Northeastern Argentine. There is also a State-owned railway, which operates about 20 percent of the total mileage, but the British-owned lines tap the principal fruit-producing areas of the country.

There are three different gages in use, which of course causes a switching problem. They are the meter (3.3 feet); the standard (4 feet 8½ inches), and the broad gage (5½ feet). The British-owned lines operate on broad and standard, while the State-owned railways run on narrow gage.

The service is especially good on the Central, Great Southern, and Buenos Aires Pacífico. Good equipment and fast schedules have been provided for the fruit trains. Refrigerator and especially constructed ventilated cars are available and are constantly being improved upon. The cubic capacity of the cars is much greater than in the United States, and the loading is much heavier. The construction of the ventilated car is unique; it is a type that might be used to good advantage in the United States in transporting certain fruits and vegetables. The railways are still experimenting with refrigerator equipment.

The loading of fruit in both ventilated and refrigerated cars is quite different from the method used in the United States. The car is loaded on the stagger system with a minimum of stripping or dunnage. This method of staggering the boxes tends to reduce ventilation to a minimum, as many of the already small tunnels or openings are practically blocked as a result of uneven stacking. Experiments in both vertical and horizontal stacking are in progress.



FIGURE 33.—Improved type of ventilated car used in transporting fruits and vegetables. (Courtesy of Buenos Aires-Pacífico Railway.)

The Rio Negro-Neuquén region is served by the Buenos Aires Great Southern, which operates a splendid express service for export fruit. Trains loaded along points in the valley reach Buenos Aires some 30 to 35 hours later, where the fruit is immediately placed in cold storage.

Bahía Blanca, a port of export, is about 12 hours from Río Negro, but a relatively small share of the export fruit is shipped there. Bahía Blanca has three loading points for overseas shipments, each equipped with a cold-storage plant. These

plants were built for freezing and storing meat; but, since the meat business has not been as flourishing as anticipated, space has been found in one of them for storing from 100,000 to 120,000 boxes of fruit.

The Cuyo region is connected with Buenos Aires by the Pacífico railway, a journey of some 25 to 30 hours. This road, like the Great Southern, has done much toward furthering the interests of the fruit industry and operates a special fruit express service. Both ventilated and refrigerator cars are used, the former for hardier fruits, melons, and vegetables, and the latter for the more perishable sorts, such as grapes and stone fruits. Refrigerator cars from this district can be switched at Buenos Aires to the docks, where they are spotted alongside the ship and the fruit transferred directly from car door to ship's chamber in one operation. This is a distinct advantage, as the fruit is not subjected to so many handlings and temperature changes, an objectionable feature common to some other lines. In addition, the railway owns or leases a number of fruit properties that are used in working out transportation problems. By having full control over the fruit, the railway is in a



FIGURE 34.—Ventilated car used in transporting apples and pears from the Río Negro Valley. This type of construction gives excellent ventilation and permits surprisingly rapid cooling. It has a capacity of about 900 boxes. (Courtesy of Great Southern Railway.)

position to carry out rather extensive research projects in connection with harvesting, packing, handling, and transport, without the usual responsibility for grower-owned fruit.

The northern region - Tucumán, Salta, and Jujuy - is served by the Central Railway, a journey some 30 to 50 hours from Buenos Aires. The distance from this district to consuming centers is one of its chief drawbacks. The service provided is good, but transportation costs and the length of time required in the haul place the section at a disadvantage compared with districts closer to market.

The Mesopotamia region (Corrientes, Misiones) is served by the Northeastern Argentine Railway. This line runs between the rivers Paraná and Uruguay, and up into Paraguay. Concordia, the center of the mandarin industry, is some 24 hours from Buenos Aires by rail; and Pindapoy, which is the center of the grapefruit industry, is about 48 hours away. Since there are no bridges across the Paraná, everything must be ferried. Large ferryboats, accommodating about 20 cars, ply between Zarate and Ibicuy, a trip requiring 4 hours. This road is in rather bad circumstances financially; hence neither equipment nor service is up to that of the other roads mentioned.

Considerable transportation is also provided by river steamers in the Mesopotamia region, and groves planted some distance from the railroads find it expedient to use the river boats. Often, however, the fruit does not fare well. It frequently happens that other available freight pays more than oranges or grapefruit, and as a result the fruit is allowed to remain on the dock. While mandarins and grapefruit are packed and shipped in boxes, the railways haul practically all of the oranges from this district in bulk. Shipments are only for home consumption; hence the need for efficient, rapid transport is not so essential as it is for exports.

Railway transportation is not so necessary in the Delta and Atlantic districts as formerly. With the extension of highways from Buenos Aires, trucks have come into use and it is more than likely that truck transport will increase.

The Delta is dependent entirely upon water for the transportation of its products. If a farmer does not own his own motorboat, he must make arrangements to have his products picked up at the landing stage and carried to the terminus at Tigre, where it is transferred to truck or railway car. From this point fruit is redistributed by rail or river boats to the interior markets. Fruit from the Delta district does not enter export channels; hence the question of rapid transportation is not of such vital importance as elsewhere.

TABLE 19.—Inland freight rates on Argentine fruit to various ports, per box, 1940

FRUIT	RIO NEGRO TO BUENOS AIRES		MENDOZA TO BUENOS AIRES		SAN JUAN TO BUENOS AIRES	
	Pesos	Cents	Pesos	Cents	Pesos	Cents
Pears:						
Williams ¹	1.00	29.8	1.00	29.8		
Other varieties	1.20	35.7	1.20	35.7		
Apples	1.20	35.7	1.20	35.7		
Grapes65	19.4	.70	20.8
Plums65	19.4		

¹ Rebates on Williams pears are granted under a special tariff dispensation and are effective from January 1 to February 29. On a minimum load of 5½ tons a 17-percent deduction is allowed; on a 24-ton load 27 percent is granted.

TABLE 20.—Ocean freight rates on Argentine fruits to specified destinations and on United States fruit to Argentina, 1939

FRUIT AND DESTINATION	BASIS	RATE			
		£	s	d	Dollars
ARGENTINE FRUIT	:	:	:	:	:
United Kingdom:	:	:	:	:	:
Apples	Standard box ¹	0	2	9	0.61
Pears	Standard box ¹	0	2	6	.55
Grapes	40 cu. ft. ²	3	12	6	16.08
Continental European ports:	:	:	:	:	:
Apples	Standard box ¹	0	2	9	.61
Pears	Standard box ¹	0	2	6	.55
Grapes	40 cu. ft. ²	3	12	6	16.08
Sweden:	:	:	:	:	:
Apples	Standard box ¹	0	3	9	.83
Pears	Standard box ¹	0	3	3	.72
Grapes	Box ³	0	2	0	.44
Rio de Janeiro:	:	Gold Pesos		:	:
Any fruit in ventilated storage	2,200 pounds	15		:	10.52
New York:	:	:	:	:	:
Pears	Box	:		4	.60
Grapes	Box	:		5	.40
UNITES STATES FRUIT	:	:	:	:	:
Buenos Aires:	:	:	:	:	:
Apples	Cu. ft.	:		6	.50
Pears	Cu. ft.	:		:	.50
Plums, peaches, grapes ⁷	Cu. ft.	:		:	.75

¹ Less 3d. (5.5 cents) rebate.

² Less 10-percent rebate.

³ Less 2d. (3.7 cents) rebate.

⁴ In 1940, 37½ cents due to foreign competition; in 1941, 65 cents.

⁵ In 1940, 25 cents; in 1941, 45 cents.

⁶ In 1940, \$1.50 to \$2.50 per barrel.

⁷ In 1940, grapes, \$1.05 in 32-pound chests.

The above rates to Europe are shown as of 1939, when conditions were more or less normal, and are based upon a definite tariff schedule. Current rates vary from day to day and are based upon war conditions and the risks involved. It is interesting to note that in all instances the rate on Argentine pears is lower than that on apples, which is the reverse of rates on shipments from the United States to Europe.

Ocean transport facilities from Argentina to Europe and the United States are most excellent under normal conditions. While a regular service has been maintained with the North American Continent, schedules to Europe, of course, have been curtailed under wartime conditions. Many British as well as Scandinavian lines operated regular, frequent, and fast services to Europe. Seven boats left each month for London, three for Liverpool and Glasgow, and two for Southampton. In addition, there were many boats leaving for the Continent.

Cold-Storage Facilities and Charges

The Argentine fruit industry is badly in need of more and better cold-storage facilities, especially in or adjacent to the areas of production. This need is recognized, but because of unsettled conditions abroad the railroads have been forced to curtail expenditures as much as possible. There is not much likelihood, therefore, of additional storage being constructed in the immediate future.

While Río Negro has no cold-storage plants in the producing areas, the Provinces of San Juan and Mendoza can boast of one each. These plants are grower-owned, and are used largely for precooling grapes. They are modern buildings and have excellent unloading and loading facilities, with direct handling from storage chamber to refrigerator car. The cars are supposed to be precooled before spotting, but frequently temperatures are rather high when the car doors are opened. The stagger system of stacking is used both in the storages and in the cars. It is claimed that by this method the temperature can be reduced from 90° F. to 34° or 36° in 24 hours.

The handling of fruit at the San Juan plant, both in the storage and in the loading of cars, could be greatly improved upon. There is evidence of poor management on every hand. The loading of cars is especially bad. As labor is cheap, the use of trucks and conveyors has been neglected. The men carry from two to three boxes of grapes at a time, and there are so many workers that they impede each other's progress. An antechamber was built between the outside wall and the cold-storage room. This is not kept cool and therefore keeps the fruit warm. By more efficient organization and the use of mechanical equipment, it should be possible to load a car with half the men in half the time.

In 1938 the Argentine Fruit Distributors took over a part of the Frigorífico at Cuatrerros, which is about 10 miles out of Bahía Blanca. The plant has a capacity of about 120,000 boxes of pears. Upon arrival from Río Negro, the fruit cars are spotted alongside a covered escalator, which conveys the fruit from the car to the second floor of the storage. After about 24 hours it is conveyed by escalators to rooms on the ground floor, where it remains until ready for loading aboard ship. The dock is located about a mile and a half from the storage plant. To reach the ship the fruit is loaded onto small platform slings carrying 40 boxes each. The slings are placed on light railway trucks, two slings to a truck. The trucks are loaded in a sort of antechamber between two storage rooms. The antechamber is connected with the storage rooms by small openings in the walls and is kept cool while the trucks are being loaded. Seven to eight trucks constitute a trainload. When the trucks are loaded the outer doors are opened and a small, toylike engine backs in and hooks onto the train for the 1½-mile run to the ship. The system is unique and may sound impractical, but it works quite rapidly and efficiently. It is possible to load about 20,000 boxes a day.

In Buenos Aires are the following large cold storage plants (frigoríficos), which are used for both precooling and permanent storage:

	<i>Box Capacity</i>
Anglo	250,000
La Negra	230,000
Puerto Nuevo	120,000
Abasto	100,000

These storages are located in different parts of the city, and all of them are from 10 to 30 minutes (3 to 10 miles) from the docks. Upon arrival in Buenos Aires, therefore, the fruit must be trucked from the car to the cold storage and hauled again from the cold storage to the ship. At the docks the fruit is unloaded from the road trucks onto small four-wheeled trucks, which are moved by laborers to the ship's side. Congestion at the docks is bad and the road trucks sometimes have to wait for

a long time to be unloaded. Fruit is also allowed to remain on the quay for some considerable time, which means harmful exposure to the sun and much unnecessary handling, in most instances none too carefully done.

The relationship of the cold-storage plant to the docks depends upon the destination of the cargo. Fruit from the Río Negro Valley, which is carried by the Southern Railway, runs on standard-gage track and has its terminus on the south side of the city. The Buenos Aires Pacífico, on the other hand, runs on broad-gage track and enters Buenos Aires from the west. The Buenos Aires Pacífico terminus is most conveniently located to the docks serving North American ports; hence their tracks have been extended from the yards to the quay to permit direct shipside loading. The use of different gage track almost prohibits the interchange of traffic in the metropolitan area, a fact that causes extra handling and the continuous use of cold storage prior to loading the fruit for export.

The Frigorífico Anglo is owned by British interests. This storage is the most accessible to the docks used by British steamship lines, including the Blue Star Line, owned by the same interests. Other ships also load from the same berthing place. Fruit from the Río Negro district uses this storage, since it is the most conveniently located to the Southern Railway yards. Fruit from the Mendoza-San Juan area arrives on the other side of the city, a distinct disadvantage insofar as apples and pears destined for Europe are concerned. The fruit, however, is delivered alongside the steamer, which means quick transfer from the car to the ship's cold chamber.

La Negra plant, which has the second largest capacity, is some distance from the docks, and long delays are occasioned because of its location and the heavy street traffic through which trucks must make their way.

The Puerto Nuevo plant is the most conveniently located, insofar as American shipments are concerned. It is situated on the new port docks, where steamers for the United States are loaded. For other docks, however, the fruit must be trucked to the steamers, which causes delays and the usual additional handicaps. It is not well located with respect to any of the railway terminals.

The Frigorífico Abasto is in the wholesale market and is used largely by the wholesale trade. Long hauls and delays also occur in the use of this plant.

There is no published or set schedule of storage charges in Buenos Aires. Each transaction is arranged separately and is contingent upon the volume involved and the ability of the client as a negotiator. One storage, for instance, has a minimum rate of 59 centavos (17½ cents) a box for the first 28 days, which includes handling both in and out. For the next 14 days there is an additional charge of 15 centavos (4½ cents) a box and for the next 14 days another 15 centavos, and so on for every 2 weeks up to a period of 2½ months, when a slight reduction in rates is granted. In other instances the storage company charges 20 centavos (6 cents) a box for the first 10 days, and for the following 35 days at the rate of 2 centavos (0.6 cent) a box a day. For the following 60 days the rate is 1 centavo a day and thereafter ½ centavo a day. An additional 10 centavos is charged against handling in and out of storage. In still another instance, storage charges range from 40 to 60 centavos (12 to 18 cents) a month, depending upon the volume, with an additional 10 centavos for handling.

Storage charges for the period February to November amount to about 3 pesos, or 89 cents a box. Operators who purchase for late holding usually figure from 3 to 3.50 pesos (89 cents to \$1.05) a box for storage.

Markets and Marketing Methods

For a number of years, expansion of the Argentine fruit industry has been predicated upon a growing export market. Neither the export nor the domestic market, however, has been favored at the expense of the other. Government officials and other agencies have been working for some years to stimulate consumption on the home market. The original idea of promoting fruit culture in Argentina was to make the country self-sufficient, and it did not take long to achieve this objective. Outside of the city of Buenos Aires the domestic market for high-grade fruit is decidedly limited. The wealth of the country is centered in Buenos Aires, which has a population of 2½ million, or 20 percent of the total population. Buenos Aires has purchasing power, a requisite generally lacking in the rest of the country.

Most of the smaller Argentine towns are reminiscent of the North American frontier community towns of some 50 or more years ago. These towns offer few prospects as a market outlet for a specialized fruit industry. In general they reflect the small income, the limited requirements, and the low purchasing power of the farm workers in the surrounding countryside.

There is some complaint that fruit production for export has been developed at the expense of the home market, which has been forced to consume the poorer grades and off-condition fruit so that the best may be carried overseas. With the volume of fruit now being produced, however, there is more than enough good fruit to go around for those who are able to pay for it. The lower grades, even windfalls, are packed and sold in communities of low purchasing power.

TABLE 21.—Exports of apples from Argentina, by months, 1935-40¹

MONTH	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
January ..	-	-	100	-	-	-
February ..	4,298	4,271	25,015	10,711	64,617	30,004
March	18,586	69,649	129,136	63,141	243,512	73,555
April	37,598	52,467	88,633	78,092	64,505	40,574
May	7,683	25,595	5,101	35,545	176,650	33,575
June	4,900	18,703	6,075	7,050	8,481	31,254
July	1,110	10,996	2,146	3,793	12,439	21,773
August	575	12,769	8,412	4,670	20,561	5,732
September ..	100	6,545	5,535	2,089	595	6,796
October ...	100	55	370	1,339	1,487	549
November ..	0	0	75	2,670	265	189
December ..	0	0	0	0	38	97
Total ..	74,950	201,050	270,600	209,100	593,150	244,098

¹ In boxes of 44 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

It is also true that the Buenos Aires market is liberally supplied with cheap, low-grade fruit. This is because the city, like any other great center of population, has its low-income group. The districts close at hand, such as the Tigre, the Delta, and the Province of Buenos Aires, are capable of producing sufficient volume of cheap, low-grade fruit to satisfy all requirements. More remote districts, such as Río Negro and Mendoza, must distribute their off-grade fruit locally, since they cannot afford to prepare such fruit for the city market. Official efforts to stimulate the consumption of fruit as an aid to public health and to the fruit industry have met with considerable success. The Ministry of Agriculture has established a bureau known as La

Sección Comercial de la Fruta, which sells fruit direct to towns and municipalities in large quantities at low prices.

During recent years Argentina has exported an average of about 38 percent of the total commercial pear production and about 26 percent of the commercial apple crop. The industry is still in its infancy, however, and most orchards have not yet reached their prime. The export movement, therefore, must be increased if the industry is to survive, since domestic demand appears to be incapable of much further expansion. While there has been a slight increase in domestic consumption over a long period, there has been little change during recent years.

TABLE 22.—Exports of pears from Argentina, 1935-40¹

MONTH	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
January ..:	18,270	18,009	119,697	162,825	280,852	125,662
February ..:	139,111	261,670	376,312	428,029	609,332	224,838
March	47,566	133,554	71,682	104,464	297,200	118,288
April	31,456	71,804	50,178	124,571	116,984	80,498
May	15,923	26,550	19,759	76,921	83,421	66,161
June	1,670	7,260	16,435	12,786	18,007	12,171
July	1,760	206	3,165	7,638	4,068	9,337
August:	250	772	886	5,809	6,789	1,935
September ..:	0	70	30	40	135	350
October ...:	0	23	0	8	119	264
November ..:	0	0	0	0	202	74
December ..:	0	0	0	0	64	31
Total ...:	256,006	519,918	658,144	923,091	1,417,173	641,609

¹ In boxes of 44 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

TABLE 23.—Exports of pears from Argentina to the United States, by months, 1935-40¹

MONTH	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
January ...:	0	873	18,399	7,500	29,926	38,700
February ..:	2,300	13,614	51,431	28,361	45,046	116,761
March	350	0	0	7,000	13,396	34,254
April	115	0	508	0	7,022	20,490
May	1,000	0	3,413	0	1,441	34,090
June	0	0	0	0	0	18,163
Total ...:	3,765	14,487	73,751	42,861	96,831	262,458

¹ In boxes of 44 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

TABLE 24.—Exports of plums from Argentina, total and to the United States, by months, 1936-40¹

MONTH	1936		1937		1938		1939		1940	
	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES
	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>	<i>Package</i>
January	5,353	-	4,406	-	994	-	3,867	645	678	-
February	6,204	1,380	15,574	3,306	17,604	9,230	38,985	22,016	17,429	8,347
March	5,195	400	4,536	-	7,732	1,086	14,728	4,460	4,371	3,254
April	1,334	-	-	-	-	-	50	-	42	-
Total	18,086	1,780	24,516	3,306	26,330	10,316	57,630	27,121	22,520	11,601

¹ In packages of 22 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

The marketing and distribution of Argentine fruit for both domestic and export markets is handled by wholesalers and exporters located in Buenos Aires. The wholesalers have their offices in and around the fruit market, which is called the Mercado de Abasto. The market is located in the northwestern part of the city about a half mile from the main business district, and about a mile from the docks. Some of the exporters have their offices in the business district, which is more convenient to the docks. The wholesale members of the trade, who also conduct a considerable export business, are largely of Italian and Spanish origin, though there are some British and north European operators who do an important export-import business.

Many, if not most, of the large wholesalers own and have developed extensive orchards, particularly in the Mendoza-San Juan districts. In addition to handling the products of their own land, they also do considerable buying. They sometimes purchase fruit already packed, but they generally buy fruit on the tree or vine.

The Argentine Fruit Distributors is the only agency that bears any resemblance to a cooperative selling agency. They operate for the grower's account only. The organization, more commonly known as the A. F. D., was until recently a subsidiary of the British-owned Great Southern Railway. Since the Government originally took little interest in promoting the fruit industry, the railroads took the lead in such work for fruit-growing and other industries that could produce tonnage for their lines. They established experimental stations, nurseries, and packing houses, and employed scientifically trained men to work with and advise the growers. Had the railroads not taken the initiative, the Argentine fruit industry would not be what it is today. They had the capital and were able to do things that individuals or even small organizations would have found impossible.

The experimental farm at Cinco Saltos, on the Great Southern in the Río Negro Valley, attempts to demonstrate to the grower what the industry is capable of doing. The farm is largely an administrative center, most of the experimental work being conducted in privately owned orchards. The Argentine Fruit Distributors' farm employs several fieldmen who visit member growers and give advice on cultural and handling practices. They are in reality extension workers.

The Argentine Fruit Distributors also operates in the Mendoza-San Juan districts in conjunction with the Buenos Aires Pacífico Railway. The railway operates a nursery at Rama Caída, which supplies trees for the district and also maintains an experiment station staffed by well-trained men. The organization has an excellent packing house at San Rafael, as well as a most modern and up-to-date drying plant. It also acts as a selling agent for this district.

The Argentine Fruit Distributors handles approximately 25 percent of the fruit shipped from the Río Negro district, and about 5 percent from the Mendoza-San Juan district. Though they have their own label, under which a large part of the crop is packed, they also undertake to pack under other shippers' labels.

The Argentine Fruit Distributors have established connections in various world markets for the handling of their account. In some markets shipments are consigned and sold by auction; in others they are handled by wholesalers on commission; and in still others the fruit is sold outright on an f.a.s. basis. The organization also undertakes a financing arrangement for the benefit of the growers. It gives an advance of 1 peso (30 cents) a box, based on the estimated production of the crop.

Interest at 5 percent is charged, the accommodation usually carrying the grower up to the first of December. On January 1, an additional advance is given, which is 50 percent of the estimated value of the fruit. No interest is charged on the January 1 payment. Packing charges are assessed on the basis of 1.50 pesos (45 cents) a box, and include box, paper, grading, and packing. Orchard supplies, such as spray materials, fertilizers, harvesting equipment, etc., are handled as a part of the organization's service and are sold to the growers at cost. The organization owns all orchard field crates or picking boxes, which are delivered to the members at the beginning of the harvesting season.

The Argentine Fruit Distributors is primarily a sales organization, and for the sales service growers are charged a 5-percent commission, based on the f.o.b. value of the fruit. This applies to domestic as well as export sales. All sales are pooled before making returns to the grower. One rather unusual and interesting feature of the arrangement is that growers are not compelled to sell through the organization, even though they are members.

The company takes charge of classifying, packing, and transporting fresh fruit (in accordance with the regulations established by the Ministry of Agriculture and the Ministry of Industry and Public Works of the Province of Mendoza) under the tariffs and conditions specified below.

Once a grower states his decision to have the organization handle his fruit, the company inscribes him in its books as a client, and in due course sends a representative to inspect his fruit. The company advises the grower of the date on which each variety of fruit must be harvested and handed over to the company. The fruit is delivered by box, not by weight, and the company receives fruit only in its own uniform-sized boxes, known as field boxes, which the company supplies growers when necessary. The company names the place to which the fruit must be delivered. The client is responsible for the return of all field boxes and mattresses (pads), which each of his workers has received. To this end the client deposits an adequate sum as guaranty of payment for the boxes and mattresses not returned at the end of the season, for which he is charged 1 peso (30 cents) and 20 centavos (6 cents) each, respectively.

The company gives a provisional numbered receipt upon delivery of fruit, on which appears the name of the grower and of the client, the date of delivery, the variety, and the number of field boxes received. The company later gives the client a final numbered receipt, giving the number of the earlier provisional receipt and showing the variety of fruit and the number of standard boxes of each quality resulting from the classification and packing.

The company charges for classification and packing materials in accordance with the following schedule.

Fruit	Container	Charge	
		Pesos	Cents
Pears	Standard box	1.80	54
Apples	Standard box	1.85	55
Apricots, plums, ¹ peaches	Half box	1.05	31
Cherries	11-pound box	.65	19

¹ Plus 40 centavos (12 cents) per half box if packed in barrels for export.

This tariff does not include the tax for Provincial inspection, which must be paid by the client. The client must also furnish his own package label. If the client sends the fruit by rail to be packed at the warehouse, the freight must be paid by him. He must receive the packed fruit at the door of the warehouse or on rail, paying all charges at that time. If payment is not made, the company reserves the right to sell the fruit to recover the expenses incurred. The rights and obligations incurred are not transferable and are settled between the organization and the client, even when the latter sells or transfers his fruit to someone else. The company is not responsible for losses or damages to fruit caused by factors not under its control.

In general Argentine growers harvest their fruit under a guaranteed-advance or outright-purchase agreement with the sales organization. Because of a limited supply and a fairly good demand, growers in the past have been successful in obtaining advances representing a coverage sufficient to take care of their actual expenses. Many small growers are working on a very close margin and cannot afford to take chances on consignments. The amount of the guaranty varies according to species and variety but so far has averaged between 5 and 7 pesos (\$1.50 and \$2.00) a box, which covers expenses and a little over. Apples have realized better prices than pears on the whole. Pears formerly also enjoyed an active demand; but with supplies becoming more plentiful, prices have decreased.

With apples coming into heavier production during the next few years, it is safe to assume that prices will ease off as increased supplies reach the market. While the consignment business so far has not been very large, it is understood that such shipments have been more or less covered by a guaranty. It is probable that as peak production is approached shippers will be unable to secure these guaranty advances.

TABLE 25.—Net annual average prices paid for apples by Argentine dealers to growers, Rto Negro Valley, by variety and grade, 1929-39¹

YEAR	DELICIOUS		RED DELICIOUS		ROME BEAUTY		JONATHAN		KING DAVID	
	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY
	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos
1929	9.47	7.01	-	-	4.08	1.72	2.77	2.00	2.46	3.61
1930	9.27	6.02	-	-	5.60	4.62	4.45	3.29	6.05	4.66
1931	10.02	6.39	-	-	5.19	4.21	5.20	2.78	7.90	5.14
1932	10.04	7.66	-	-	5.20	4.58	4.40	3.41	6.24	4.84
1933	8.14	5.52	-	-	4.37	3.51	3.26	2.38	4.42	3.46
1934	11.51	8.74	-	-	7.08	5.98	4.88	3.59	3.84	4.14
1935	8.21	6.52	9.27	6.84	4.32	3.95	4.07	3.04	4.57	3.33
1936	7.11	5.51	8.25	7.14	3.34	3.00	2.25	2.12	2.73	2.51
1937	5.88	4.62	6.60	5.50	4.15	3.19	3.07	2.60	3.42	2.61
1938	4.40	3.26	6.23	5.04	2.88	2.65	1.49	1.54	1.81	2.07
1939	4.96	3.39	6.87	4.95	2.78	2.33	3.10	2.69	2.80	2.60
	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars
1929	3.96	2.93	-	-	1.71	0.72	1.16	0.84	1.03	1.51
1930	3.41	2.21	-	-	2.06	1.69	1.64	1.21	2.22	1.71
1931	2.94	1.87	-	-	1.52	1.24	1.53	0.82	2.32	1.51
1932	2.58	1.97	-	-	1.34	1.18	1.13	0.88	1.61	1.25
1933	2.61	1.77	-	-	1.40	1.13	1.04	0.76	1.42	1.11
1934	3.86	2.93	-	-	2.38	2.01	1.64	1.20	1.29	1.39
1935	2.68	2.13	3.03	2.23	1.41	1.29	1.33	0.99	1.49	1.09
1936	2.36	1.82	2.73	2.36	1.11	0.99	0.74	0.70	0.90	0.83
1937	1.94	1.52	2.18	1.81	1.37	1.05	1.01	0.86	1.13	0.93
1938	1.43	1.06	2.03	1.64	0.94	0.86	0.48	0.50	1.59	0.87
1939	1.53	1.05	2.12	1.53	0.86	0.72	0.96	0.83	0.86	0.80

¹ Conversions made at the average official rates for the years shown (from paper pesos). Argentine Fruit Distributors, Buenos Aires.

Wholesalers operating on the Buenos Aires market charge from 5- to 8-percent selling commission. Most of the large wholesale jobbers are also exporters. The charge for this service is 7 percent. Exporters living in Buenos Aires have their representatives in the various producing districts, who purchase direct from the grower and pack the fruit under the exporters' labels. They also purchase fruit from competitive sources and sell under the exporters' labels. Operations in Mendoza Province include many such purchases, the fruit being sold on both domestic and foreign markets.

Many of the wholesalers and exporters have sufficient holdings of their own to provide them with a good volume of business. Many large properties that the original owners were unable to operate at a profit have been rented to wholesalers in Buenos Aires, who can carry on the business because of the savings they are able to effect through reduced selling and handling charges. Joint-account deals are sometimes arranged between grower and shipper, or arrangements are made between exporters and a local agent. Exporters sometimes purchase fruit on an f.o.b. basis; again purchases are made on the basis of an agreed amount per box on the tree, the buyer furnishing everything. It is also common for buyers to pay a lump sum for a crop as it stands on the trees or vines. These deals are frequently made early in the season, the buyer thereafter assuming all risks, such as those due to adverse growing conditions, attacks from pests, and bad weather. The buyer also does his own picking and packing. He operates his own packing house, which is usually well equipped. Sometimes buyers purchase outright, paying a set price per packed box loaded on board cars. Others act as selling agents, working strictly for the grower's account.

Sales methods vary according to district. Practices established some years ago have developed into a more or less fixed custom. In the Cuyo district the general tendency is to sell the crop on the tree, whereas in the Río Negro district sales are effected on the basis of a set price per box delivered to the packing house. The prices paid vary with the season and up to the present time have proven profitable to the grower. As an illustration, the following approximate prices were paid to growers in the Mendoza district for fresh fruit during the 1938-39 season.

	<i>Centavos per Kilogram</i>	<i>Cent per pound</i>
Pears (early varieties)	5.7	0.8
Pears (late varieties)	5.6	.7
Pears (Williams)	2.0	.3
Peaches (table and drying varieties)	5.55	.7

In the Río Negro Valley buyers pay from 50 centavos (15 cents) up to 1 peso (30 cents) per box for pears, according to season, delivered to the packing house. When working for the account of the grower as selling agent, they pay cartage, freight, storage, and other charges incidental to sales. For domestic sales these charges are as follows: Freight 1.00 to 1.20 pesos; cartage 0.10; cold storage 0.40 to 0.60 per month; cartage out of storage 0.10; selling commission 5 to 8 percent. Total charges, exclusive of commission, range from 1.60 to 2.00 pesos, or 48 to 60 cents per box. For export sales the charges are much the same, except for an additional loading and Government tax, which amount to about 8½ cents.

Some sales in 1940 were made by the grower on the basis of 10 centavos per kilogram for Extra Fancy and Fancy grades, 8 centavos for Choice, 5 centavos for drops, and 3 centavos for culls. This is equivalent to about 60 cents per box for Extra

Fancy and Fancy, 48 cents for Choice, 30 cents for drops, and 18 cents for culls. In addition, the buyer furnished labor, packing material, and all other costs incidental to selling.

TABLE 26.—*Net annual average prices paid for pears by Argentine dealers to growers, Rio Negro Valley, by variety and grade, 1929-39¹*

YEAR	WILLIAMS		PASSE CRASSANNE		AREMBERG		WINTER NELIS	
	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY	EXTRA FANCY	FANCY
	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos	: Pesos
1929	5.88	4.17	7.14	6.88	7.61	6.51	5.08	2.86
1930	4.40	3.25	7.59	6.59	6.81	5.20	4.27	3.23
1931	2.62	2.29	10.93	8.59	4.84	0.64	2.16	3.01
1932	2.91	2.36	11.28	9.09	7.83	6.62	4.26	3.37
1933	1.55	1.05	4.39	1.31	7.20	4.34	2.92	1.86
1934	2.59	-	5.20	5.48	6.05	4.14	4.32	5.54
1935	1.70	-	7.13	5.16	5.35	3.77	5.74	4.35
1936	1.39	1.00	2.67	2.38	3.56	3.29	5.72	4.93
1937	1.53	0.97	1.57	0.52	2.35	2.81	2.50	2.34
1938	0.70	0.51	1.05	1.24	2.37	2.41	2.88	2.62
1939	1.60	1.03	-	-	2.28	2.45	3.20	3.27
	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars
1929	2.56	1.75	2.99	2.88	3.19	2.72	2.13	1.20
1930	1.61	1.19	2.79	2.42	2.50	1.94	1.57	0.75
1931	0.77	0.67	3.21	2.52	1.60	0.19	0.63	0.88
1932	0.75	0.61	2.90	2.34	2.02	1.70	1.10	0.87
1933	0.50	0.33	1.41	0.42	2.31	1.39	0.93	0.59
1934	0.87	-	1.75	1.84	2.03	1.39	1.45	1.66
1935	0.56	-	2.33	1.68	1.75	1.23	1.87	1.42
1936	0.46	0.33	0.88	0.79	1.18	1.09	1.90	1.63
1937	0.50	0.32	0.52	0.17	0.77	0.93	0.82	0.77
1938	0.23	0.17	0.34	0.40	0.77	0.78	0.94	0.85
1939	0.49	0.32	0.50	0.33	0.70	0.76	0.99	1.01

¹ Conversions made at average official rates for the years shown (for paper pesos). Argentine Fruit Distributors, Buenos Aires.

Much of the fruit produced in Mendoza, as in the Río Negro, is sold for export. Railway and shipping companies have given considerable thought to the export movement of fruit, and shipping facilities undoubtedly would have been made available to handle the increased supplies had the European war not intervened. While supplies reaching certain European markets were beginning to approach the saturation point in 1939, the market was beginning to expand in certain other directions. The inevitable rapid increase in production, however, suggests certain complications in future marketing.

It is quite possible that European and American markets will be unable to absorb a heavily increased tonnage at prices satisfactory to the growers. Williams pears in heavy crop years, such as 1939, have already returned less than 1 peso (30 cents) per box. Growing costs so far have been covered, but there is no assurance that even these costs will be met in the future. While growers as yet have not been forced to sell for less than production costs, certain exporters are of the opinion that a shift from purchase or partial payment to an open consignment deal is not improbable.

The present popularity of the Williams on most markets is freely governed by the supply. Whenever any fruit or variety becomes so plentiful as to be available for general distribution at popular prices, the novelty wears off and prices fall in line with the whole general price structure for that type of goods. When the supply of Cox's Orange Pippin, for instance, is scarce on the English market, the consuming public apparently is willing to pay a good price for it. On the other hand, when it is in plentiful supply, prices adjust themselves to the values ruling for comparable varieties. The history of the Delicious on the American market, as well as the current steady decline in demand for that variety on the Argentine market itself, offers an additional illustration of this fact.

Argentine fruit exporters are fully alive to the fact that the industry is facing a grave situation with regard to the successful marketing of its products. Many

Marketing Season

Pears are available on the Argentine market from early in January until late May or early June. The season begins with Williams (Bartlett) and finishes with Passe Crassane, Winter Bartlett, and Winter Nelis. Since 85 to 90 percent of total production consists of Williams, the heaviest consuming period for pears extends from January to April.

Local markets are pretty well supplied with home-grown offerings of apples throughout the greater part of the year. Although the country is not yet entirely self-sufficient, efforts are constantly being made to replace imports to a greater degree by planting varieties that will further extend the marketing season. Delicious are held in storage long after their normal storage life has passed. It has been suggested that varieties such as Red Astrachan should be planted more extensively in order to supply the markets during December and January.

Plums are on offer from January to March. The season starts off with Beauty and finishes with Santa Catalina. The principal commercial varieties are the Santa Rosa, Gaviota, Ponds Seedling, President, and Kelsey, which are in generous supply throughout the season. Plums are on an export basis, many being shipped to Brazil and some to the United States.

Apricots are marketed from the end of November to the end of January. The season begins with Blenheims and finishes with Moorpark and Peche de Nancy. The planting of apricots is being encouraged in certain areas, but for canning and drying purposes only.

The markets are quite generously supplied with peaches and nectarines from early in January until the end of March. The peach season starts with Hales Early and ends with late-maturing Italian varieties, such as Giallo de Sicilia and Pavia Lanthaupe. With a few exceptions, Argentine peaches on the market are of extremely poor eating quality. They are mostly clingstone canning varieties offered for sale in the fresh state. They are hard, tough, rubbery, and of very poor flavor, but are excellent keepers. Nectarines are better, but as in most countries supplies are not heavy at any time.

Argentina produces an abundance of quinces, in many places the trees being used as hedges or windbreaks. They are available from February until May and are used mainly for preserving.

While Argentina produces principally wine grapes, it is also a heavy producer of table grapes. The local markets are generously supplied with excellent fruit from the middle of February until May. Muscatels, both red and white, are generally preferred on the home market. They are not good travelers; therefore they do not figure to any extent in the export trade. Foreign markets are an important consideration in the Cuyo region, and every effort is being made to conform to the requirements of the markets catered to. The season extends from Ribier to Angelino.

Government Inspection Service

The exportation of fresh fruit from Argentina has been governed since 1933 by various Government decrees. These decrees regulate exports with a view to

safeguarding the interests of the industry as a whole. The regulations provide for maturity, proper classification as to grade, and the kind and size of container used. The law created the Division of Control of Fruit Production in the Ministry of Agriculture. This Division is fortunate in having as its head a man who has the confidence and respect of the industry and the trade alike, but it is seriously handicapped by lack of funds and has not been able as yet to carry out all its objectives.

Inspection Offices of the Division of Control of Fruit Production are located in the various growing districts and men attached to them attempt to police the industry. These men determine the maturity of the fruit by variety and issue the dates at which harvesting may commence. Each export grower is registered with the Division, and buyers are forbidden to buy fruit for export from unregistered growers. All packages must be standardized and made of suitable material. If a grower harvests his fruit prior to the approved date, it is rejected and he is refused an export permit. During the packing season an inspector is assigned to a certain number of vineyards, or orchards, or packing houses. Inspection is compulsory, and before a box may be shipped for export from the point of origin it must bear the inspector's stamp.

Fruit intended for export must be held in storage for a period of not less than 24 hours at a temperature of 32° before it may be loaded aboard ship. An additional inspection takes place at the time of loading, when the fruit is examined particularly for maturity. Great stress is placed upon the value of the pressure tester for determining maturity. If the fruit is considered too mature, it is rejected and must be sold on the local market. Temperatures are also taken at the time of loading.

In order to defray the cost of inspection, each producer or exporter is required to pay a tax, which is referred to as dues. A decree provides that -

Producers and exporters of fruit shall pay upon inspection at the place of origin the sum of one-half centavo, Argentine paper, for every kilogram or fraction thereof of fruit of the following species: Pears, apples, grapes, peaches, nectarines, apricots, plums, and melons; and three-tenths centavo, Argentine paper, for each kilogram or fraction thereof of other fruits not specified above and whose inspection at place of origin may be required. [In terms of United States dollars, about 3 cents per box on apples or pears.]

Provincial taxes on export grapes are levied only in the Province of Mendoza, and amount to 1 centavo per kilogram. Grapes are the only export fruit paying a Provincial tax as well as Federal dues.

The National Government maintains an agronomist in each district, who consults with and advises the growers on all matters pertaining to agriculture. The Government also maintains in each Province a staff of inspectors, who inspect orchards, packing plants, and the packed fruit, and a section devoted to the promotion of by-product industries. Officials of this section are also qualified to make inspections.

The fundamental attitude and philosophy of governmental inspection work in the Argentine differs from that in the United States. Inspectors in the latter country work closely with the growers in a mutual and cooperative effort to improve the industry. In Argentina the inspectors seem to assume the attitude that it is their duty to police the industry and do not cultivate a helpful, cooperative relationship with the growers and shippers. Inspectors refuse to work in the cold-storage rooms. The fruit must be brought out into the warm air, where the work proceeds in a leisurely fashion. Furthermore, assistants are required to handle and open the packages. When the work is completed the inspector makes no effort to repack the fruit. With respect

to the enforcement of grade classification, more than one packing-house manager suggested that inspectors were not too careful. Superficially, however, the inspectors appeared to be efficient and painstaking.

The grades or standards promulgated by the National Government apply only to exports. While they are patterned after the Pacific Northwest boxed-apple and boxed-pear grades, they are by no means as strict. An Extra Fancy is referred to as a Río Negro or Mendoza Extra Fancy. More grade defects are permitted, color requirements are less exacting, and more leniency is permitted in the pack. Most houses are attempting to put up a good average commercial pack of fruit, which includes the maximum tolerance of defects permitted within the grade.

For fruit sold within the country, the grower is at liberty to provide any designation his knowledge or conscience will permit. Fruit that would hardly pass the Pacific Northwest grade may be marked Fancy, or even Extra Fancy should the packer so desire. There is therefore no point in offering fruit on the Argentine market by description or grade designation.

The following Argentine apple and pear export standards are translated from official reports of the Argentine Ministry of Agriculture.

Export fruit shall be so packed as to fill the boxes completely. Each box must contain fruit of uniform size, and of one variety only. Paper used in wrapping the fruit must bear the legend "Argentine Produce." Two grades may be used: Extra Fancy, and Fancy. The Extra Fancy grade shall consist of fruit that is well-developed and characteristic of the variety, mature, of good color, sound, and free of defects. The Fancy grade shall consist of fruit similar to the above, but rather inferior in uniformity and color.

The presence of insect pests shall be governed by the requirements of the importing country. For the Extra Fancy grade the following tolerances are permitted:

(1) A total maximum area of 3 percent of each fruit covered with oil spots, bruises, thrips, surface fungi, physiological disease, etc. For example, a box of 100 units, classified as Extra Fancy, is inspected and all or many of the units are found to have spots. If, by estimating the areas infected it is concluded that in no case do they exceed 3 percent of the surface of any fruit, the grade is accepted, and export under such grade is permitted.

(2) A total maximum of 4 percent on each fruit covered, if no more than 5 percent of the units are involved. If a box of 100 units classified as Extra Fancy is inspected and only 5 fruits are found that have spots of more than 3 percent but not more than 4 percent of the surface covered, the grade is accepted, and export under such grade is permitted.

For the Fancy grade, the following tolerances are permitted:

(1) A total maximum area of 5 percent of each fruit covered.

(2) A total maximum of 7 percent of each fruit covered, if no more than 10 percent of the units are involved.

All fresh fruit for the export trade shall be wrapped and packed in accordance with the provisions established in this decree, and shall be cut off the tree or picked by hand carefully in order not to injure the stalk, and shall not be pulled.

Only sound, clean fruit of right maturity and not damp shall be packed. Sound fruit is understood to be fruit virtually free from insects, cryptogamic diseases, or any other injury of a physical or mechanical nature that may affect its appearance. Clean fruit comprises sound fruit with the skin free of foreign material, which, though not injurious, may partially or totally disfigure it.

The fruit shall be packed in such a manner as to fill the containers completely, the necessary compression being obtained by the shape of the lid or other means in order to avoid the movement of its contents. All the fruit contained in one container must be of uniform size and of only one variety. Containers having a gross weight of 20 kilograms or more shall be fastened with wire or metal strips, one on each end, in addition to the necessary nails to seal the lid and the bottom of the container.

The containers used for the different fruit shall be new, of seasoned wood, dry and smooth, which cannot transmit flavor or smell to its contents.

In addition to what has been established in the previous provisions, the following requisites for each kind of fruit (apples given as an example) must be met:

(1) Crate for apples: Inside measurements, length 457 mm., width 292 mm., and depth 267 mm.; ends 19 mm. thick. At each end of the lid and bottom of container a cleat 20 mm. wide by 10 mm. thick.

(2) Half-sized crate for apples: Inside measurements, length 457 mm., width 292 mm., and depth 134 mm.; ends 19 mm. thick. At each end of the lid and bottom of container a cleat 20 mm. wide by 10 mm. thick.

(3) The containers for apples shall be lined inside with adequate paper on the sides and under the lid and on the bottom with corrugated cardboard or other acceptable material.

(4) Each apple shall be wrapped with oiled paper (sulphite, Manila, or any other similar material) and the lettering "Industria Argentina" (Argentine Manufacture) shall be printed thereon in type letters not smaller than 4 mm. high.

(5) Two choice grades shall prevail for this fruit: Extra Seleccionado (Extra Fancy) and Seleccionado (Fancy).

(6) Extra Seleccionado comprises fruit that is well-developed with the variety's characteristics, of good color, sound, and clean.

(7) Seleccionado comprises fruit similar to that previously mentioned but somewhat inferior.

(8) The Ministry of Agriculture may authorize a third choice grade of apples, which shall be called Elegido (Choice), for the varieties and cases determined by that Ministry. Elegido comprises fruit similar to the grade Seleccionado as to the requirements pertaining to that grade, except as to color.

(9) The fruit shall be arranged in layers, with an equal number of fruit in each layer.

(10) A box of apples shall not contain more than 252 units and a half box not more than 126 units.

(11) The apple containers shall be marked with the number of units they contain.

Canning and Drying Industries

The canning and drying of fruits in Argentina has developed along with the growth of the fresh-fruit industry. As production increased, the usual problem of what to do with the surpluses and off-grade fruit entered the picture. This, however, did not remain a problem for long, since the large meat-packing concerns saw an opportunity in constructing processing plants in the fruit-producing districts. Modern, up-to-date canning machinery was imported from the United States and the plants have been operated on a highly efficient basis. Other interests also have entered the same field.

The plants have accomplished three things: (1) relieved Argentine growers of their surplus and off-grade fruit; (2) reduced imports of canned fruit, largely from the United States, so contributing materially to the Government's self-sufficiency program; (3) created a greater cash income for the farmer by fostering the growing of highly perishable crops that cannot be shipped to distant markets.

Argentineans do not use canned goods as extensively as do people in countries where the canning industry has made more rapid strides. The output of the canning plants, however, is bound to increase. This supply, of course, means increased competition for fruit that is to be marketed in the fresh state. Though apple and pear plantings are stationary or on the decline in certain sections, an expansion of production of stone fruits is in progress. These plantings are intended primarily for canning and drying, and not for the fresh-fruit market.

The possibilities of developing export outlets for canned and dried products are not being overlooked. Efforts have been made to interest the British market in canned pears, and other fields are being explored. Exports were started in 1938, and in 1939 about 20,000 cases of 2½ size cans were shipped to Britain. While it is stated that

the possibilities of developing exports are not very encouraging because of the high cost of sugar and tin, these charges can be offset to some extent by cheap labor and the low prices paid for the fruit.

Canning plants are located principally in the Buenos Aires and Mendoza districts, but drying plants are more widely scattered. The principal products canned, and the quantity produced in 1939 are listed below.

Quince jam - 9,000 tons
 Tomato Paste - 6,000 tons
 Peaches - 5 million cans
 Pears - 1 million cans
 Peas - unknown quantity

One of the large operators interviewed painted a rather gloomy picture of the canning industry. He said the varieties, especially of peaches, were unsuitable and the quality of the fruit was poor; the costs of cans and canning were higher than in the United States; and freight to Europe was about the same. Argentina, he said, could not compete with the United States on the Brazilian market.

The daily output of United States canneries about equals the monthly output of the Argentine industry. Local consumption, however, is expanding, and public interest in quality is increasing. Canned peaches are now being sold under Government standards; in fact, according to law they cannot be sold otherwise. Standards are also being extended to include other products. Better canning varieties of peaches are becoming available, especially early ones that can be harvested about the end of January. Real Jorge and Tomkinson, both clear yellow clings, are the most important varieties. The Montevideo variety represents the largest planting of mid-season peaches, harvested from February 20 to March 15. The approximate prices paid for fruit for canning in Mendoza in 1940 are given below.

	<i>Centavos per kilogram</i>	<i>Cents per pound</i>
Pears	9-10	1.2-1.4
Apricots:		
Large	15-20	2.0-2.7
Small	8-10	1.1-1.4
Plums:		
Export varieties	6-7	.8-1.0
Drying varieties	4½-5½	.6-.7
Apples:		
Delicious	15-16	2.0-2.2
Other varieties	8-10	1.1-1.4
Cherries	10-20	1.4-2.7
Quinces	2-3	.3-.4

Fruit drying is a less highly organized industry than is canning. Less investment is required, and many large growers can afford to put in drying plants. In some plants operations are conducted under most efficient, highly industrialized, and hygienic conditions, whereas in others the process leaves much to be desired. If sanitary laws were passed and enforced, many of the smaller drying plants would be forced either to make drastic changes or to go out of business. The approximate prices paid for fruit for drying during the 1939 season in Mendoza are given below.

	<i>Centavos per kilogram</i>	<i>Cents per pound</i>
Peaches	8	1.1
Plums	7	1.0
Apricots	15-20	2.0-2.7
Cherries	40	5.4
Apples	10	1.4
Pears (Williams)	3	.4



FIGURE 35.—Pears in a drying yard in the Río Negro Valley.
(Courtesy of the Great Southern Railway.)

The Argentine Government has taken an active part in promoting the dried-fruit industry. Their primary interest is, first, to establish a position of self-sufficiency and, second, to develop overseas outlets for exportable surpluses. Though the drying of fruit has been practiced for many years in Argentina, it is only recently that active measures have been adopted to place the industry on a commercial basis.

In 1938 the Government issued a decree prescribing rules and regulations to raise the standards of dried fruits. These have met with a certain amount of success, especially where fruit is processed in commercial drying plants. On the farms where home drying is carried out, classification is of minor importance.

Certain sections of Argentina are ideally suited for the drying of fruits. In the arid regions of the Río Negro Valley and the Cuyo district, climatic, geographic, and economic conditions are especially favorable for the development of a drying industry. At San Rafael, in the Province of Mendoza, a large, modern, up-to-date drying plant has been constructed, which is capable of handling a large volume of fruit.

The varieties of fruit produced in these regions were selected to supply the fresh-fruit market; consequently it is the surplus of these varieties that is being dried, rather than varieties especially suited for drying. In the Province of Mendoza commercial fruit drying is expected to replace, more or less, the shipping of fresh fruit. Not only are growers being encouraged to process a larger part of their tonnage but they are advised to increase or replace their acreage by varieties especially suited for drying.

The following varieties are recommended for drying:

Pears - Williams, Gifford, Clapp's Favorite, Hardy.
Apples - Delicious, Jonathan, King David, Rome Beauty, Gravenstein.
Apricots - Royal, Tilton, Blenheim, Moorpark.
Peaches - Elberta, Muir.
Plums - D'Agen, Coe's Golden Drop.
Grapes - Muscatel, Thompson Seedless, Cereza.

The production of dried fruits in Argentina increased from 4,678 short tons in 1937 to 11,648 short tons in 1940, or 149 percent. Imports of dried fruits, which originated largely in the United States, declined from 5,079 short tons in 1936 to 2,910 short tons in 1940, or 43 percent. Prunes account for approximately 50 percent of the total dried-fruit imports, of which the United States supplies over 90 percent. Figs are imported largely from Greece, and over 95 percent of the dried-peach imports are supplied by Chile. Exports of dried fruits are of comparatively small volume but have increased from 629 short tons in 1936 to 749 short tons in 1940, an increase of 19 percent. Exports go mainly to Brazil and Uruguay. Argentina is rapidly approaching self-sufficiency in dried fruit; and, with the rapid increase in domestic production, increasing supplies for the export market will soon be made available.

Trends and General Outlook for Deciduous Fruit

During the past 10 years Argentina has risen from obscurity to international importance as a fruit-producing nation. Certain parts of the country have demonstrated their ability to produce fruit for the most discriminating markets of the world. Soil and climate in the irrigated districts are especially adapted for the production of high quality fruit. This is particularly true of the Río Negro Valley, which is blessed with a good soil, an equable climate, an abundance of sunshine, and a more than ample supply of water.

Fruit growing is a new industry; the trees are young and producing their best crops. Disease and insect pests are as yet of no real economic importance. The most popular market varieties have been selected. The fruit when properly handled has good carrying and keeping quality. Furthermore, production costs are low; in fact, growers contend that under present (1940) conditions if they can secure 1 peso (30 cents) a box for pears and 1.50 pesos (45 cents) a box for apples, delivered to the packing shed, they make a reasonable profit.

From a country until 1930 importing most fruits, Argentina has not only satisfied domestic requirements but developed exportable surpluses of substantial proportions. Railway and shipping companies have given considerable thought to the export movement of fruit, and shipping facilities were being made available to handle the increased supplies when the European war broke out.

While exports have had a rapid and substantial gain, seasonal imports of apples and pears have dwindled to an insignificant volume. The planting of pear trees, particularly of the Williams variety, was very heavy during the period 1928-36. More recently, heavy plantings of apples and late winter pears have been made. The potential tonnage from all these plantings is still to be harvested and marketed.

With the harvesting of the first really heavy crop in 1936, marketing problems began to develop, and it was then recognized that the supply of the Williams variety was out of all proportion to the supply of later maturing varieties. The planting of

Williams slowed down and there developed a definite shift toward late winter pears. At present the latter represent only about 15 percent of the total, but in a few years' time the percentage will be somewhere around 50. In the Río Negro Valley alone it is estimated that total pear production in 1945 will approximate 7 million bushels.

The planting of apple trees also has been heavy during the past 4 or 5 years, especially in the Río Negro and Atlantic districts. It is difficult to forecast production, not to mention the ability to market the crop at remunerative prices when all of the trees planted come into full bearing. Based upon present apple acreage in the Río Negro Valley, forecasted production for 1945 is estimated at 3 million boxes, or just under 2 million more than 1939 shipments. While a big increase in production is expected, most of the desirable land in the Río Negro has been planted; consequently, no further great expansion of acreage is anticipated.

The future of the Cuyo region (Mendoza-San Juan) is more doubtful. While this section possesses certain natural advantages, such as a fertile soil, plenty of sunshine, and a reasonable amount of water, the disadvantages, such as late spring frosts and the common occurrence of hailstorms, are likely to prove serious. In San Rafael, which is the most important area in the district, apples and pears have not been entirely satisfactory. Practically no additional plantings of Williams are being made. The acreage already planted to this variety is considered excessive, and the tendency is to reduce rather than to increase plantings. There has been a slight expansion in the planting of late winter pears, but pear production can be said to be stationary.

There has been a small increase in apple plantings in Cuyo, but further plantings are being discouraged. Stone fruits are more popular than apples at present. The many peaches being set out consist mainly of canning and late varieties. There is also some interest in plums for drying. Apricots and cherries are considered out of the question because of frost, and many plantings are going out of production. The season is too short for table grapes, and the establishment of additional vineyards is being discouraged.

Tunuyán and Tupungato have their limitations and are probably not destined to become very important fruit-producing districts. With crops wiped out at frequent intervals by spring frosts or damaged severely by hail, there is not much incentive to expand the industry. Fruit from this region must be of export quality, as it can hardly be sold on the Buenos Aires market in competition with fruit from nearby sources produced at much less cost. Certain orchards are already beginning to show signs of neglect, as the owners are not willing to spend the money necessary for their proper upkeep. As competition becomes keener on both world and home markets, the ability to produce both efficiently and economically is expected to be tested severely.

The Atlantic region, which includes orchards in Buenos Aires Province and the Delta district, offers but little encouragement from a commercial-marketing point of view. Diseases are already difficult to control in newly established orchards. As these plantings grow older, problems are expected to multiply and become more difficult to solve. In addition to the numerous defects that give the fruit a poor appearance, the coloring of the fruit is very disappointing. Color has been recognized for years as the greatest single quality factor in the marketing of fruit, but it was never emphasized quite as strongly as it is today. High color subordinates many minor defects common to the Atlantic district, but since the fruit does not color well in this section, the fruit is placed at a trading disadvantage.

Estimates based upon present plantings indicate that production of apples in the Province of Buenos Aires will soon reach half a million bushels, which must be marketed in competition with over a million bushels of inferior fruit originating in the Paraná Delta. At present the comparatively short supplies produced in Buenos Aires are enjoying good local demand at fancy prices. People come to the orchards from the surrounding countryside and pay from 2.50 to 3 pesos (75 to 90 cents) a box. This is considerably in excess of what growers in the Río Negro are netting from fruit sold on the Buenos Aires market. As supplies increase in the Province, however, this orchard or roadside selling is expected to become less important than it is today. When people can purchase for less in the local market places, it is likely that trips to the orchard will become less popular.

A large part of the crop produced in the Delta finds its way into the Buenos Aires market. Fruit from the Delta is of very inferior quality. Its principal selling point is its cheapness.

Since Buenos Aires is not a large quality market, the real threat of the Atlantic district is to the export producing regions, such as the Río Negro and Cuyo regions. With production on the increase and export outlets curtailed, some real competition is bound to develop on the home market. With Buenos Aires flooded with an abundance of cheap, poor quality fruit, shipments of good fruit from the more distant regions are likely to encounter disappointing prices in the years to come.

Heavy Argentine production is to be expected for the next few years, and from a purely statistical point of view the outlook for imported American fruit is a distinctly discouraging one. Production has by no means reached its peak, and, according to the information at hand, it is quite capable of more than doubling during the next 3 to 5 years. Trees already in production have not yet attained their full bearing capacity, and the large acreage of nonbearing trees will be producing some fruit in a very short time. Taking a longer view, however, the outlook for American producers is less gloomy. While young trees recently planted will add substantially to current output, older trees are expected to show a decline.

The following factors must be taken into account in a consideration of the future of the industry.

(1) The unstable foundation of the industry itself; that is to say, the planting of orchards on unsuitable sites, the planting distances employed, the cultural methods practiced. Orchards planted in frost pockets or in the path of frequent hailstorms will be removed for economic reasons. Standard trees planted 15, 20, or 25 feet apart have not yet stood the test of close spacing. The high color and finish, which is now so apparent in fruit of young trees, is bound to diminish as competition between trees develops and light and air are excluded.

(2) Insect pests and disease. These have not as yet become economically serious but are certain to increase as the industry grows older. Control measures will become more costly and increasingly difficult under the existing planting conditions.

(3) The difficulty of soil maintenance. Fruit trees are heavy feeders and will soon deplete what may appear to be a strong fertile soil. Building up soils through the application of fertilizer and green-manure crops means increased production costs. Two or three years of low prices will result in a general curtailment of cultivation and care, especially spraying, which means a lower percentage of merchantable fruit.

Many growers are already working on a very close margin, and if prices drop to unremunerative levels they will not be in a position to carry on.

(4) The excessive planting of Williams pears. The tree population of Williams is out of all proportion to that of other pear varieties. Market outlets are limited, and there is little possibility that North American markets will absorb heavy quantities in competition with United States late winter pears. Late winter pears are not especially popular on the Argentine markets; consequently, export outlets are already being sought. This problem will become increasingly difficult as the volume increases.

(5) Curtailment of markets by the European war. Since the industry is established on an export basis, the outlook has already been greatly modified as a result of hostilities abroad. The failure of Great Britain and other European countries to buy apples and pears since the outbreak of war, and the difficulty of securing adequate shipping space to neutral countries, other than the Americas, create a pressing problem for the immediate future. This problem will become acute if crops are not substantially reduced or if the war should be of long duration. The short 1940 and 1941 crops were blessings in disguise. Through the loss of export outlets, prices may have been disappointing in some cases, but the price decline was a small matter in comparison with what it might have been had there been full crops to dispose of. Even in the absence of war, the next 4 or 5 years would have witnessed the testing of the European and American markets and their capacity to absorb the anticipated tonnage. Assuming that the war continues, it is certain that the South American countries cannot consume the supplies; and after the war European nations may not be in a position to pay for South American fruit.

The eastern part of Argentina will never be able to compete with the western and southern Provinces from the standpoint of high quality, so essential in exporting. In the domestic market, which is chiefly the city of Buenos Aires, the Río Negro and Mendoza regions will find it extremely difficult to compete with the large quantities of lower priced fruit available from the Delta and Buenos Aires Province. With a small population having limited purchasing power, no great weight of fruit is required to depress the market and send prices toppling. While the fruit from the Río Negro and Mendoza districts will command a premium over that shipped in from the districts closer to Buenos Aires, it is problematical whether the advantage gained will be sufficient to offset the additional transportation, packing, and other charges.

The industry as yet has received no financial aid from the Government, but it is quite possible that agencies will have to be set up to take care of the surpluses that are due in the near future, if the industry is to survive.

PRODUCTION AND MARKETING OF GRAPES

Producing Regions

Mendoza Province is what might be termed the capital of the wine-grape industry. Most of the Province is more than 2,300 feet above sea level and has as its back door the colossal range of the Andes Mountains. About 75 percent of the wine made in Argentina is produced around Mendoza. The city has 1,325 wineries with an annual capacity of 283 million gallons of wine. It also claims to have the largest single vat in the world.

The Mendoza wine industry, however, has been experiencing difficulties in recent years, and large acreages have gone out of production because of low prices. Shortage of water and attacks by phylloxera have also taken their toll of vines. The table-grape zones around Mendoza are at Guaymallen, Maipú, Las Heras, and San Juan. The principal varieties grown are Emperor, Malaga, Almeria, Ferral, Lattuario, and Alphonse Lavalle.

The system of landownership and the type of people working the farms, orchards, and vineyards are serious drawbacks to the development and future of this section. The country offers much in the way of soil and climate but is definitely lacking in the human element. The owners of the farms throughout Mendoza and San Juan are business or professional people who have made money in other lines. They do not live on the places but reside in the cities, many of them in Buenos Aires, 650 to 750 miles away. Ninety percent of the men who work the land cannot read or write. Farm advisers must go to these men and explain everything to them or demonstrate just how a thing is to be done. The larger places have a farm manager, called a *contratista*, who works for an average wage of 70 pesos per hectare (\$8.50 per acre) per year, plus a 10-percent interest in the crop.

The people who live and work on the estates have a very low, almost primitive, standard of living. Their houses are made of adobe or bamboo cane plastered together with mud. The floors are of dirt and the furnishings scanty and the very cheapest money can buy. Their wardrobe consists of what they have on their backs. Their shoes, if they have any, are cheap sandals of the tennis-shoe type. Sanitary facilities are virtually nonexistent. Livestock,



FIGURE 36.—Home of the *contratista* (farm manager) which in contrast to that of the average laborer is quite a pretentious dwelling.

fowls, and people all share the same four walls. The workers have little incentive, are unprogressive, and seem satisfied with their general surroundings.

The foregoing comments represent no prejudice on the part of the writer; they merely describe the conditions found on the many places visited and those reported by authoritative persons as typical in the grape regions. Generally speaking, the most highly developed and most efficiently run places are those owned by people of Anglo-Saxon stock. There are, of course, exceptions. Some of the very excellent farms visited were owned by Argentineans of Spanish, Italian, or French origin, but in almost every instance they lived on the farms themselves. One such grower showed exceptional progress in management. He paid his men wages considerably higher than the average. If a man worked more than 25 acres the wage rate paid was \$16 an acre a

year. For less than 25 acres the rate was \$18. In all cases the workers received an additional 10-percent interest in the crop. The men performed all the work, such as plowing, pruning, wiring, etc. The owner defrayed half the sulphuring (spraying) costs, and in addition paid for fertilizers and the thinning of the crop. The results were reflected in the size and quality of the crop. Farm laborers in Argentina are usually good workers if given a chance, and are anxious to get ahead so that they can acquire a place of their own.

The planting system is quite different from that employed in California. For table grapes the vines are planted 5 to 8 feet apart and trained to an overhead system of wires called parrals. Almerias are usually planted 8 feet apart; Muscatels, 4 feet; and Emperors, 7 to 8 feet. In the better vineyards some very excellent fruit is produced. Wine grapes are produced largely on trellises, and the canes are trained along 2 and 3 wires. Table grapes are ranch-packed. Each grower employs trimmers and packers, and work is done either under the parrals or under quickly improvised shelters. Generally open sheds are provided in or on the edge of the vineyard.

For grapes, export certificates are issued at the shipping point, but for deciduous tree fruits, inspections take place at Buenos Aires. Finances do not permit the employment of sufficient inspectors to carry on the work in each district; consequently, each grower who intends to export is registered and given a Government stamp. If the grape grower is found to be violating the spirit of the law he is first warned then deprived of the stamp and no longer permitted to export. The authorities are doing everything in their power to regulate export shipments, and on the whole they are doing a conscientious and thorough job.



FIGURE 37.—The parral system of training. Note the use of the log trellis.

There is a modern cold-storage plant at Mendoza, which is the property of the growers. It is used principally for precooling grapes before loading into refrigerator cars.

The San Juan district is generally conceded to be superior to Mendoza as a grape-producing region. The town of San Juan, which is 95 miles north and slightly east of Mendoza, is the center of production. The Province is divided into 16 zones and has a total population of 211,785. The capital, San Juan, is a city of about 30,000 inhabitants. It has an elevation 2,084 feet above sea level and is 860 miles from Buenos Aires, a train journey of 25 hours on the Buenos Aires Pacífico railway. Being farther north, the growing season of the Province, in general, is somewhat earlier than that of Mendoza.

The western part of the Province lies at the base of the Andes foothills. Some vineyards and orchards are located in the foothills proper, but in general they are planted in the valley. Being close to the mountains, the western part is cool. The eastern part, however, is quite hot. The Province has but little rainfall, averaging about 3.5 inches a year. The 1940 season, however, was said to be a most unusual one, precipitation exceeding the combined rainfall of the past 35 years. Grape growing is the chief industry of the Province, which produces 229,000 short tons of wine grapes, 816,000 tons of table grapes, and 6,500 tons of raisin grapes a year. Other fruits are grown in lesser quantities.

The district is divided into various fruit zones. Chimbas is the earliest district, Albardón second, and Carpentoría third. Albardón is the premier muscatel district, although other varieties also do well. It is divided into various sections according to the time the crop matures. Grapes in the early districts are grown entirely on shallow, gravelly soil. The medium-district grapes are planted on soil that is deeper but light. The late-maturing vines are planted on the heavy soils. In some districts, however, early maturity is associated with proximity to the foothills. Grapes from the early zones are unsatisfactory for export, as they do not carry well. Posito is primarily a wine-grape district, but the soil is heavily infested by phylloxera and many vineyards have been abandoned. Reduction in tonnage has been heavy in recent years. Angaco Sud is a good district, but vineyards are suffering there from a scarcity of water.

Santa Lucia is essentially a table-grape district producing chiefly Almerias. It also is gradually going out because of phylloxera attacks. Zonda and Ullum are districts situated at the very base of the foothills. Both zones are infected by phylloxera, but the quality of the grapes is just beginning to be affected. Caucete is as yet free of phylloxera. It produces some very fine Almerias.

San Juan contains an abundance of land adapted to planting, but the grape acreage is restricted as a result of the prohibitive tax that the Government levies against the establishment of new vineyards. Further expansion of the grape industry is unlikely, at least for the time being, because of the tax and the shortage of water, which has been especially acute during the past 2 years.

The heavy tax on new or replanted grape acreage was levied to overcome the effects of dis-

astrous prices and subsequent abandonment of wine-grape vineyards. After the first official attempt to regulate the industry and stabilize prices failed, the Government



FIGURE 38.—Table grapes trained to the parral, or overhead system of wiring. (Courtesy of José Manuel Gómez, agricultural engineer, San Juan Ministry of Agriculture.)

formed the Junta Reguladora (Wine Regulating Board). The banks were largely responsible for this organization, since they were carrying heavy mortgages on most of the vineyards.

The first step was to make a basic study of the wine-grape industry. The Wine Regulating Board was created as an emergency measure by Executive Decree on December 24, 1934. Census and other pertinent figures were collected from each zone. Upon analysis it was concluded that the only solution to the problem was a reduction in acreage. This called for Government action and required the passage of a bill providing for the removal of the vines. Some 37,000 acres of vines were taken out of production, reimbursement of the growers costing the Government 50 million pesos (\$15,000,000).

Following the removal or abandonment of many vineyards, the growers took much better care of the remaining vines. This resulted in an all-time wine-production record. The Government then destroyed 15 percent of the wine output. But money spent on production restriction has left insufficient amounts to finance official sanitary controls; plantings are therefore not being protected against damage from phylloxera, which is becoming a serious problem.

Farming in San Juan, as in Mendoza, is based largely on absentee ownership. The owners often are not primarily dependent upon the vineyards. The actual operation is in the hands of hired employees under a manager, or *contratista*, who works for a small salary based on the size of the acreage supervised plus an interest in the crop. On the smaller places it is customary for the owner to provide an adobe house, rent-free, in return for which the tenant waters the vines whenever necessary. When he is not engaged in irrigating the grapes or assisting with the harvest, the tenant hires out in the neighborhood as a farm hand.

The grower of table grapes knows little or nothing about what happens to his fruit after it is sold to an exporter's agent, who usually also packs the crop. The buyer pays a fixed amount per kilogram on the vine, or a fixed price per kilogram for packable grapes.

The packer supplies and maintains the necessary labor force, which lives under very primitive and unsanitary conditions during the course of the packing season. The workers' hours run from sunrise to sunset, and wages vary according to the type of work performed. In addition to wages, the harvest workers receive food. The cost of feeding the workers averages between 60 and 70 centavos (18 to 20 cents) per head per day. Pickers are paid at the rate of 2.50 pesos (75 cents) a day; trimmers, 1.50 to 2.00 pesos (45 to 60 cents); packers, 4.30 to 4.70 pesos (\$1.29 to \$1.41); and the head packer, 5 pesos (\$1.50).

The bunches are clipped from the canes and placed in field boxes, weighing from 33 to 44 pounds. Four or five of these boxes are placed upon a stretcherlike affair and carried into the packing house by hand. In some of the larger places the field boxes are hauled to the shed on a mule-drawn sled or low wagon. Cost of cartage of packed boxes varies according to the distance from the railway, but the average cost of packing and hauling amounts to about 20 cents a box.

The soils of San Juan are largely volcanic. They vary from surface gravel to an almost unlimited depth. In some districts there is an underlying clay hardpan. North-east of the San Juan River the soil runs deep, whereas to the south and west it is shallow and quite gravelly in places. In the Zonda district, however, the soil is

deep. This section is completely hemmed in by the foothills of the Andes and forms a small valley. Some very good Almerias are produced here.

Production Practices

The water shortage is the most serious drawback to grape growing in the San Juan district. Unless more water is obtained, many vineyards will have to go out of production. At the Government experiment station at Angaco Sud, a fine collection of varieties, including American stock and labrusca varieties, is close to extinction. It is estimated that a minimum of 2,575 cubic feet a second is required to cover the present acreage under cultivation in San Juan. In 1940 water rights were limited to but 1,200 cubic feet. During the 1937-38 season the flow was up to 6,866 cubic feet a second. The water supply is dependent upon mountain snowfall, which forms glaciers and melts gradually during the spring and summer months. During the past 2 years the snow pack has been very light.

Corral manure or the manure from cattle or sheep feeding lots is almost the only type of fertilizer used. In recent years growers have been making rather heavy applications. Supplies are becoming scarce and prices are increasing.

For table grapes one of the common systems is the San Juan, or parral. This is the high overhead trellis. The most common way to train the vines is to grow a trunk about 6½ feet high, trained to a stake, with the canes tied to overhead wires. Generally vines are pruned to four canes and four spurs, all of which are allowed to bear fruit. In Muscatels, two buds are left to a cane, but for Almerias six are left. The two- or three-wire trellis is called an espaldera. Muscatels are usually planted too close and are insufficiently wired.

Very little thinning of bunches or trimming of ends is actually practiced. Most growers simply unhang the bunches and remove a few leaves; very few practice cluster thinning.

The vineyards receive about three plowings a year, but no other cultivation during the summer. Weeds and grass are allowed to grow and are cut just before the harvest. They act as mulch and are turned under later.

The vines usually receive from three to five dustings. Sulphur is used, to which has been added a certain percentage of copper as a mildew control. In the later districts, Almerias frequently receive up to seven dustings. The mealybug is a pest of some importance but is not regarded as serious. The bagworm is prevalent in some sections, especially on the shade trees serving as windbreaks. Where vines are sprayed with arsenic the bagworm is easily controlled and is not regarded as a pest of serious importance.

Windbreaks are an essential part of good orchard or vine culture because of the zonda, a hot, dry, desert wind, which occurs during the late winter or spring, sometimes causing serious damage during flowering time. Hail in this district is unusual.

Yields and Harvesting Dates

The table-grape industry, on the whole, has proven profitable. Almerias produce an average yield per acre of from 8 to 10 tons, Emperors 12 to 14 tons, Ribiers 6

to 6½ tons. Muscatels in the Albardón district produce about 35 tons (25 tons in the rest of the Province is considered average), Red Malagas 35 tons, and Thompson Seedless 15 tons. About 1,000 boxes per acre is considered a very good yield. Thompson Seedless are just being planted. The Criolla is a very good grape for this district, being similar to the Mission grape of the United States.

The San Juan Province is just about completely planted. Vines already cover as much, if not more, land than can be watered. The irrigation system is antiquated and inadequate. Until dams or reservoirs are built, the possibilities for expansion are negligible. Some of the soil is becoming very alkaline, and there is not sufficient water to wash away the salts. Vineyards on such soils are deteriorating. Injury by phylloxera may also lead to a decline in production.

Approximate ripening dates for grapes in the Cuyo district

Variety	San Juan	Mendoza
Alphonse Lavalle (Ribier)	Middle of January	End of January
Dattier of Beyrouth	do.	First of February
Malaga Wonder	do.	do.
Lattuarib	First of February	Middle of February
Angelino	Middle of February	do.
Almeria	do.	First of March
Cornichon Violeta	do.	do.
Emperor	do.	do.
Prune de Cazouls	do.	do.

In general, the San Juan district is from 10 to 15 days earlier than Mendoza.



FIGURE 39.—Packing grapes for the export market. The South African style of packing is being used, though most of the grapes for export shipments are packed in lugs containing 10 kilograms (22 pounds). (Courtesy of Buenos Aires Pacifico Railway.)

Packing

Grapes for export are packed in four different packages. The B.A.P. type of box (California lug) is used for packing the block or loose pack (face and fill) and must contain a net weight of 20 pounds of fruit. Any variety of grape may be packed in this container. The B.A.P. pack figures prominently in the export trade. The Cuyo box is used for packing wrapped bunches of any variety suitable for export, and must also contain a net weight of 20 pounds. The South African pack, that is, individually wrapped bunches, must contain a net weight of 10 pounds. Fruit packed in the package known as the tray is used in catering to nearby markets. It is packed loose, is similar to the B.A.P. pack, and is confined to markets not more than 10 days' distance from the port of export. This package must contain a net weight of 22 pounds of fruit.

The packing is done by both men and women who have been closely associated with the industry for many years. They are shifted about from place to place but live mostly in the towns and villages located in the working area.

The trimmers remove the small and defective berries first and then thin the bunches that are too tight and compact to permit proper packing. This work is usually done by the less experienced. Packing is more exacting, and the bunches must be arranged and fitted in so as to avoid an uneven face or a loose pack. When the bunches are too large and tight it is difficult to get a good, smooth, even face; so considerable care must be exercised in selecting the bunches to be



FIGURE 40.—Packing 10 kilo (22-pound) lugs for the export market.

used in the facing. Filling the boxes compactly as packing proceeds is also an important requirement, as boxes that are filled too full in order to give the weight are apt to suffer considerable damage through crushing. Crushed berries, no matter how small their percentage, create a poor impression on the market and result in lower returns. On the whole, the pack produced in the Cuyo district is very satisfactory and measures up to the requirements of the most discriminating markets.

Costs of Production and Marketing

Figures relating to production costs are inaccurate and unobtainable. No cost-accounting records are kept. Growers and shippers interviewed on this point stated that the cost of bringing an acre into production was governed by the amount of labor and the treatment involved. Including the three annual applications of fertilizer plus the necessary spray applications, the average cost runs in the vicinity

of \$36 to \$42 per acre per year. If the grower gets 1.3 cents a pound net for his fruit, he can make a profit. Prices, however, usually run higher than this. The buyer pays between 1.6 and 1.8 cents a pound on the vines. From 30 to 50 percent of the total is lost in trimming and grading, which means that the buyer pays about 2.6 cents a pound for packed fruit. The grower's price, however, is the run of the vineyard. With average yields of 8 to 10 tons an acre, the grower receives between two and three hundred dollars an acre for his fruit.

The cost of packing grapes, including cold storage (precooling) and loading in car, is about 1.50 pesos (45 cents) per 20-pound box. Some shippers pack for less, but others find it profitable to pay a little more to insure a good pack and proper handling.

The following itemization submitted by one of the better growers and shippers gives some indication of packing costs. For small lots the expenses in Buenos Aires run much higher. These costs do not include overhead.

	<i>Pesos</i>	<i>Pesos</i>
Box, made up, including wastage	0.40-0.45	12.0-13.5
Labels	.02-.025	.6- .8
Liners	.05	1.5
Wood wool	.03-.06	.9- 1.8
Cutting, cleaning, and packing	.35-.60	10.5-18.0
Cartage to cold storage and movement of personnel	.10	3.0
Precooling	.25	7.5
Rail freight, San Juan to Buenos Aires	.66	19.8
Expenses in Buenos Aires (cartage, loading, 0.10 tax, 0.045 stamp duties, customs, commissions)	.28	8.4
Total	<u>2.14-2.475</u>	<u>64.2-74.3</u>

Inland freight from Mendoza to Buenos Aires is 65 centavos (about 19½ cents) a box and from San Juan to Buenos Aires it is 70 centavos or 21 cents a box. Ocean freight to most European ports is 40 cents a box; to Sweden 36 cents a box. To New York the normal rate is 40 cents, but owing to the threat of foreign competition the rate for the 1940 season was reduced to 25 cents. This reduction proved to be quite profitable to the shipper, and encouraged an increased volume of exports.

The total expenses incurred in marketing a box of San Juan grapes in New York during the 1940 shipping season are shown below.

	<i>Pesos</i>	<i>Cents</i>
Picking, packing, and cartage	0.80	24
Package and packing material	.50	15
Precooling	.25	7½
Inland freight	.66	20
Government fees, consular invoices, etc.	.14	4½
Loading on board steamer	.08	2
Total cost, f.o.b. Buenos Aires	<u>2.44</u>	<u>73</u>
Ocean freight and insurance	1.13	34
Total cost, c.i.f. New York	<u>3.57</u>	<u>1.07</u>
Duty, unloading, cartage	.91	27
Total laid-down cost	<u>4.48</u>	<u>1.34</u>

Marketing

Grapes when packed are trucked to Mendoza and San Juan, where they are placed in cold storage for precooling. These storage plants are grower-owned. After precooling

the grapes are loaded into refrigerator cars that have been previously iced and have been spotted alongside the cold-storage plant. The cars have a capacity of between 25 and 40 tons, averaging about 30, and hold between 1,900 and 2,500 boxes of grapes. The cars make the trip in about 30 hours and are placed alongside the ship for direct loading. The export season begins the middle of January with Ribiers and Malagas and finishes the end of March with Emperors and Almerias.



FIGURE 41.—Refrigerator car used by the Buenos Aires Pacifico Railway for transporting grapes from the San Juan-Mendoza area to Buenos Aires. (Courtesy of Buenos Aires Pacifico Railway.)

TABLE 28.—Monthly exports of table grapes from Argentina,¹ total and to the United States, 1936

MONTH	1936		1937		1938		1939		1940	
	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES	TOTAL	UNITED STATES
	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>	<i> Packages:</i>
Jan. :	-	-	27,428:	23,096:	10,742:	9,522:	32,545:	29,031:	14,091:	7,652
Feb. :	109,291:	71,008:	135,668:	95,820:	139,918:	89,397:	137,249:	184,289:	124,415:	86,862
Mar. :	297,588:	199,683:	334,710:	181,186:	327,157:	190,659:	386,293:	212,033:	272,195:	164,894
Apr. :	394,747:	226,857:	296,960:	161,823:	322,266:	180,534:	333,378:	177,489:	228,364:	115,146
May :	135,892:	47,317:	166,790:	96,022:	103,026:	32,338:	126,299:	49,040:	43,093:	20,408
June :	25,701:	-	22,236:	-	32,092:	2,000:	6,562:	200:	1,217:	25,494
July :	10,488:	-	598:	-	3,702:	-	50:	-	52:	-
Total:	973,707:	544,865:	984,390:	557,947:	938,903:	504,450:	1,022,378:	552,082:	683,427:	420,256

¹ In packages of 22 pounds.

In 1940 the following varieties and quantities were sold through the New York auction:

Variety	San Juan		Mendoza	
	Boxes	Percent of total	Boxes	Percent of total
Almeria	144,462	67.24	87,779	53.02
Daltier	21,506	10.01	9,740	5.88
Alphonse Lavalle	16,966	7.87	10,743	6.49
Emperor	11,371	5.29	16,852	10.18
Ferral	8,393	3.91	1,815	1.10
Malaga	5,674	2.64	918	0.55
Thompson Seedless	2,650	1.24	4,974	3.00
Muscatal	1,040	0.49	-	-
Lattuario	821	0.38	19,281	11.65
Prune de Cazouls	723	0.34	3,395	2.05
Santa Paula	645	0.30	3,257	1.97
Angelino	327	0.15	2,206	1.33
Cornichon	23	0.01	1,470	0.89
Black Olivette	-	-	1,259	0.76
Others	233	0.13	1,884	1.13
Total	214,843	100.00	165,573	100.00

The United States is the largest receiver of Argentine grapes and is considered most important from a financial point of view. Brazil comes second, with Sweden prior to the war a close third. Shipments to Great Britain have not proven altogether satisfactory owing to the heavy competition with South African grapes, which enter free of the relatively high duty. Exports to the United States have remained on a fairly even keel for the past 6 or 8 years, ranging from 429,000 boxes in 1935 to 552,082 boxes in 1939. During the 1940 season, shipments amounted to 420,256 packages.

TABLE 29.—Exports of grapes from Argentina, by country of destination, 1936-40

COUNTRY	1936	1937	1938	1939	1940
	<i>Packages</i>	<i>Packages</i>	<i>Packages</i>	<i>Packages</i>	<i>Packages</i>
United States	544,865	557,947	504,450	552,082	420,256
Brazil	233,358	258,391	178,454	228,919	176,113
Sweden	54,794	84,524	103,966	128,511	8,737
England	23,264	20,829	84,646	33,541	33,780
Canada	9,995	5,395	14,113	18,616	26,929
Norway	1,800	4,660	10,277	13,675	-
Switzerland	12,052	3,700	4,553	10,570	-
Germany	23,264	20,829	30,741	7,684	-
Poland	-	-	-	6,493	-
Denmark	-	-	-	6,000	-
French West Africa	6,994	6,249	7,036	5,003	-
Paraguay	140	168	667	4,666	4,128
Others	63,181	21,698	-	6,616	13,484
Total	973,707	984,390	938,903	1,022,376	683,427

¹ In packages of 22 pounds.

Exports to the United States so far have been confined to the New York market, but plans are under discussion to develop other ports of discharge. Boston, Philadelphia, Baltimore, and New Orleans are the ports most frequently mentioned. The New York market has utilized from 50 to 70 percent of the total received at that port. Because of war, exports to Europe have dropped sharply, and shippers are looking to the United States to absorb an additional volume. The Scandinavian countries, which had developed into very important outlets for Argentine grapes, were cut off completely after the occupation of Norway and Denmark by German troops. Ships en route to these countries at the time of invasion were turned back and the cargoes diverted to Western Hemisphere markets.

Small growers usually sell their crops to packer-exporters from Buenos Aires. Large growers, however, do their own packing and selling. Most of them have established connections in various markets and ship their fruit under their own label. Most exporters work on a consignment basis. In some instances a deal is arranged between shipper and receiver on a joint-account basis. Other firms work for the grower's account only, charging from 5 to 8 percent for selling service. Exporters of grapes also ship apples and pears; consequently, selling methods and sales arrangements are more or less the same as those covered under the general treatment of marketing fruit in Argentina.

Sales on the New York market are usually made through the auctions. During the 1940 season, 95.6 percent of the total receipts were disposed of through this channel. Prior to the war, sales in England were about equally divided between auction and private-treaty brokers. In continental Europe sales were handled almost entirely by shippers' agents and wholesale brokers. The exporters in Buenos Aires either sold

to speculators or worked through representatives abroad on a prearranged commission basis. The total selling charges vary according to market. In New York it is 9 percent, 7 percent selling commission and 2 percent auction charges.

The buyer pays the grower about 1 cent a pound on the vine, or about 2 cents a pound for packed fruit. The cost of a 20-pound box of fruit is therefore 40 cents. Expenses, duty-paid, landed New York, amount to \$1.07, making a total investment of \$1.47. The weighted average selling price in New York during the 1940 season for all varieties was \$1.80 a box for Mendoza fruit, and \$1.90 for San Juan. The weighted average by variety ranged from \$1.37 to \$3.15. Thompson Seedless commanded the highest prices, on an average, fruit from both Mendoza and San Juan outranking all other varieties.

Future Prospects

In general, future prospects for growers of table grapes are more encouraging than for growers of tree fruits. Desirable land is more restricted and water in the best growing districts is not abundant. Furthermore, a gradual reduction in vines is apparent, due to the gradual spread of phylloxera. No concerted effort is being made by the industry to replace vineyards with phylloxera-resistant stock, and the Government is taking no action to prevent its spread.

Prices of table grapes have resulted in returns favorable to both grower and shipper. Argentine grapes reaching the United States offer no competition to California grapes; consequently, the imports constitute no interference to the shipping and marketing program of the United States. Improved handling and transportation facilities insure a better delivery at point of destination. Experiments are in progress to improve present packing, handling, precooling, loading, and transportation methods.

PRODUCTION AND MARKETING OF CITRUS FRUIT

Argentina is still an importer of citrus fruit, but it is striving for and rapidly approaching a state of self-sufficiency. Plantings in recent years have been developed on a large scale and spread over several widely scattered zones. Citrus development is more restricted than other fruits, because of climatic conditions, but there is considerable room for expansion in areas with a favorable climate.

The most important citrus-producing area in the country is known as the Mesopotamia district. It includes the Provinces of Entre Rios and Corrientes and the Territory of Misiones and is nonirrigated. The second in importance, also nonirrigated, is the Northern district, which includes the Provinces of Tucumán, Salta, and Jujuy. The Delta district, close to Buenos Aires, is third. Drainage, rather than irrigation, is a leading problem in this district.

Oranges have been produced for many years in Argentina, but they have consisted largely of more or less wild seedling sweet oranges. The history of commercial citrus production, however, is interesting because of its almost mushroomlike growth. Without previous experience, or experimental evidence upon which to base the project, large developments have been undertaken in various parts of the country. Some of these attempts have been fairly satisfactory, while others are serious failures.

Undesirable rootstocks, insect pests and disease, transportation problems, and many other factors have resulted in costly and disastrous ventures. By and large, the citrus industry is still very much in an experimental state in Argentina.

Producing Regions

Mesopotamia

The Province of Entre Rios lies between the Paraná and Uruguay Rivers. Concordia, capital of the Province as well as the center of the tangerine industry, is on the Uruguay River, about 327 miles north of Buenos Aires.

TABLE 30.—Number of trees and declared production of sweet oranges in Argentina, by Provinces and Territories, 1937

PROVINCE OR TERRITORY	NUMBER OF TREES			PRODUCTION 1,000 boxes
	NONBEARING Thousands	BEARING Thousands	TOTAL Thousands	
Corrientes	2,734	2,136	4,870	2,343
Misiones	883	508	1,391	309
Tucumán	554	265	819	175
Buenos Aires	236	199	435	145
Entre Rios	396	330	726	143
Jujuy	149	92	241	66
Santa Fé	178	87	265	52
Others	217	262	479	260
Total	5,347	3,879	9,226	3,493

¹ In boxes of 70.5 pounds.

Argentine National Agricultural Census, June 30, 1937.

The climate in general is mild and rather damp, the mean annual temperature being 64° F. and the average rainfall 41 inches. The country is served by both rail and water transportation.

The Province is mostly flat, with a gentle roll that affords good drainage. The heaviest plantings of mandarins have been made along each side of the river, in belts from 12 to 24 miles wide, where a light, sandy, gravelly soil prevails. Farther away from the river the soil becomes heavier, with a predominance of clay. There are relatively few plantings on this heavy soil. The sandy soils adapted to mandarins vary from 20 inches to 60 inches in depth. The surface soil is light, and the subsoil runs into a mixture of clay and sand.

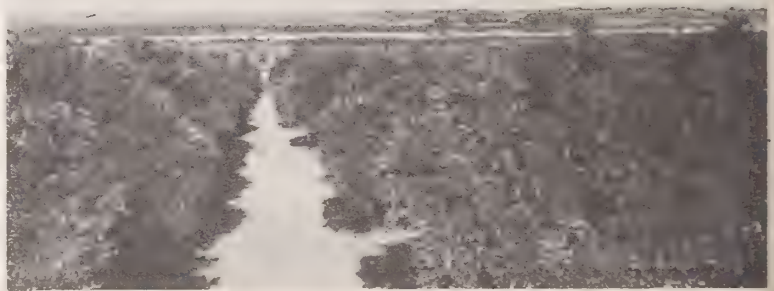


FIGURE 42.—A tangerine planting near Concordia. The Uruguay River and Uruguay in the distance.

TABLE 31.—Number of trees and declared production of mandarins in Argentina, by Provinces and Territories, 1937.

PROVINCE OR TERRITORY	NUMBER OF TREES			PRODUCTION
	NONBEARING	BEARING	TOTAL	
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Boxes</i> ¹
Entre Rios	951	855	1,806	334,298
Corrientes	259	292	551	245,746
Buenos Aires	142	166	308	89,487
Santa Fé	247	168	415	48,535
Tucumán	107	146	253	68,309
Misiones	77	64	141	26,321
Others	132	180	312	91,123
Total	1,915	1,871	3,786	903,819

¹ In boxes of 66 pounds.
Argentine National Agricultural Census, June 30, 1937.

About 30,000 acres have been planted to mandarins and about 3,000 acres to oranges in Entre Rios. Orange plantings, however, are increasing rapidly, and mandarins are practically stationary. Lemon plantings are also increasing, 2,500 acres having been planted in 1940 alone. There is already some apprehension over the future citrus-marketing problem, especially of mandarins, as plantings have perhaps been unjustifiably heavy.

TABLE 32.—Number of trees and declared production of lemons in Argentina, by Provinces and Territories, 1937

PROVINCE OR TERRITORY	NUMBER OF TREES			PRODUCTION
	NONBEARING	BEARING	TOTAL	
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Boxes</i> ¹
Buenos Aires	188	142	330	121,269
Corrientes	64	33	97	13,853
Entre Rios	46	24	70	5,816
Santa Fé	40	15	55	3,346
Tucumán	33	21	54	9,757
Misiones	31	9	40	7,349
Others	44	30	74	23,172
Total	446	274	720	184,562

¹ In boxes of 70.5 pounds.
Argentine National Agricultural Census, June 30, 1937.

In 1939 20,000 tons of oranges and 1,700,000 boxes of mandarins were shipped from the Province. Plantings vary in size from small quintas to groves containing up to 1,250 acres. The average-sized planting is from 50 to 65 acres.

The topography of the lower or southern part of Corrientes is similar to that of Entre Rios, but farther north it becomes somewhat more rolling and broken. The lower part of Misiones is like that of the upper part of Corrientes, but tends to become more hilly and more heavily wooded toward the north and east. The climate of the two divisions is somewhat similar, although Misiones, being farther north, is more tropical. Rainfall is abundant, and temperatures are fairly high in both. In Corrientes, the average annual rainfall is approximately 50 inches, and in Misiones 60.

The region in many respects is similar to the gently rolling terrain of southeastern Pennsylvania or the eastern slope of the Piedmont in Virginia. The soil is

almost blood red in color and very sticky when wet. It bears a close resemblance to the Porters red clay loam so common throughout the Piedmont district of Virginia, the Carolinas, and Georgia. The land is well covered with grass, but sparsely wooded. This region is the native home of the yerba maté tree from whose leaves yerba maté or Paraguay tea is made. Yerba maté tea is the favorite national drink and is consumed in large quantities by the working people.

Tung-oil trees have been planted here rather extensively. Maté, tung, citrus, and cattle have all been experimented with on a colossal scale, but so far none have proven a great success. The country, however, undoubtedly possesses certain advantages and conditions that will be of value when the right crop or enterprise is discovered.

Northern District

This region, including the Provinces of Tucumán, Salta, and Jujuy, lies between latitudes 22° and 28° S. Jujuy is in the far northwestern corner, bordering on Chile and Bolivia. Salta is also in this far corner, and borders on Bolivia and Paraguay. Tucumán is farther south and almost due west of Corrientes and Misiones.

While this is a nonirrigated district, rainfall varies considerably in the different parts, ranging from 12 inches or less to 38 inches a year. Citrus plantings have been made in the eastern part, where rainfall is heaviest. The best fruit is said to be produced in Jujuy, the hottest part of the district. The chief disadvantage of this section, however, is that it is 950 miles from Buenos Aires and more than 40 hours are required to move the fruit to market.

Delta District

The Delta, just north of Buenos Aires, is the "Netherlands" of Argentina. The climate is mild and damp, being tempered by the rivers that completely surround it. It is one of the most heavily planted districts in the country. It is also most cosmopolitan in its makeup, having no apparent preference as to variety or species of fruit produced. Tropical, subtropical, and temperate plants all thrive.

Despite the seemingly unorthodox conditions under which citrus fruit is produced in the Paraná islands of the Delta, favorable results are being obtained. The productivity of the trees, as well as the quality of the fruit produced, has encouraged rather extensive plantings, especially of lemons. The principal advantage of this district is its late season, which enables it to supply the market when fruit from the north is finishing and supplies from neighboring countries are being imported. Prices obtained on imported fruit at this season are very satisfactory; therefore returns on fruit produced in this section are likewise remunerative. It is understood that in order to encourage the cultivation of citrus fruits in the Delta arrangements have been made to supply the growers with grafts and budwood from trees of known parentage at 3 centavos each.

The district is already producing about 30 million lemons, 10 million common oranges, 10 million Navels, 11 million mandarins, and 200,000 grapefruit annually. Lemons are becoming increasingly popular on the Buenos Aires market, and in order to supply this demand many young plantings have been established in recent years.

Growth of the Citrus Industry

As a commercial industry, citrus growing in Argentina is in its infancy. Such fruit, however, was brought to Argentina by the Jesuit missionaries from Spain, who settled in Misiones and the contiguous territory in the latter part of the seventeenth and early part of the eighteenth centuries. They brought seeds of both sour and sweet oranges and planted them over the areas in which they traveled. These plantings provided the foundation upon which the present industry is built. The climate seems to be well adapted to citrus fruit, but the industry has been retarded by losses suffered from a faulty choice of rootstock.

Following the completion of the railroad in about 1880, orange groves were established in Corrientes on a commercial basis and furnished a fairly good supply for local and Buenos Aires markets. These groves consisted almost entirely of seedling trees. More recently (1927) the Entre Rios or Northeastern Argentine Railway Company took the initiative in promoting the growing of grapefruit and lemons, as well as oranges, in northeastern Corrientes and in Misiones.

The selection of varieties was based largely upon popularity and commercial value on world markets, and not upon any knowledge as to the adaptability to local conditions. Valencia Late, Washington Navel, Parson Brown, and Hamlin were some of the selected varieties of oranges. Duncan, Marsh Seedless, and Foster's Pink were chosen as the most suitable varieties of grapefruit. Large sums were raised by private companies and the Northeastern Argentine Railway with which to promote the industry. The original purchase of 70,000 orange and grapefruit trees was made in Australia. These trees were budded on lemon stock.



FIGURE 43.—Entre Rios landscape, with tangerine groves in the distance.

In 1928 a large expansion took place, in which thousands of grapefruit and Navel and Valencia oranges were planted, all budded on sour orange stock. The trees grew rapidly and developed into what appeared to be promising orchards, but after bearing one or more crops they began to decline and die. Large plantings of Valencia Lates were set out in 1928, likewise on sour orange stock. In 1936 they started to decline. Grapefruit trees budded on sour orange stock were also set out on a large scale in 1928. The trees did remarkably well and produced large crops from 1936 to 1939. In 1939, however, they began to show weakness and many died within the year. The original plantings of grapefruit budded on lemon stock are still apparently in vigorous condition.

Oranges

Native oranges are popular with the people. They are not produced for export and, since local markets are not discriminating, appearance is not an essential requirement as long as the oranges are sweet and full of juice. They ripen from May to September, and most of them are shipped to market loose. Rotted and the worst deformed and diseased fruit are removed, but on the whole the offerings have a wild, tree-run appearance. Native trees bear well generally and are perhaps the most reliable source of orange supply. A number of commercial varieties have been introduced from different parts of the world, but have not been given sufficient trial as yet to determine their quality or adaptability.

The Hamlin variety has been planted to a small extent in Misiones and so far has behaved satisfactorily. It bears heavily, in fact in some cases tends to overproduce. It has a fine skin and produces uniform-sized fruit. Buds and grafts have also done well. It is recommended for the early zones, such as Misiones and northern Corrientes.

The Valencia was planted rather extensively in order to extend the marketing season for Argentine oranges. Large acreages were set out, budded on sour orange stock. The trees developed satisfactorily for the first few years but after producing a few crops began to decline and die. Lack of proper affinity between stock and scion is probably the cause of its failure. The fruit itself does well, and further plantings are being made, propagated on sweet orange.

The Lue-Gim-Gong is another variety that shows promise under local conditions and is being recommended because of its late ripening. It bears early and gives abundant yields.

The Pera, which has been planted so extensively in Brazil and which is considered to be their best late variety, has not proven altogether satisfactory under Argentine conditions. Rather substantial plantings have been made in Corrientes, and, while a good crop is produced, the quality of the fruit is decidedly inferior to both Valencia and Lue-Gim-Gong.

The Washington Navel, together with other navel varieties, has been planted in different parts of the country. Results on the whole have been unsatisfactory. In some districts it has borne fair-sized crops, in others, very light. It is not recommended because of its undependable bearing habits.

Parson Brown has proven less satisfactory than Hamlin, from the standpoint both of ripening season and of quality of fruit. Additional plantings are not recommended. The Mediterranean Sweet, which does so well in certain parts of the United States, has also shown its adaptability to Argentine conditions. It is being cultivated to some extent in Tucumán, Salta, and Jujuy. The Jaffa was introduced from Palestine, and, while only small plantings have been established, it is said to produce satisfactorily under Argentine conditions. The Homossa variety was brought in from Florida but has not responded in any exceptional way. It is not being encouraged.

Grapefruit

Large commercial plantings of grapefruit were established in 1928 in northern Corrientes and Misiones and consisted almost entirely of Marsh Seedless, Duncan, and McCarty. Their success at the moment is extremely doubtful.

The Marsh Seedless was considered the best variety for commercial purposes. Trees grew vigorously and produced good crops for a number of years; then they began to decline. The fruit is smooth, bright, and attractive, but the variety has a tendency to produce a large percentage of small sizes. Trees budded on lemon stock are apparently in good condition, but those budded on sour orange have a very doubtful future.

The Duncan is objectionable because of the large number of seeds. The appearance of the fruit, however, is highly satisfactory. The skin is smooth, bright, and of a satinlike finish. Sizes tend to be small, a heavy percentage running to 112's and smaller.

While considered commercially satisfactory under Argentine conditions, the McCarty is not as popular as the Marsh Seedless and Duncan. Its chief drawback is the fact that it tends to produce its crop on the ends of the branches rather than throughout the tree.

The Rootstock Problem

The most serious problem confronting producers of grapefruit and improved varieties of oranges in Argentina today is the question of rootstock. According to Hume-¹

no problem in citrus-fruit culture is more worthy of painstaking investigation from all angles than that which relates to stocks, their adaptability to soil and scion, their disease resistance and their influence on crop production.

The Argentine citrus industry was established, not as a result of scientific research and an exhaustive study or a thorough knowledge of local conditions, but upon such general information as was available.

The originally purchased trees happened to be budded on rough lemon root. It was decided that experts from the States should be employed to advise and assist in the development of the project. The question of rootstock was the first problem on the agenda, and it was agreed that, following the practice in Florida, sour orange not lemon was the proper stock to use. As a result tens of thousands of trees were propagated on sour orange stock and set out.

For the first few years the trees made a good, healthy, vigorous growth, and then began to decline. Growth was checked and the leaves were small. Then the leaves began to drop, and the twigs and limbs began to die back. The trees lived on a few years, produced a few small fruits, and were then pulled out or abandoned. Since 1939, when the condition first became serious, the mortality of trees has been tremendous.

While various theories have been advanced as to the cause, no scientific data is available to support the basis for the claims made. It would appear, however, that the trouble is due to a combination of factors, such as lack of affinity between stock and scion and the failure of the union to adapt itself to existing soil conditions. The injury is described as "poor rootlets," which, according to local plant pathologists, is not a problem of disease, but one of nutrition. The grafting of sweet orange and sour orange stock is said to encourage a deep rooting system, and the root hairs developed in the subsoil come in contact with an excess of toxic salts and moisture, which bring about their decomposition. The so-called root disease was first

¹ HUME, H. HAROLD. CITRUS FRUITS AND THEIR CULTURE. 597 pp., illus. Jacksonville, Fla. 1904.

discovered in 1932 in Corrientes, and since then it has spread progressively to other zones throughout the Province and the Territory of Misiones.



FIGURE 44.—The fate of thousands of orange trees affected with root rot, Corrientes and Misiones

During the past 5 years, orange groves have been badly affected, but it was not until 1938-39 that grapefruit trees likewise began to suffer. Mandarins budded on sour orange in Entre Rios seem to be thriving, but in this district soil conditions are quite different from those found farther north.

Original plantings in the Pindapoy district made on rough lemon stock are still doing well, but those set out later, representing a substantial percentage of the total tree population, have been affected by the root trouble. According to an authoritative source, about 19,000 grapefruit trees in the Pindapoy district appear to have a chance of surviving the root trouble, all of them propagated on lemon stock. About 11,000 trees are estimated to have succumbed so far. About 35,000 orange trees have failed, only those on sweet orange stock appearing to be in sound condition.

New plantings and replacements have been sufficiently heavy to keep up production in some sections. In Misiones, however, many large plantings of 10,000 trees and more have been removed or abandoned and no effort made to replace them. While certain laboratory investigations have been made to determine whether the root rot was parasitic or not, no field experiments are in progress to find a stock suitable for this section.

Cultural Practices

Planting systems

The usual planting systems are employed. In some cases trees have been laid out on the hexagonal system, but generally groves have been planted on the square, with the trees spaced 23 feet apart. From 23 to 33 feet apart is the recommended planting distance, but most growers plant 23 to 26 feet apart. In the Delta region many trees are set 17 and 20 feet apart, but the trees in this section do not grow large. Mandarins in Entre Rios are planted 23 to 26 feet apart, which is the recommended distance, but in well-cared-for orange and grapefruit groves this is proving too close. In Corrientes and Misiones, 23 to 26 feet is also the common planting distance, but the soil here is heavier and in well-cared-for groves the trees are beginning to crowd.

Cultivation

Clean cultivation is the recommended practice, but lack of money is restricting operations in most groves. This is particularly true in very small groves. Where clean tillage is practiced, the work is well done. The land is first plowed and then disked and harrowed throughout the summer season. Orchard implements are used that enable the cultivation under and around the trees, supplemented with hand labor when necessary. In some cases, where cultivation is neglected, weeds and grass grow almost shoulder high.

In the Delta region, most groves are rather unkempt and in a more or less wild state. A few growers practice clean cultivation, and a few have their places in sod, which is cut and allowed to remain as mulch.

Fertilizers

Some fertilizer is used in Argentine citrus groves, but only in the commercial form. Nitrate of soda and sulphate of ammonia are the kinds most commonly used, although some growers use tankage and dried blood. No special cover crops are used, but the weeds and grass furnish considerable organic matter when turned under. In many instances, growers do not have the money to apply fertilizer and depend upon such nourishment as the trees can derive from the green-manure crops.

Pest and disease control measures

The usual pests and diseases common to citrus are present, gummosis, scab, and scale being the most important economically. Control measures are not carried out effectively. Some growers make one or two spray applications, but many do not spray at all. Parasites are depended upon to a large extent to bring about the necessary control.

Spraying equipment is expensive, and most growers are unable to buy power machinery. Barrel outfits, which are not satisfactory, are used for such spraying as is done. The need for a medium-sized, moderately priced power outfit is quite apparent.

In Corrientes and Misiones, red scale was formerly of serious economic importance. At one time it practically threatened the destruction of the industry. Due to the introduction and rapid increase of parasites it has ceased to be a menace, but a black fungus, which is the principal enemy of scale, is beginning to cause growers considerable worry. While it kills the scale, it discolors the fruit, leaving a black sooty covering on the skin. This discoloration is difficult to remove. Despite that difficulty, growers are afraid to use oil spray on the scale for fear of killing the fungus. Ladybird beetles are also present in large numbers and assist in keeping scale in check.

Production Costs

The cost of producing citrus fruit in Argentina is estimated to be about one-tenth the cost in the United States. No irrigation is required, and very little is spent for spraying, fertilization, and cultivation. No cost-of-production studies

have been undertaken as yet, and growers speak only in very general terms. The cost of producing mandarins is estimated to be from 80 centavos to 1 peso (24 to 30 cents) a box, and of oranges about 8 pesos (\$2.40) a thousand. Labor is cheap, 2 pesos (60 cents) a day being the average wage for ordinary labor and 2.50 pesos (75 cents) for skilled. Mechanics responsible for keeping the farm machinery in operation receive 100 pesos (\$30) a month.

Yields

Production varies according to species, variety, district, and season. Oranges and mandarins have a distinct biennial-bearing tendency. Grapefruit yields also vary greatly. In some years the trees carry a uniformly distributed crop; in others it is scattering or confined pretty much to the outside of the trees. In the Pindapoy district, grapefruit trees from 10 to 12 years old produce an average of 5 boxes a tree. Tangerine production around Concordia varies considerably. In some years old trees produce up to 25 boxes a tree, but the average is from 2 to 3. The production of oranges is more uniform, in some districts the yield averaging 2 to 2½ boxes a tree and in others 4 or 5.

Grading and Packing

Except for mandarins and grapefruit, no attempt has been made to standardize citrus fruits. Mandarins are packed in boxes containing about 300 units, which weigh about 66 pounds net. The little sizing and selecting practiced is done by hand. Sizes in the Misiones district have a tendency to run small, with a heavy percentage of the crop 120's and smaller. Grapefruit plantings were established largely to supply overseas markets; consequently grades were established for this fruit.

In 1937 the Government, in order to establish a reputation for Argentine grapefruit on world markets, decided that export sizes should be restricted to 80's, 90's, and 100's. While the demand at that time, especially from England, was strong for 120's, 150's and even 170's, growers were prohibited from shipping these sizes. Consequently, a large percentage of marketable fruit could not be sold. On the whole, grapefruit is quite well graded and packed, though at times the pack is somewhat slack. The cost of harvesting and packing a box of grapefruit, including box and material, is estimated at something slightly under 2 pesos.

Oranges are usually purchased at from 1.50 to 2 pesos a field, or loose, box, delivered at the railway station. This is tree-run fruit, with only rots and the very worst specimens thrown out. These oranges are loaded into boxcars in bulk and shipped to Buenos Aires for further selection. Mandarins are also usually sold on the tree. The buyer pays from 1.60 to 2.40 pesos a box and furnishes everything. He picks, packs, and hauls the fruit and supplies all materials.

Marketing Season

While the country is still on an import basis, for citrus fruit, every effort is being made to bring about self-sufficiency by increasing home-grown supplies and lengthening the marketing season.

Common oranges, which predominate, are available on the market from May until September. To replace imported offerings from Paraguay and Brazil, new plantings are being encouraged as much as possible. Valencia Lates are recommended, especially since they figure most prominently in the later marketing period.

The grapefruit-marketing season in Argentina extends from June until September. At present, however, it is not considered a very profitable fruit for the home market. The general public is not grapefruit-minded, and the creation of a market is a slow and difficult process. There is difficulty in absorbing the present supply, and no effort is being made to extend the season.

The present season for lemons extends from June to September, with a longer period being sought through the selection of other varieties and a wider area of production. Lemons are becoming increasingly popular in Argentina.

The demand for tangerines, or mandarins, extends over a much longer period than in most countries. This calls for a longer marketing season, which now extends from the end of May until November and draws supplies from several districts.

Markets and Selling Prices

Oranges

All oranges produced in Argentina are sold locally. The supply still falls short of domestic demand, and an effort is being made to restrict imports and extend the marketing season for home-grown fruit. No exports have been attempted, and any effort in this direction is unlikely, because of the poor appearance of the fruit. Oranges are usually purchased at so much a box on the tree, the buyer picking and hauling, or upon a packing basis delivered to the railway station. The price ranges from 1.60 to 2.40 pesos a box, and averages 2 pesos. The fruit is not packed but hauled loose in boxes to the station and shipped in bulk to Buenos Aires. Practically all wholesale sales are made on a bulk basis. The displays in the market consist of great piles of oranges surrounded by a fence or a wall of stacked boxes.

Grapefruit

Grapefruit shipments in 1939 totaled 50,000 boxes, 30,000 of which were exported. Good prices were obtained in the years 1934 to 1937, but since then prices have declined steadily. In 1939 net returns to the grower amounted to but 5 centavos a box. Argentina is a poor market for grapefruit, and, with export outlets now restricted, marketing problems are expected to increase.

The freight on grapefruit from Misiones to Buenos Aires for a minimum car of 15 tons is 31 pesos a ton, or 1.10 to 1.12 pesos a box. For less than carlot shipments the freight is 46 pesos a ton, or 1.50 to 1.55 a box. Packing and transportation charges to Buenos Aires amount to approximately 3 pesos a box. In 1939 growers received a net of 2 pesos, which just barely covered production costs. The fruit is shipped on consignment.

Wholesalers in Buenos Aires who also own or operate groves in the Pindapoy district are said to be in a more favorable position than those who simply grow the

fruit. The wholesalers, having their own sales organizations, can handle the fruit at less cost. In fact, it is claimed that they are the only ones who have made money in this district.

The water rate from Misiones to Buenos Aires is about the same as the rail, and the service is much less satisfactory. Frequently fruit is brought down to the landing stages for the boats to pick up. If better paying cargo is available, the boats go on and leave the fruit to await the next boat.

Mandarins

The mandarin season lasts about 100 days, commencing the middle of May and lasting until September. All shipments are made to the Buenos Aires market. There is no export movement of mandarins.

The average selling price of mandarins in Buenos Aires is from 5 to 6 pesos a box. For the first 30 days of the shipping season, good prices obtain; but during the next 30 days supplies are heavier and the prices drop. The last 30 days supplies are shorter and good prices are again obtained. The freight from Concordia to Buenos Aires is 60 centavos a box.

Prospects for the Citrus Industry

Citrus can be successfully produced in Argentina, provided locations are selected and the proper rootstock is found. The economic basis for expanding the industry, however, warrants careful attention. The domestic market is able to absorb additional supplies of both oranges and lemons, but if grapefruit and mandarins are to become profitable crops suitable export outlets must of necessity be located and developed.

TABLE 33.—Imports into Argentina of oranges and mandarins, by country of origin, 1935-40¹

COUNTRY	1935	1936	1937	1938	1939	1940
	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes	: Boxes
Brazil	585,623	820,221	1,505,261	1,624,529	2,592,358	2,491,553
Paraguay	478,266	63,846	73,885	249,284	54,389	147,544
Others	52,255	34,570	3,647	2,195	-	7,101
Total	1,116,147	918,637	1,582,793	1,876,008	2,646,747	2,646,198

¹ In boxes of 68.3 pounds.

1935-38, Argentine General Bureau of Statistics; 1939-40 Boletín Informativo, Argentine Ministry of Agriculture.

Argentina is still an importer of oranges, taking about 2 million boxes annually, principally from Paraguay and Brazil. Most Paraguayan oranges are grown wild and are plentiful and cheap. Argentina is striving hard to establish self-sufficiency in oranges. An effort is being made to produce more late oranges in order to replace imports from Brazil. Valencia Lates, which mature in October, are being planted in increasing quantities.

The present production of mandarins is already about 2 million boxes, and by 1944 potential production is estimated at 4 million boxes, or 60,000 tons. While prices at the present moment are considered quite satisfactory, the future does not appear to be especially encouraging, considering the increased plantings that are

being made on sweet stock. In view of the prospective increased supplies, marketing complications are to be expected; however, it takes less time for trees to go out of production than it takes to bring them into bearing. Mandarins so far have made money, but good returns have stimulated planting to such an extent that the security of this fruit is being threatened.

Lemons at the moment are a profitable crop; and in view of the returns, plantings have shown a rapid increase. Some planters for this reason are already becoming apprehensive as to the future.

TABLE 34.-Total imports of lemons into Argentina, 1930-40¹

YEAR	IMPORTS ²	YEAR	IMPORTS ²
	<i>Boxes</i>		<i>Boxes</i>
1930	98,316	1936	38,588
1931	108,604	1937	59,193
1932	52,879	1938	72,017
1933	51,972	1939	6,067
1934	47,063	1940	12,884
1935	59,352		

¹ Practically all from Italy.

² In boxes of 70.5 pounds.

1930-38, Argentine General Bureau of Statistics; 1939-40, Boletín Informativo, Argentine Ministry of Agriculture.

The grapefruit picture is a most discouraging one. Present supplies are in excess of local demand, but the volume is expected to show a steady decline, largely through the loss of trees. As a matter of fact, for all practical purposes the grapefruit industry has virtually collapsed and there is little probability that an effort will be made to revive it. Low prices and loss of the export market, together with the heavy mortality of the trees, have discouraged all attempts, at least for the time being, to replace the losses and maintain the industry at its 1936 level.

TABLE 35.-Exports of grapefruit from Argentina, by country of destination, 1935-40¹

COUNTRY	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
Africa (Dakar)	-	31.4	267.1	-	-	-
Germany	94.3	-	-	-	-	-
Belgium	-	110.	-	-	-	-
France	10,267.1	724.2	-	-	-	-
United Kingdom	-	21,368.5	10,897.1	9,825.7	17,920.	-
Norway	94.3	78.7	188.5	486.5	708.5	-
Sweden	110.	787.1	314.2	991.4	110.	-
Switzerland	-	31.4	-	157.1	157.1	-
Others	-	-	-	-	-	-
Total	10,565.7	23,131.3	11,666.9	11,462.7	18,895.6	-

¹ In boxes of 70 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

ARGENTINA AS A MARKET FOR AMERICAN FRUIT

The possibility of developing an important outlet for American fruit in Argentina is extremely doubtful. Under existing conditions, at least, the chances for doing any appreciable business are decidedly remote. The three obstacles are (1) excessive

tariff barriers, (2) exchange restrictions, and (3) high freight rates. United States exports to Argentina declined by nearly 93 percent from 1929-30 to 1938-39.

TABLE 36.—Imports of apples into Argentina, by months, 1934-40¹

MONTHS	1934	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
January	-	2,956	2,455	1,603	13,378	13,328	17,336
February	-	-	2,405	-	50	-	-
March	23,399	-	551	-	100	-	-
April	-	7,115	100	-	-	-	-
May	-	-	-	-	2,305	-	-
June	-	-	-	-	1,152	-	-
July	1,303	-	-	-	1,152	-	-
August	1,152	-	-	-	601	-	-
September	3,257	-	-	-	-	-	-
October	52,309	20,743	8,618	6,263	701	-	4,860
November	58,672	66,539	77,111	61,128	44,844	21,294	37,178
December	43,290	123,658	43,892	71,650	38,430	94,096	43,791
Total	183,382	221,011	135,132	140,644	102,713	128,718	103,165

¹ In boxes of 44 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

TABLE 37.—Imports of pears into Argentina, by months, 1934-40¹

MONTHS	1934	1935	1936	1937	1938	1939	1940
	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>	<i>Boxes</i>
January	-	-	-	-	-	1,954	1,152
February	-	-	-	-	-	-	-
March	-	-	-	-	-	-	-
April	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-
June	-	-	-	-	-	-	-
July	-	-	-	-	-	-	-
August	351	-	-	-	-	-	-
September	6,614	-	1,553	-	-	-	-
October	5,912	3,958	852	852	-	-	1,754
November	7,265	7,415	9,424	5,411	6,664	-	-
December	4,259	11,023	50	6,113	1,854	5,662	2,205
Total	24,401	22,396	11,879	12,376	8,518	7,616	5,111

¹ In boxes of 44 pounds.

Boletín Informativo, Argentine Ministry of Agriculture.

Under the terms of the trade agreement between the United States and Argentina, signed October 14, 1941, Argentina granted concessions on fresh apples, pears, and grapes, while the United States concessions included those on fresh pears, grapes, and plums. Argentina reduced its import duty on fresh apples from the United States by about 49 percent, effective for the October-January period. The duty on fresh pears was also cut by 49 percent for the October-December period. The Argentine duty on fresh grapes was reduced by 50 percent, effective September 1 to November 30. Grape exports, however, to Argentina have not been an important item in the past. It is possible that the lower rates may have a stimulating effect upon them. The duty on raisins was cut by 35 percent. This may help to restore some of the trade that was lost during the 1937-40 period. From 1931-32 to 1935-36 raisin exports averaged 516 tons annually. By 1939-40 they were reduced to 192 tons.

The present low American duty of 0.5 cent per pound on imports of Argentine pears was bound against increase. The agreement, however, did not provide for a limitation of exports. The volume of pears that may be exported to the United States is to be left to a mixed commission to determine in advance of the shipping season.

One of the most important factors affecting United States exports to Argentina in recent years has been the restrictions on exchange. In the agreement, the Argentine Government will undertake to provide at least some exchange on all items included in the agreement but has made no commitments as to the actual amount.

Although the population of Argentina is estimated at between 13 and 14 million people, only a small percentage of this total, largely in the Buenos Aires area, have sufficient purchasing power to buy American fruit. The Argentine capital has a population of about 2 million. It is estimated that only about 10 percent of this number have sufficient purchasing power to be able to buy United States fruit. For cheap, low-grade fruit, there is a much broader outlet; but in view of high transportation and other costs, it does not pay to ship this class of merchandise from the United States.

A very heavy percentage of Argentina's production of fruit includes early or midseason varieties, all of which have a more or less limited storage and marketing life. Delicious apples, the most heavily planted variety of fruit in the country, is held long after its prime and loses all of its best qualities. Fresh imported supplies should have no more difficulty in competition with this spent, lifeless fruit than fresh or new-crop Argentine exports have in competing with storage supplies in foreign markets.

The same arguments advanced by Southern Hemisphere apple growers and shippers for their exports apply to growers and shippers in the Northern Hemisphere. Williams, an early variety, comprises about 85 percent of the total Argentine pear tonnage. It is a variety that has a definitely short storage life, approximately 60 days, which means that the fruit must be moved into consumption during that season regardless of market, price, or any other factor. Argentine fruits are wanted on foreign markets in their season because they are fresh. There is a consumer demand in the Argentine market as well for fresh supplies from other countries. The question, however, is to get them in and at a price that the consumer can afford to pay.

Assuming that all trade barriers in Argentina were removed, it is doubtful whether the takings of United States apples and pears would exceed half a million boxes annually. During the years 1928-29 to 1930-31, in which the United States exports of apples to Argentina averaged something over 700,000 bushels annually, Argentina's fruit production was just getting on its feet. Almost immediately thereafter, Argentina became not only self-sufficient with respect to its own requirements but assumed an important role as an exporting country. Outlets, therefore, had to be created and no effort was spared in the process. There can be no question that Argentina has great hopes of increasing its market outlet in the United States, but just how much it intends to open up the Argentine market for American fruit is not yet clear.

Prior to 1931, United States apples and pears were imported into Argentina free of duty; then they were subjected to a duty of 42 percent ad valorem, which was based on an arbitrary valuation of the fruit. This worked out at about 77 cents a bushel,

as compared with the 15 cents and 22 cents paid by Argentine apples and pears, respectively, entering the United States. After the imposition of this prohibitive tax, imports fell off sharply, from 700,000 bushels to less than 200,000 bushels.

At the beginning of the 1939 season, the position of United States fruit in Argentina was further complicated for a time through the strict enforcement of exchange control. Importers were refused exchange permits, without which fruit could not be landed. This position was later modified, through a decree released on October 7, under which imports of fresh fruits from the United States were limited to an amount equivalent in value to 80 percent of the imports during the second half of 1938. On November 7 an additional decree was issued permitting unlimited imports of American apples up to January 31, 1940.

While the 1940 and 1941 Argentine tree-fruit crops were reduced by about half as a result of frost, supplies during the pear-marketing season were still greatly in excess of what the home market could absorb. With European markets closed or greatly curtailed because of the war, exporters looked to the United States to take up the slack. With this in mind, both the pear and grape shippers urged the Government to make certain concessions in the way of exchange permits for American fruits in order not to jeopardize exports of pears and grapes to the United States.

Argentina offers a very doubtful potential market for California grapes. Argentina is both a grape-eating and a wine-drinking country. The Argentineans are accustomed, however, to cheap grapes. The landed cost of California grapes is prohibitive, and demand would be restricted entirely to a limited luxury-class trade. Some importers believe 5,000 boxes might be disposed of annually. If the duty were removed and freight charges reduced, it is believed that some business could be developed. There is no market in Argentina for United States oranges. The country is rapidly approaching self-sufficiency, and any imports required will probably be covered by offerings from Paraguay and Brazil. The Argentine public is not grapefruit-minded; consequently, no great volume is required to take care of the limited demand. As an exporter of grapefruit, the country is not likely to become a factor. Grapefruit production is on the decline, and exports have practically stopped; but sufficient quantities will be produced, no doubt, to take care of all local requirements. Present imports of grapefruit approximate 1,000 boxes a year. Some importers believe this might be increased to 5,000 boxes, a relatively small amount.

Exports of fruit to Argentina are limited to a few varieties popular on Argentine markets. The Argentine public prefers red apples and has a distinct prejudice against green varieties of any kind. Delicious is the most popular variety, and for boxed apples the trade preference is for Delicious exclusively. For barreled apples, demand is for Gano and Ben Davis, principally, and for a few Delicious and Winesap. Anjou is the only variety of pear wanted on the Argentine market. The demand for grapes is confined largely to Emperors and possibly a few Malagas.

Argentine fruit for some time enjoyed a distinct advantage in the matter of freight rates. The discrepancy between the rates on north- and south-bound fruit, however, has been corrected, uniform rates having been established between given ports irrespective of the direction in which the cargo is moving. Fruits from the United States have also been penalized through the introduction of various complicated sanitary regulations.

