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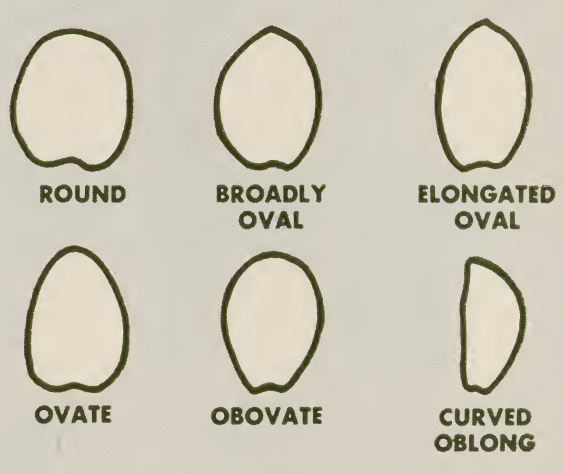
OLIVE VARIETIES IN CALIFORNIA

HUDSON HARTMANN P. PAPAIOANNOU

THESE ARE THE GENERAL SHAPES



THE VARIETIES GROWING IN THE STATE ARE DESCRIBED IN DETAIL, INSIDE.

CALIFORNIA AGRICULTURAL EXPERIMENT STATION
THE COLLEGE OF AGRICULTURE
UNIVERSITY OF CALIFORNIA · BERKELEY

This bulletin provides reference material for research workers . . . processors . . . Farm Advisors.

It contains:

a summary of all the information now available on the olive varieties grown in California.

a detailed study of the five commercial varieties, which account for 26,168 of the 28,438 acres now planted to olives in California.

descriptions of varieties imported during the early days of the olive industry but now found only as scattered trees or orchards (2,200 acres) in the state.

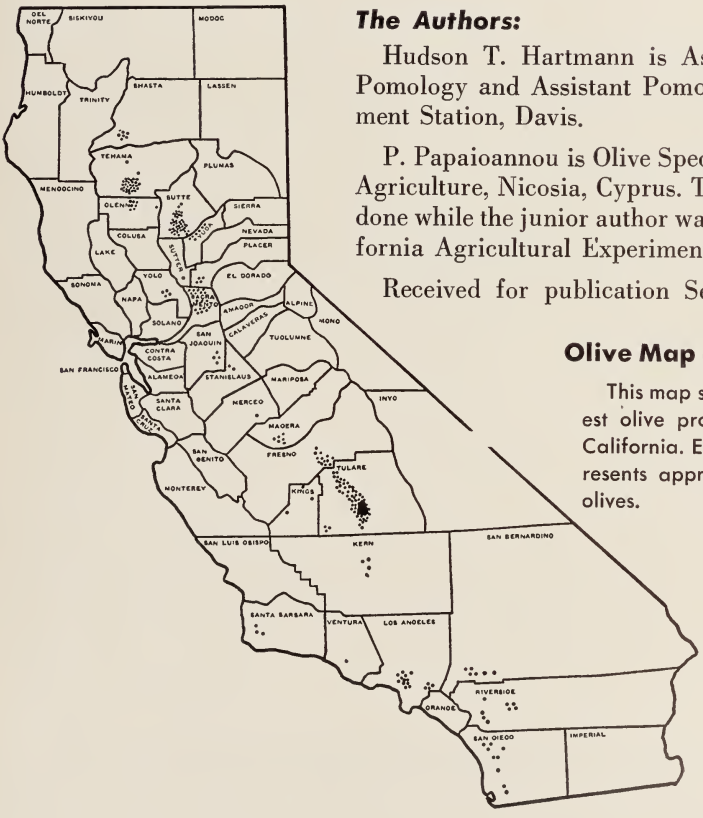
descriptions of importations by the U.S.D.A. Division of Plant Exploration and Introduction at Chico.

a list of new importations by the University of California.

characteristic differences in bearing habits, size and shape of fruits and pits of more than 50 varieties.

measurements to assist in varietal identification and analyses for oil content.

photographs of fruits, pits, and mature trees of the most important varieties.



Olive Map of California

This map shows the areas of greatest olive production in the state of California. Each dot on the map represents approximately 100 acres of olives.

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OLIVE VARIETIES IN CALIFORNIA

The identifying characteristics of olive varieties growing in California were described in five studies (3, 13, 14, 15, 16)[1] made at this station between 1889 and 1899. Since that time, however, little further information on varieties has been published, other than general statements incidental to cultural practices recommended to the industry.

THE OLIVE VARIETIES (*Olea europaea*) now grown commercially in California—Mission, Manzanillo, Sevillano, Ascolano, and Barouni—comprise 26,168 acres of the total 28,438 now planted to this fruit. All of these except Mission were imported from the Mediterranean region between 1875 and 1905 (fig. 1).

Of the many other varieties brought into California during that period, few have survived for commercial use, and nearly all of those suitable only for oil production have been discarded.

Since 1900, importations—principally from the Mediterranean region, Australia, and South America—have been made by the Division of Plant Exploration and Introduction of the United States Department of Agriculture. Forty-five of these are now in bearing at the U.S.D.A. Plant Introduction Garden at Chico, California, and are being studied.

[1] Numbers in parentheses refer to "Literature Cited" at end of this bulletin.

Fig. 1. These are the 5 most important olive varieties grown in California. Left to right: Sevillano, Ascolano, Barouni, Manzanillo, Mission. These and all other fruits shown are natural size.

The Division of Pomology of the University of California at Davis has recently established (1946) a collection at its Wolfskill Experimental Orchards at Winters, California, including almost all the varieties known to be growing in the state. Since 1947, it has also been adding to this collection new importations from the Mediterranean countries and South America.

None of the many minor types formerly imported has so far proved equal to the five main varieties. The new importations (1947–50) will have to be thoroughly tested in the principal olive districts before their value can be determined—a matter of another 10 to 15 years. No new recommendations, therefore, can be made at present.

In the Corning district, Sevillano and Manzanillo are preferred for new plantings and for top-working other varieties, if this is desired. In Butte County, though Mission and Manzanillo varieties are chiefly grown, the packers in that area favor Mission. In Tulare County, Manzanillo is believed to be the most suitable; Ascolano and Sevillano, too, are recommended, but the demand for these two is more limited than for Manzanillo. Mission is not advised for new plantings in the Tulare district.

THESE ARE THE FIVE MAIN VARIETIES GROWING IN THE STATE

MISSION

Origin and acreage. Mission was introduced into California by seeds brought from San Blas, Mexico, in 1769, and planted at Mission San Diego by Junípero Serra and by Don José de Galves (17). The trees were soon in production at all the missions along the California coast. As agricultural development of the state began, commercial olive orchards were planted, the nursery stock for which was grown from cuttings secured from the various missions. By 1875, the Mission variety predominated in the 11,500 bearing olive trees in California, and until the late 1940's, it was the most widely planted olive in the state. Manzanillo, however, is now rapidly replacing it in popularity. Although 54 per cent of the bearing acreage in 1948 was Mission, the nonbearing acreage was 14 per cent Mission, as compared with 58 per cent Manzanillo.

Butte County olive acreage is now approximately 75 per cent Mission, and the Corning district about 18 per cent. In Tulare County, though 20 per cent of the trees are Mission, many of the orchards are being grafted to the Manzanillo variety.

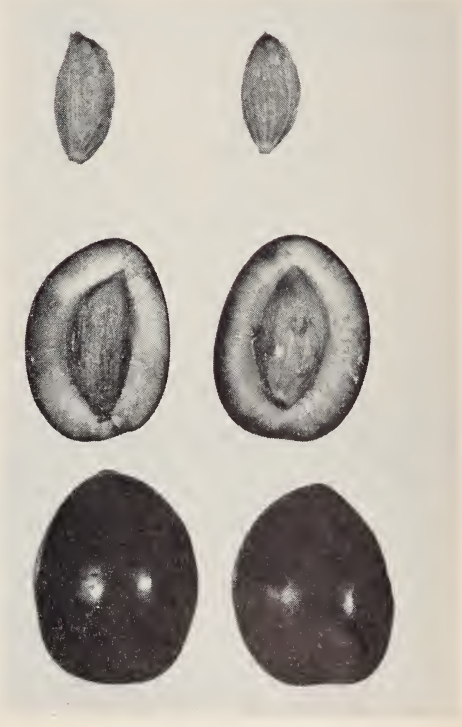


Fig. 2. Mission, from Winters, California.

Fig. 3. Typical Mission olive tree near Bangor, California.

The tree. The Mission tree has a definite upright tendency, very old trees often reaching a height of 40 to 50 feet (fig. 3). To make harvesting easier, most growers keep the trees topped.

Disease and insect pests. Mission is the only major variety whose susceptibility to peacock spot (*Cycloconium oleaginum* (34) is of commercial importance. It is comparatively resistant to olive knot (*Bacterium savastanoi*) (33).

All olive varieties commonly grown in California have about the same susceptibility or resistance to the usual insect pests—namely, oleander scale (*Aspidiotus hederae* [Vallot]), olive scale (*Parlatoria oleae* [Colvee]), and black scale (*Saissetia oleae* [Bern.]).

Bearing habits. Varieties differ markedly in respect to alternate or irregular bearing. Many Mission orchards bear crops only in alternate years, or even once in every three or four years, despite good cultural practices—including irrigation and introgen fertilization. Some orchards, however, produce good crops each year.

Blooming dates. All the commercial olive varieties blossom at nearly the same dates. Temperature and other climatic conditions cause fluctuations in blooming dates in different parts of the state. The

range of full bloom is from May 1 to May 25 in most years.

Fruit maturation. Olives are picked at various stages of maturation, depending upon the type of processing they are to undergo. For the Spanish-green process, they are harvested while deep green or straw-colored. As ripe olives, they are acceptable for processing from the stage of straw color to that showing some red.

Missions are late maturing, usually in November—later than other commonly grown varieties. In some seasons, frost injury causes shriveling before the fruit reaches the proper stage for pickling. This variety, however, contains sufficient oil so that the frost-damaged fruits may be left on the trees until they become black. They can then be harvested for oil extraction any time between December 15 and March 1.

Yield. The average yield[2] of approximately 150 acres in Tulare County was 3.7 tons per acre for the ten-year period 1936–1946. The maximum rate was 7.5 tons per acre in 1940, and the minimum was 1.0 in 1945. These figures are based on orchard records in Tulare County, where olive yields are usually higher than for orchards in the remaining sections of the state.

Uses of the fruit. Mission is relatively easy to handle during processing and results in a product of high quality and uniformity. It is used in the production of black-ripe and green-ripe olives and for the Greek style, salt-cure process.

An appreciable percentage of the crop is used for oil extraction. Undersized and frost-damaged fruits of this variety may be salvaged for this purpose. The oil content of Mission is the highest of all the commercial varieties. Expressed as a percentage of the fresh weight, it averages 20 to 24 per cent, differing somewhat according to locality and perhaps with strains in the variety.

Fruit. Missions are uniformly high in quality, but are handicapped by their size. Few fruits of the "Mammoth" or larger size are produced. To meet the present demand for large olives, other varieties must be used.

Several strains of Mission are widespread in California. Each differs from the other, however, chiefly in fruit characteristics. The fruits of three representative strains are described below:

Mission No. 26A[3] Collected from the California Agricultural Experiment Station, Davis.

The fruit is usually borne singly, rarely in twos, on variably sized peduncles, medium to fairly long. The order of maturity is quite even, the olives passing quickly from green to the colored stage. The mature fruit becomes velvet-black late in November; the lenticels are rather obscure.

The shape varies from broad-oval to oval-elongated, sometimes with a protrusion at one side. Although the base is generally broad, it may be square, rounded, or slanted. The apex-half tapers to a blunt point but sometimes is round or has a small projection.

The pit is large and varies in shape. It may be long or short—protruding at one side, erect, or with the apex-end curved. It is sometimes cylindroconical and often has a broad middle- or apex-half. The base is variably tapered, the end being narrow or round. The apex also tapers variably and is slightly curved with a small point. The point—set off-center on the apex—has a thick base and a sharp end.

The surface of the pit is fairly smooth, with a number of branched furrows—shallow, running lengthwise, often to the apex end. This portion, however, is warted with cavities of various sizes, ir-

[2] Based on records of the Lindsay Ripe Olive Co., Lindsay, California.

[3] These numbers refer to definite collections of fruits and correspond with the numbers given in tables 2 and 3.

regularly distributed. The main furrows forming the halves of the endocarp are somewhat obscure, a characteristic of this variety.

Mission No. 26B. Collected from the University of California's Wolfskill Experimental Orchard at Winters.

The fruit is borne singly on medium to fairly long peduncles. It ripens evenly, almost a month before that of Mission No. 26A—probably because of the warmer summer climate at Winters.

The shape is uniform—a broad oval. The base is quite broad with a prominent stem-end cavity. The apex-end is round with a blunt point or a projection of variable size.

The pit is larger than that of Mission No. 26A, but is smaller than that of Mission No. 26C. The shape varies, as does No. 26A.

Mission No. 26C. Collected from the Millard Sharpe orchard at Vacaville.

The fruit is borne singly or in clusters of five or more on medium to long peduncles. It ripens late in October.

The shape varies. It is generally oval or oblong, but it may be erect, slightly curved, or protruding at one side. The base may be rounded, square, or slanted. The apex-half is variably tapered, rounded, or bluntly pointed, and is often cylindrical in form, curved towards the apex-end with a sharp point.

The pit is the largest of the three Mission specimens described. Its shape resembles that of Mission Nos. 26A and 26B.

MANZANILLO [Mancanilha, Ampoulleau]

Origin and acreage. Manzanillo is a native of Spain, where for many years it has been grown as one of the leading table varieties. Large quantities are now grown and processed there in brine for export as fermented-green olives. This variety can also be found in Portugal, France, Italy, Palestine, Australia, Argentina, and Chile.

In 1875 it was brought into California from Spain (3, 13, 15, 16, 18) and was soon found to be one of the best varieties imported from the Mediterranean countries about that time.

In 1948, Manzanillo constituted 5,456 of the 25,366 acres of bearing olives in California (4). In Tulare County approximately 60 per cent of the bearing acreage is now planted to this variety; in Butte County, 6 per cent; and in the Corning district, only 2 per cent. In Sacramento County, approximately 20 per cent of the trees are Manzanillo.

The tree. Typical Manzanillo trees are about 15 to 30 feet tall at maturity and if not crowded, have a spreading habit of growth (fig. 5).

Disease and insect pests. Manzanillo is more susceptible to olive knot than

Fig. 4. Manzanillo, from Davis, California.

Fig. 5. Typical Manzanillo tree near Bangor, California.

Mission, but less so than Sevillano. It is quite resistant to peacock spot.

It is just as susceptible to attacks by the scale insects as the other major varieties.

Bearing habits. Its tendency toward regular bearing is one of the most important advantages of Manzanillo. It is probably the most regular bearer of all the commercial varieties except Barouni.

Fruit maturation. The fruit usually matures in October or early November—sufficiently early to permit harvesting for pickling before danger of frost. The harvest generally follows that of Ascolano but precedes that of Sevillano and Mission.

Yield. The average annual yield of 640 acres in Tulare County from 1936 to 1946 was 3.8 tons per acre. The range was from 2.5 tons in 1937 to 6.0 in 1940.

Uses of the fruit. This variety is adaptable to several processing methods.

It is used largely in the production of green- and black-ripe olives. Some fruits, however, are processed as Spanish-green fermented pickles. By December, Manzanillos usually contain enough oil—18 to 20 per cent of the fresh weight—to warrant their use for oil extraction. Pickling, however, is usually more profitable.

The fruit is normally borne singly—rarely in twos or threes—on variably sized (short or long) peduncles.

It is medium in size, tough in texture, and uniform in shape—a slight or broad oval. The base is round or hollow, often slightly depressed on two sides; the stem-end cavity is prominent, and the apex round. The surface is spotted regularly with tiny, whitish lenticels. These become less pronounced towards maturity, when the fruit becomes velvet-black.

The pit is medium sized, rather uniform, and erect—often protruding at one side. The base-half is square or rounded and is generally depressed at two sides—especially toward the end, which is usually broad—rarely narrow. A small percentage of the pits has a bluntly pointed, cylindroconical base. The apex-end is rounded (never tapering like the Mission variety) and terminates in an inconspicuous, thin, sharp point.

The surface of the pit is densely covered with branched furrows—medium to long—all shallow except those toward the base-end, where they are somewhat prominent. The main furrows forming the two halves of the endocarp are almost obscure. A warty area of woody texture is near the terminal portion of the apex.

SEVILLANO [Gordal, Sevillana, Sevilhana, Espagnole, Queen]

Origin and acreage. Sevillano derives its name from Sevilla, the province in Spain where it originated. It is grown there in large quantities, which are exported as Spanish-green fermented olives. This variety is also grown commercially in France, Palestine, Argentina, Portugal, Algeria, Chile, and Australia.

Sevillano was brought into California about 1885 (14). When the emphasis of the California olive industry shifted in 1910 from oil to pickling, this variety was widely used in top-working trees of the small-fruited oil types, especially in the Corning area. Sevillano now comprises 75 per cent of the bearing olive acreage in that region. It is not widely planted in Butte, Sacramento, or Tulare counties, constituting only 6, 5, and 6 per cent, respectively, of the bearing acreage of olives in those counties.

The tree. Mature Sevillano trees (fig. 7) vary considerably in size. With favorable soil and climatic conditions, they often attain a height of 25 to 35 feet. In poor soil, they remain quite small. Because their tendency is to spread rather than to grow upright, harvesting is relatively easy.

Unlike other commercial varieties, Sevillano fails to root satisfactorily from cuttings. It is usually propagated by grafting onto seedlings of other varieties. Softwood cuttings, however, have been grown successfully when treated with certain root-promoting substances like indolebutyric acid at a concentration of about 50 parts per million (12).

Fig. 6. Sevillano, from Davis, California.

Disease and insect pests. Although Sevillano is resistant to peacock spot (34), it is quite susceptible to olive knot (33). Throughout the Corning district, where the majority of trees are Sevillano, the latter disease is very prevalent.

This variety is susceptible also to three other diseases, apparently because of physiological weaknesses—about the cause or remedy for which little is known.

All are restricted to certain years and certain orchards. "Soft nose" causes the fruit to darken at the apex and to shrivel. This nonparasitic disease is thought to develop from such environmental conditions as weather and cultural practices or to be influenced by the root-stock used.

In "split pit," the normally broad, conically shaped apex appears flat and blunt. The pit splits into two parts. Growers in the Corning area believe this disease is connected with irrigation practices. Processors regard susceptibility to "split pit" a serious defect in this variety.

A condition termed by growers as "shotberry" or "sports" is frequently observed in Sevillano orchards. It is more pronounced in some years than in others, and neither the cause nor remedy is known. Cracking the pits reveals aborted seed. Though the defective fruits cling to the tree, their growth rate is arrested. They are sometimes harvested and process fairly well.

Bearing habits. Sevillano bears somewhat erratically in California. It is not as dependable in setting regular crops as either Manzanillo or Barouni. Some orchards, particularly in the Corning area, bear only a few scattered fruits for several consecutive years and then may set a fairly heavy crop. Some orchards, however, bear quite regularly.

Fruit maturation. Harvest is generally from mid to late October—after Ascolano, Barouni, and Manzanillo, but before Mission.

Yield. The average annual yield of 170 acres in Tulare County from 1936 to 1945 was 3.3 tons per acre. The range was from a low of 0.7 in 1939 to a high of 7.9 tons per acre in 1943.

Uses of the fruit. Most packers consider this variety more difficult to process and the quality somewhat lower than either Mission or Manzanillo. If harvested at the proper degree of ripeness (at an earlier stage than for the two varieties mentioned), a very acceptable product can be made.

Sevillano's chief use is as canned ripe olives—and to a lesser extent as green fermented olives (Spanish and Sicilian types). Because of its relatively low oil content, very little of the crop is processed for oil.

Fruit. Sevillano olives are the largest produced by any variety grown in California. There are several known strains differing principally in fruit and pit characteristics. Four representative ones are described below.

Sevillano No. 49A. Collected at the California Agricultural Experiment Station, Davis.

The fruit grows singly, rarely in twos, on short- to medium-sized peduncles. At maturity, whitish lenticels are sparsely present on the velvet-black epidermis.

The large fruits are rather rough in texture and are variable in shape. Some are plump and ovate, depressed on two sides, with a round or blunt apex. Others are elliptic or elongated-oval, slightly depressed on two sides, with a round apex. The base in both shapes is rounded, with one shoulder raised. The stem-end cavity is narrow and rather deep, off-center in position, so that the fruit seems to protrude on one side.

The pit is quite large, rough, erect, and variable in shape. Two forms seem to predominate, however. In one type, the base-half is broader than the apex-half, giving the pit a conical appearance. The apex is tapered fairly broad, with a blunt, thin, or fairly thick, sharp point. The

Fig. 7. Typical Sevillano tree near Davis, California.

other type is oblong, cylindroid, sometimes flat at the two sides, often with the base-half more prominently depressed. The apex is round or slightly tapered, with a small, sharp, or inconspicuous point. Both types have broad bases, often somewhat square or rounded.

The surface is covered with a dense but fine network of small, branched furrows, cavities, and small wart-like projections. Assorted furrows cross the surface lengthwise. The two main ones—on opposite sides of the pit—are the longest and most prominent. Those on the base-half parallel the main furrows and are easily distinguishable. The upper half of the pit, especially near the apex, is often raised but usually has a warty appearance. In some pits, a zone in the middle of the base-half has no furrows. The warty reticulate texture, however, is always present.

The pits have a strong tendency to split along the main furrows.

Sevillano No. 49B. Collected at the Bequette Orchard, Lindsay.

The fruit grows singly, rarely in twos, on medium-sized peduncles. At maturity, it is velvet-black.

It is large and tough in texture. It is of assorted shapes—irregular-oval or elongated-oval, erect, or often ovate, protrud-

ing at one side. The base is variable—broad, round, or narrow, and bluntly pointed. The apex is normally tapered with a blunt end but is rarely rounded.

The pit is large, oblong, and depressed on two sides. It is not as flat as Sevillano Nos. 49A and 49C. It is erect, often slightly curved. Its greatest width is usually at the middle but sometimes may be in the base-half, giving the pit a conical shape. The base is often rounded but more often tapers to a narrow point. The apex tapers sharply toward the end. It is rather narrow, terminating in a medium-sized, curved point or in a small, straight, sharp one.

The surface is rough. Numerous long, prominent furrows cross it longitudinally. Those in the base-half only are well defined, especially those paralleling the two forming the halves of the endocarp. The apex-half is dotted with irregular cavities and warty projections less prominent than those in the corresponding portion of Sevillano No. 49A.

Sevillano No. 49C. Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 33225.

This strain was imported from Granada, Spain, in 1912 (26).

The fruit grows isolated, rarely in twos, on medium-sized peduncles. At maturity, it is velvet-black, with rather obscure whitish lenticels on the epidermis.

It is large and uniform, tough in texture. It has the highest ratio of flesh to pit of all the Sevillano strains studied. Its shape is regularly ovate, with slight depressions on the two sides. The base is rounded, with a small stem-end cavity. The apex is almost round.

The pit is of medium size, uniform in shape, erect, and somewhat oblong—never conical as in the other specimens of Sevillano. The middle portion is broad. The base-half tapers to a narrow, blunt point and is seldom rounded. The apex-half tapers uniformly, terminating in a point that may be thin and sharp, or fairly thick.

The surface is the smoothest of any Sevillano strain reported. The arrangement of the furrows and cavities is much like that of Sevillano No. 49B, although it is less detailed. The pit is hard. In contrast to Sevillano No. 49A, no splitting has been observed along the main furrows.

Sevillano No 49D. Collected from the Citrus Experiment Station, Riverside.

The tree of the strain described below was grafted on the so-called California "wild olive" (*Foresteria neomexicana*).

The fruit grows singly, rarely in twos, on medium-sized peduncles. At maturity, the color is velvet-black, and the epidermis is distinctly spotted with fairly broad, brownish lenticels. The texture is somewhat tough.

Olives of this strain are the largest of any of the Sevillanos collected, averaging 17.8 grams fresh weight. The shape is round or ovate, with slight depressions on both sides and with rounded ends.

The pit is very large, irregular in shape, erect, and usually distinctly conical, with prominent depressions on the two sides. It is somewhat flatter than the pits of Sevillano Nos. 49A and 49B. The base is broad, square, or rounded. The apex-half tapers uniformly—it is infrequently curved—usually terminating in a blunt point of varying size and shape.

The surface of the pit is very rough. The arrangement of the furrows, cavities, and warty portion is similar to that of Sevillano No. 49B, though much more prominent and detailed.

ASCOLANO [Asiolani, White Olive of Ascoli]

Origin and acreage. Ascolano was brought into California from Italy about 1885. It is one of the standard Italian pickling olives, though it is not widely

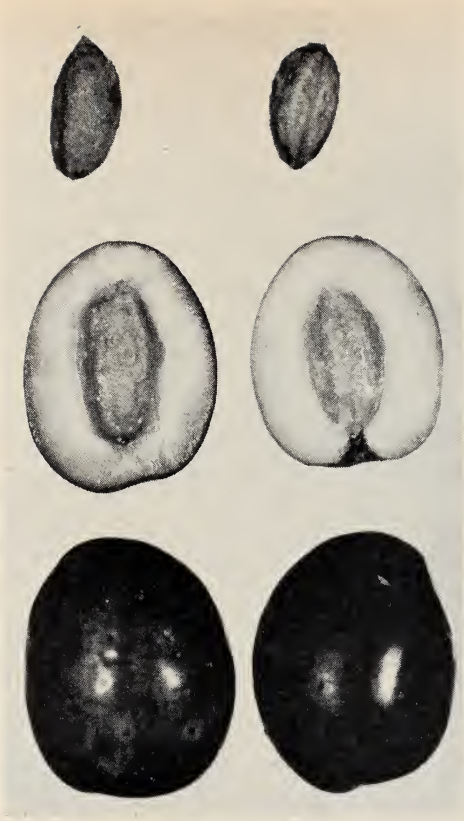


Fig. 8. Ascolano, from Davis, California.

planted in any other olive-producing countries except Argentina. Some small acreages are found, however, in Palestine and Chile.

About 700 acres were in bearing in California in 1948, constituting approximately 3 per cent of the state's total bearing acreage. The most extensive plantings are in the San Joaquin Valley; Kings County has 250 acres and Tulare, 145. Only 83 acres are reported in Butte County, 38 in Sacramento County, and scattered trees in the Corning area.

The tree. Mature trees attain a height of 20 to 30 feet (fig. 9). They are not especially upright in growth habit; when uncrowded, they develop into a symmetric round shape.

Disease. Ascolano is more susceptible to olive knot than Mission but is probably less so than Sevillano.

Bearing habits. This variety is not as dependable in setting regular crops as Barouni. Young trees bear fairly regularly but older ones tend toward alternate or irregular bearing.

Fruit maturation. In most years the fruits mature rapidly and are ready for harvest between mid-September and the first of October—earlier than all of the other commercial olives. They require special effort in both harvesting and processing to avoid bruising.

Yield. The average annual yield of a 16-acre orchard in Tulare County for the past ten years (1940–49) has been 3.8 tons per acre. The range was from 1.8 tons in 1947 to 6 tons in 1943.

Uses of the fruit. Ascolano is well suited for canned ripe olives. It is not adapted to green pickling, because "salt shrivel" is severe during fermentation and the fruits become almost white after fermentation. Occasionally this variety is used for oil extraction.

Fruit. Descriptions of three representative strains of this variety are given below.

Ascolano No. 42A. Collected from the California Agricultural Experiment Station, Davis.

The fruit grows singly, or in twos, on short-to-medium peduncles. At maturity—in November, for this strain—it is wine-black, with whitish and fairly conspicuous lenticels on the epidermis. The texture is soft and the size large. In shape the fruit of this strain is broadly oval, or often regularly oval, protruding at one side. The base is rounded, or somewhat slanted. The stem-end cavity is narrow and deep. The apex is round or bluntly pointed; the stigma is persistent.

The pit is of medium size and is somewhat irregular—short or long, erect or slightly curved, or cylindroid. The base is variable—broad, rounded, often somewhat truncated, or narrow. The apex is broad and tapers slightly, terminating in

Fig. 9. Typical Ascolano tree near Fair Oaks, California.

a small, variably curved, and rather thick, sharp point. The surface is rough and is densely crossed with many branched prominent furrows. These may be long or short. They run longitudinally but are often obscure near the apex end. The two main furrows forming the halves of the endocarp are prominent and continuous from base to apex.

Ascolano No. 42B. Collected from the Citrus Experiment Station, Riverside.

The fruit sets singly, rarely in twos, on short- to medium-sized peduncles, which are submerged in the deep stem-end cavity. At maturity, the olives are reddish-black in color and are covered with a thin layer of bloom. Small white lenticels are fairly conspicuous on the epidermis. The texture is tough, and the size large.

The shape is round or ovate, often protruding at one side. The base is rounded or, in ovate fruits, slanted. The stem-end cavity is narrow but exceptionally deep—from 4 to 6 mm. The apex is usually rounded. The stigma is persistent, even at an advanced stage of maturity.

The pit is rather small—in ratio of pit to fruit, the smallest in the Ascolano strains examined.

The shape may be oval, broad, or cylindroid. The base is square or rounded; the apex is rounded with a small, sharp point.

The surface is quite rough. Many long, branched, prominent furrows, or a few short ones, cross the surface longitudinally. Cavities of assorted sizes densely cover the remaining area. In all cases, the main furrows forming the halves of the endocarp are continuous and very prominent.

Ascolano No. 42C. Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 63857.

This strain was imported from Italy in 1925 under the name Asiolani [(29), No. 83, p. 22].

The fruit grows singly or in clusters on peduncles variable in length. It ripens very unevenly. At maturity it is reddish-black. Small lenticels are barely visible in all stages of maturity.

The olives of this strain are large and soft-textured. The shape varies. One type is round, variably protruding at the side. The base is broad, and the apex is rounded or bluntly pointed. Other fruits are irregularly oval, protruding at one side. These are erect and often slightly curved. The base is rounded, and the apex is somewhat pointed. The stem-end cavity is usually narrow and is of variable depth, especially in the oval-shaped fruits. The stigma is persistent.

The pit is of two types—with distinct differences. (*a*) Pits from the round fruits are short, cylindroid, and erect. The base is broad, rounded, or somewhat square. The slightly tapering apex terminates in a short, fairly thick, sharp point. (*b*) Pits from oval fruits are oblong, erect, or slightly curved, cylindroid, and narrow. Sometimes the apex-half is much broader than the base. The apex itself is broad with a long, thick, sharp point.

The surface is densely covered with long, variably branching, fairly deep furrows—very prominent in the base-half. The main furrows forming the halves of the endocarp are not as conspicuous as in Ascolano No. 42B.

BAROUNI [Baruni]

Origin and acreage. One of the standard table olives in Tunisia, North Africa, Barouni was introduced into California in 1905 by the U.S.D.A. Division of Plant Exploration and Introduction. Other olive-producing countries do not grow it extensively. It is the most recent variety to be planted on a commercial scale in California. It was widely planted throughout the state, particularly in Butte County, about 1920 and 1925.

California has about 400 acres of this variety, 117 acres being in Butte County and 80 in Tulare County. The remainder of the acreage is in small plantings throughout the state. New plantings of Barouni are not being made in California.

Fig. 10. Barouni, from Vacaville, California.

The tree. A typical Barouni tree is medium in size—15 to 25 feet tall—with a moderately spreading top (fig. 11).

Disease and insect pests. Barouni is somewhat more susceptible to olive knot than the Mission. It is more resistant to peacock spot than the Mission.

Bearing habits. The most noteworthy feature of Barouni is its tendency to bear satisfactory crops each year. It is probably the most consistent bearer of all the commercial varieites grown in California.

Fruit maturation. Barouni fruits are usually harvested in October or early November, about the same time as Manzanillo, but after Ascolano and before Sevillano and Mission.

Yield. A 4-acre orchard in Butte County yielded an average of 2.9 tons per acre annually during the 9-year period from 1941 to 1949.

Uses of the fruit. This variety is difficult to process satisfactorily. An appreciable quantity, however, is canned ripe. A large percentage (500 to 700 tons) is shipped fresh to eastern cities, for home-processing. Barouni is of doubtful value for the Spanish-green process because of the reddish color that sometimes develops near the pit and of its tough and woody texture after processing. Because of its relatively low oil content—13 to 18 per cent—it is of very little value for oil extraction.

Fig. 11. Typical Barouni tree near Chico, California.

The fruit is borne singly or rarely in twos, on medium-sized peduncles. Early in the stage of final maturity, the exposed side of the fruit turns reddish-purple. The color at maturity is reddish-black. Though small lenticels are fairly conspicuous on the surface of the green fruit, they become rather obscure as maturity is reached.

This olive is large and tough-textured. In shape, it ranges from oval to oval-elongated, protruding at one side. The base is rather broad, somewhat truncated, often somewhat slanted. The stem-end cavity is moderately deep and rather prominent. The apex is rounded or bluntly pointed.

The pit is relatively large and smooth and is uniform in shape. It is erect, oblong, irregularly cylindroid, and slightly protruding at one side. The base is broad, rounded, often somewhat square. The apex-half is usually the broadest portion of the pit. The apex itself is usually broad, slightly tapering, terminating in a small- or medium-sized, thin or thick but generally straight, sharp point.

In general, the pit is similar to that of Mission. The base-end of Barouni is not as tapering as Mission. In the latter, the point at the apex is set off-center, while that of Barouni is set almost in the center.

The surface of the pit is densely crossed longitudinally with deep furrows—long and branched. These extend all the way from the base end to the terminal portion of the apex, though they are more pronounced in the base-half. The main furrows forming the endocarp are not prominent.

THESE ARE THE MINOR VARIETIES HAVING SMALL-SIZED FRUIT

The varieties in the three groups below account for not more than 10 per cent of the total bearing acreage in the state. They are found only in variety collections, or as individual orchards or trees. For that reason, it is not possible to give data on acreage, yields, or susceptibility to insects and diseases. The descriptions should be of assistance in identification. All in the first group are oil varieties.

ATROVIOLACEA BRUN BIBIER—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50972.

Imported from Adelaide, South Australia in 1920 (28).

The tree is of medium size, about 15 feet high, with a spherical-shaped top. It has definite alternate-bearing habits at Chico.

The fruit grows singly, in twos, or in threes on variably sized peduncles. The stigma is persistent. At maturity, in late November, the olives are black.

The shape is oblong, protruding slightly at one side. The base is narrow with a prominent cavity; the apex is pointed, often curved.

The pit is large and oblong, protruding at one side. It is widest at the center; the base is narrow; the apex is straight, pointed, or slightly curved. The surface has shallow furrows; all are branched, except the two prominent ones forming the halves of the endocarp.

BLACK ITALIAN—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50973.

Imported from Adelaide, South Australia in 1920 (28).

The tree is large, more than 20 feet high. Its central branches have an upright growth habit, spreading at the top. It has a tendency to bear heavy crops regularly.

The fruit grows individually or in clusters on variably sized peduncles. At maturity in late November, the fruit is

Meslale

Moraioli

Redding Picholine

Rubra

Atroviolacea Brun Bibier

Black Italian

Bouquetier

Uvaria

small-fruited varieties

Bouteillon

Chemlali

Frantojo

Grappolo

Late Blanquette

Lecci

Lucca

black with a prominent bloom. On the green fruit, small white lenticels are visible but disappear towards maturity.

In shape, the olive is uniform—oval to oblong, protruding slightly at one side. The apex-half is wider, ending in a small, pointed projection; the base is narrow and slanted.

The pit is large and oblong, erect, or slightly curved, and protrudes at one side. The base-half is narrower than the apex-half. Both taper to a point, that at the apex being smaller and sharper. The numerous furrows—shallow, long, and somewhat branched—are more prominent in the lower half.

BOUQUETIER—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50974.

Imported from Adelaide, South Australia in 1920 (28), but originated in France.

The tree has upright central branches with a spreading top. It tends to bear in alternate years. When grown without irrigation, the fruit shrivels badly.

The fruit grows isolated on variably sized peduncles and ripens unevenly. When semi-ripe, this olive is reddish-purple, changing to reddish-black at maturity in late November. The bloom is quite prominent in the latter stage.

The shape of the olive is oval or slightly oblique. The base is broad and often slanted; the apex is bluntly pointed.

The pit is uniform in shape—erect and oval, protruding at one side. It is widest at the center, with a narrow base and a broad apex, the latter ending in a small, sharp point. The surface is rather smooth.

BOUTEILLON [Redounan] — Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50975.

Imported from Adelaide, South Australia, in 1920 (3) but originated in France.

The tree is sparsely foliated, with a spreading top of somewhat drooping habit. It bears moderate crops fairly regularly.

The fruit is borne singly or in clusters on variably sized peduncles. It matures by November 1, becoming velvet-black with a prominent bloom.

The shape of the olive is elongated-oval or slightly oblique. The base is round, often narrow or slanted; the apex is round.

The pit is large, erect, and oblong, protruding at one side. Both the base and the apex are tapered and broad, the latter ending in a small, sharp point. The surface is quite smooth, with numerous small, assorted cavities in the upper half.

CHEMLALI—Collected at the Citrus Experiment Station, Riverside.

Imported from North Africa, this variety has several strains. It is widely grown in Tunisia (5, 21) and is in common use for oil in Algeria (24).

The tree usually bears heavy crops in alternate years.

The fruit is borne in clusters on long peduncles and ripens unevenly. In early December it changes color immediately from green to bluish-pink, becoming black at maturity, about December 15. The "straw-color" stage is seldom evident.

The shape of the olive is oblong or ovoid, with a slight protrusion at one side. The base is narrow—often slanted at one end; the apex is usually rounded. The surface of the fruit may be smooth but occasionally has small wart-like projections. On the green fruit, lenticels are present but inconspicuous, becoming prominent at the pink semiripe stage.

The pit is erect and oblong, protruding at one side. The base-half is wider than the apex-half. Both taper to a point, that at the apex being smaller and sharper. The surface is covered with numerous long, shallow, and branching furrows.

FRANTOJO [Frantoio, Frantoiana, Razzo, Correggiolo]—Collected at the California Agricultural Experiment Station, Davis.

Imported from Italy about 1885 (5, 18).

The tree is vigorous with a prominently spread top and drooping terminal branches. It tends to bear in alternate years.

The fruit grows individually or in clusters on variably sized peduncles. It matures early—by October 15—turning black, with a prominent bloom and obscure lenticels.

The shape is elongated-oval to oblong. The base is somewhat slanted; the apex is round and is broader than the base.

The pit is large, oblong, and erect, protruding at one side. The base tapers and is pointed; the apex is broad and cylindroid, ending in a small, sharp point. The surface is fairly smooth, with long, shallow, and branching furrows running lengthwise.

GRAPPOLO—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 63861.

Imported from Italy in 1925 [(29), No. 83, p. 22.]

The tree has a vigorous growth habit, with widely spread top, dense foliage, and large broad leaves. It has a tendency toward irregular bearing.

The fruit is usually borne in clusters of two to seven. It starts coloring by November 15 and at maturity is reddish-black.

The shape of the olive is elongated-oval, with a slight protrusion at one side. The base is round or slanted; the apex is slightly pointed, sometimes round, and often broader than the base, especially in the plump fruits.

The pit is large, oblong, and fairly smooth—generally resembling the Lucca pit, but with more prominent furrowing.

LATE BLANQUETTE [Blanquetier, Canivano Blanco]—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50983.

Imported from Adelaide, South Australia in 1920 (28) but originated in France.

The tree is medium in size, upright in growth habit, and has a spreading top. It bears heavy crops in most years.

The fruit grows singly or in twos on variably sized peduncles. It ripens so unevenly that four distinct stages of maturity can be observed at once on a single tree. At maturity, in December, the olives are shining velvet-black.

The shape of the olive is ellipsoidal to oval, very slightly oblique. The base is broad and round; the apex is usually round.

The pit resembles that of Bouquetier.

LECCI [Leccino, Leccio]—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 63862.

Imported from Italy (5, 17, 18) in 1925 [(29), No. 83, p. 22]. This variety is generally grown in the region of Toscana.

The tree is vigorous with a spreading top. It has a tendency toward irregular bearing.

The fruit, which matures in December, resembles that of Grappolo.

The pit is large, uniform, and oblong, with a fairly smooth texture.

LUCCA—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50985.

Imported from Adelaide, South Australia in 1920 (28).

The tree is vigorous with a spreading top of drooping habit. It tends to bear in alternate years.

The fruit grows singly or in clusters on various-sized peduncles. It matures in November and has a prominent bloom, with obscure lenticels.

The shape of the olive is elongated-oval. The base is usually rounded, often slanted; the apex is rounded.

The pit is quite large, oblong, erect, or slightly curved, and cylindroid. The base-half is broader, tapering toward the end; the apex, also broad, ends in a small, sharp point. The surface is rough, crossed lengthwise with many branched furrows—more prominent on the lower-half. The apex half is dotted with a number of small, variably shaped, deep cavities.

MESLALE—Collected from the U.S. D.A. Plant Introduction Garden, Chico. P.I. No. 86753.

Imported from Marrakech, French Morocco, in 1930 (31), as a large-fruited variety, supposedly the same as Meslala (5).

The tree is medium in size and has an upright growth tendency. It bears crops regularly.

The fruit ripens late in December. The shape of the olive is oval-oblique, resembling a small Mission.

The pit is quite large and smooth—similar to that of Late Blanquette, though the apex of Meslale ends in a longer point.

MORAIOLI [Moraiolo] — Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 63865.

Imported from Italy in 1925 [(29), No. 83, p. 22]. This variety is grown in the provinces of Siena and Firenze, Italy (5).

The tree is vigorous with a prominently spreading top; its terminal growth is upright. It has a definite tendency to bear in alternate years.

The fruit grows singly, often in twos, or threes, on short- to medium-sized peduncles. It matures in December to a shining velvet-black, with prominent bloom and almost obscure lenticels.

The shape of the olive is ovate. It is slightly depressed on two sides, with one broad cross-diameter. At maturity, one ridge is prominent on each side of the fruit. The base-half is narrow, ending in a round, hollow, often slanted, base with a prominent cavity; the apex is round. It resembles the Bidh el Hammam variety.

The pit is medium in size—oblong, irregular, erect, or very slightly curved, strongly protruding at one side. The base-half is cylindroconical and narrower than the apex-half. Each tapers to a point, that at the apex being smaller and more sharply curved. The surface is crossed longitudinally with many long, branched, shallow furrows.

REDDING PICHOLINE [Redding]—Collected at Winters.

Imported from France in 1872 (3, 13, 15). This has long been an established variety in California, but is not the true French Picholine described by Lelong (16) (fig. 12).

The tree is a vigorous grower with spreading top. It tends to bear heavily each year.

The fruit is borne singly or in clusters on long peduncles. It matures in late October, becoming a velvet-black.

The shape of the olive is ellipsoidal to oval, rounded at both ends.

Fig. 12. Redding Picholine, from Winters, Calif.

The pit is quite large, elongated-oval, and widest at the center. The base tapers toward the end; the apex is broad and rounded, with a tiny point at the end. The surface is moderately rough and is crossed lengthwise—especially in the base-half—with long, branched, fairly prominent furrows.

The chief use of the variety in California at present is in the production of seedlings to be used as rootstocks for other varieties. It is of no value for pickling and produces oil of poor quality.

RUBRA—Collected at the California Agricultural Experiment Station, Davis.

Imported from France (3, 13, 15) about 1880 (fig. 13).

The tree is medium in size—about 15 feet tall—and has a definite upright growth habit. It is outstanding for its regular bearing.

The fruit grows singly or in clusters on variably sized peduncles. This variety at Davis blooms unusually late—in June—and matures in November, at which time the color is shining velvet-black and the lenticels obscure.

The shape of the olive is broadly oval. The base is broad, rounded, or hollow, often slanted; the stem-end cavity varies in size and is often prominent; the apex is rounded.

The pit is large and uniform—ovoid, erect, and slightly protruding at one side. Both the base and apex are broad—the former somewhat truncated, often slanted, the latter round, ending in a small, straight, or slightly curved point. The surface is fairly smooth, crossed lengthwise with long, shallow, branched furrows.

UVARIA—Collected at La Habra.

Imported into California from France (3, 15, 16) about 1875.

The tree is about 15 feet tall.

The fruit grows in unusually dense clusters, resembling grapes. At maturity, in December, it is velvet-black with a prominent bloom.

The shape of the olive is uniform—elongated-oval, often slightly ovoid, with a protrusion at one side. The center is widest; both ends are almost round.

The pit is large and cylindroid, oblong and erect, and is slightly depressed at the two sides. The base often tapers to a round or conical end. The apex-half is

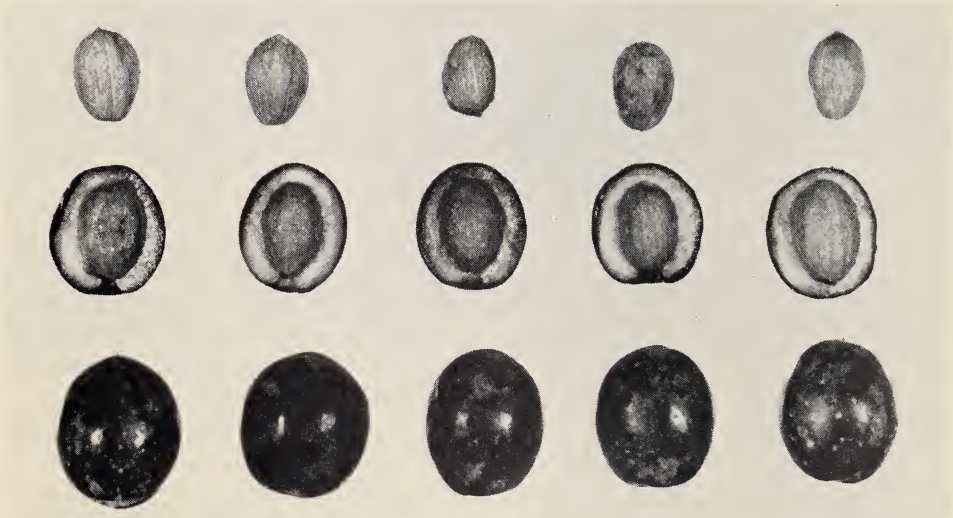


Fig. 13. Rubra, from Davis, California.

wider and tapers somewhat, often to a point. The side furrows forming the halves of the endocarp are fairly prominent; four or five shallow furrows—mostly branched—cross the pit lengthwise. These are more prominent at the base-half, eventually disappearing at the apex-half. In addition, the whole surface is covered with a fine reticulate furrowing.

HERE ARE THE MINOR VARIETIES HAVING MEDIUM-SIZED FRUIT

BIDH EL HAMMAM [Bidh el Ammam] Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 12684.

Imported from Tunisia in 1922 [(25), No. 11, p. 103] (fig. 14).

The tree is vigorous and quite tall—about 25 feet—with a prominently spread top. It bears good crops each year.

The fruit grows singly, rarely in twos or more, on short- to medium-sized peduncles. At maturity the fruit is reddish-black with prominent bloom. On the green fruit, small lenticels are conspicuous but disappear by maturity. This variety ripens very unevenly—an entire branch of green olives and one of black olives can be observed on a tree at the same time.

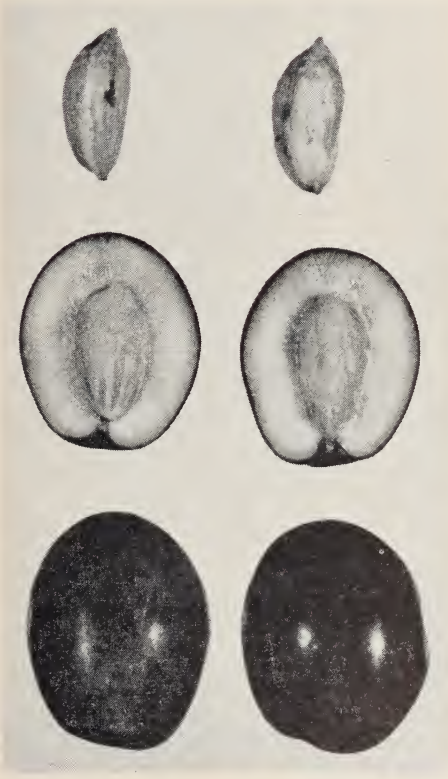


Fig. 14. Bidh el Hammam, from Chico, Calif.

The shape of the olive is ovate, distinctly protruding at one side. The base is narrow, often slanted; the apex-half is much broader than the base-half and is rounded or has a small projection; the stem-end cavity is quite prominent. The surface is rough with two distinct ridges on opposite sides—prominent on the upper half before the final stage of maturity.

The pit is medium in size—irregular, oblong, usually erect, and often variably curved. It strongly protrudes at one side, the other side being almost flat. The base-half is usually conical, often flat, ending in a narrow or pointed base; the apex-half is broader, terminating in a small, sharp point. The surface is crossed longitudinally by a number of medium and long, fairly prominent furrows—mostly branched—the two forming the endocarp being the longest and most prominent. Several deep cavities of assorted sizes are also present on the upper half of the pit toward the apex.

It is unlikely that this variety would become of importance commercially in California because the uneven ripening of the fruit in the different parts of the tree would necessitate harvesting several times during the season.

DOLCE DEL MAROCCO—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 63858.

Imported from Italy in 1925 [(29), No. 83, p. 22].

The tree is vigorous, with an upright tendency of growth and large, broad leaves. It bears fairly heavy crops most years but occasionally fails to set fruit.

The fruit grows singly or in clusters on variably sized peduncles. It matures in November, becoming a reddish-black with prominent bloom and obscure lenticels.

The shape of the olive is oblong and narrow, erect, and often slightly curved, protruding at one side. The base-half is somewhat conical, narrow at the end, often slanted; the apex-half is broader, tapering, and bluntly pointed, or has a small pointed projection set laterally on the opposite side of the protrusion. The stem-end cavity is moderate in size. The surface is rather rough.

The pit is large, oblong-cylindroid, erect or slightly curved, or with the apex-half wider than the base-half. The base-half is usually cylindroconical, narrow at the end; the apex is fairly broad toward the end, terminating in a thick, sharp point—straight or curved. The surface is fairly smooth, crossed lengthwise by numerous long, shallow, branched furrows—barely visible at the apex end.

This variety is rather small for pickling; it may, however, have some value for oil.

GORDO—Collected at the California Agricultural Experiment Station, Davis.

The origin of this variety is unknown.

The tree is about 15 feet tall with a prominently spreading top; the lateral growth has an upright tendency. This tree bears fruit only in alternate years.

The fruit grows isolated, rarely in twos, on medium- to large-sized peduncles, and ripens very unevenly. At maturity, in late November, the color is reddish-black; lenticels are conspicuous on the green fruit but rather obscure at maturity.

The shape of the olive is oval to elongated-oval and is slightly oblique. The base is rounded, often slanted; the apex is rounded or has a small projection.

The pit is medium in size and variable in shape—oblong, cylindroid, often with the center widest, usually erect. The base and apex are also variable—being rounded, narrow, or pointed; the latter ends in a thin, very sharp point. The surface is rough with medium-sized, branched furrows that run lengthwise and prevail in the base-half.

This variety is of little value for commercial use because of its extreme alternate-bearing habit.

GROSSE ABERKAN [Grosse Aberkan du Beni Aidel (23)]—Collected from the Citrus Experiment Station, Riverside.

Imported from Mustafa, Algeria, in 1905 [(25), No. 11, p. 134] by the U.S.D.A. Division of Plant Exploration and Introduction. P.I. No. 13257.

The tree is about 20 feet tall with a spreading top, drooping terminals, and dense foliage. It has a strong alternate-bearing tendency.

The fruit grows singly, rarely in twos or more, on short- to medium-sized peduncles. It ripens rather unevenly, becoming bluish-black at maturity in November. The bloom is fairly prominent.

The shape of the olive is variable, usually resembling that of Bidh el Hammam. Some fruits—longer than others—have a narrower cross-diameter and a somewhat depressed base-half, giving the base a truncated appearance. The stem-end cavity is fairly prominent.

The pit is large and variable in shape—predominantly oblong, erect, and protruding at one side. The base-half is

usually cylindroconical, with narrow or pointed base. The apex-half is much broader, somewhat cylindroid, and rounded, ending in a medium-sized, sharp, straight, or slightly curved point. The surface is rough with furrows and cavities similar to those on the Bidh el Hammam.

This variety would be of little value as a canning olive because of its alternate-bearing tendency.

GROSSA DI SPAGNA—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 62750.

Imported from Italy in 1925 [(29), No. 82, p. 28].

The tree bears with good regularity.

The fruit grows singly, rarely in twos, on variably sized peduncles. It ripens so unevenly that during December both solid green and black fruits may be observed on the same tree. At maturity in late December, the fruit is bluish-black; whitish lenticels are quite prominent at the last stage of maturity.

The shape of the olive is variable—usually elongated oval, often broadly oval or erect, protruding at one side. The base is rounded but occasionally slanted; the apex is bluntly pointed, often rounded; the stem-end cavity is prominent.

The pit is large and variable in shape—short, erect, cylindroid, or variably depressed on two sides. Some pits, however, are oblong, erect, or slightly curved, cylindroid, or somewhat flat on two sides. The base is usually broad, square, or truncated—rarely rounded or narrow; the apex-half is broader than the base-half and is rounded—rarely tapered—terminating in a small, thin, sharp point. The surface is densely crossed lengthwise by medium-sized—rarely long—continuous or branched, deep furrows; these usually disappear on reaching the middle of the pit. In the apex-half, warty projections appear; the main furrows may be prominent but usually are shallow or obscure in this half.

This variety may have some value as a canning olive because of its good size and high oil content but would be difficult to harvest because of its uneven ripening of the fruit.

LUCQUES [Olive de Lucques, Lucquoise (13, 21), Cornezuelo (9), Crescent]—Collected at Vacaville.

Imported from France about 1890 (fig. 15).

The tree is of medium size with a spreading top and drooping lateral growth. Observations have shown that it bears fairly regularly.

The fruit is borne individually, rarely in twos or threes, on variably sized peduncles. It matures in December, turning a shining velvet-black, with fairly prominent bloom and rather obscure small lenticels on the surface.

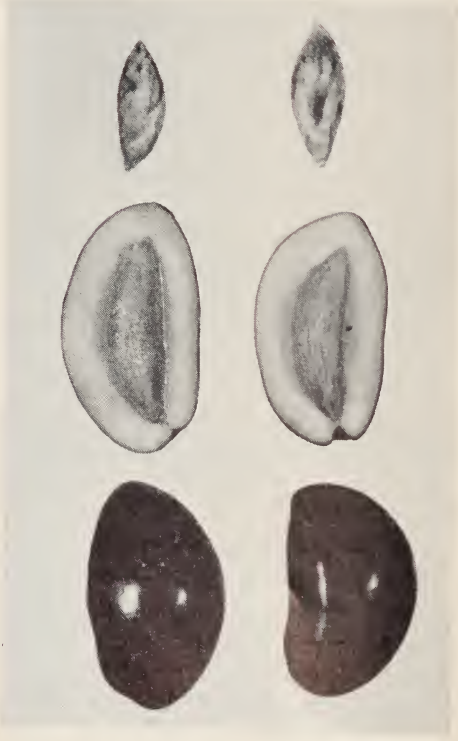


Fig. 15. Lucques, from Vacaville, California.

The shape of the olive is oblong, variably curved, and fairly flat on two opposite sides. The base is slanted, conical, and narrow at the end; the apex is broader than the base and is pointed with an occasional small projection. The surface is rather rough.

The pit is medium sized, cylindroid, curved, or somewhat twisted, and is sharply pointed at both ends. The surface is rather smooth.

This variety would probably be of little value for commercial pickling because of its peculiar shape and sharply pointed pit.

MAURINI—Collected from the University of California Citrus Experiment Station, Riverside.

Imported from Pescia, Italy in 1925 [(29), No. 83, p. 22]. The tree at Riverside originated from scions obtained from the U.S.D.A. Plant Introduction Garden at Chico, P.I. No. 63863.

The tree at Chico is vigorous and has an upright growth tendency with small, somewhat lanceolate foliage. It bears heavy crops each year; the graft at Riverside bears fruit consistently.

The fruit is borne isolated or in clusters on short- to medium-sized peduncles. It matures early—in October—becoming a bluish-black.

The shape of the olive is like that of a small Mission—oval, oblique, and with slightly pointed apex.

The pit is fairly large, oblong—cylindroid, almost erect. The base is rounded and often narrow; the broad, curved apex terminates in a medium-sized, fairly thick, very sharp point. The surface is densely covered with long furrows—mostly branched—running lengthwise. These are more prominent on the base-half.

This variety would be of value only as an oil olive because of its small size; the oil content, however, is not very high.

MENARA—Collected from the U.S. D.A. Plant Introduction Garden, Chico. P.I. No. 86752.

Imported from Marrakech, French Morocco in 1930 [(29), No. 83, p. 22].

The tree is moderate in size—15 to 20 feet tall—with an upright growth habit. It tends to set moderately heavy crops but occasionally fails to set fruit.

The fruit is borne isolated, in twos, often in threes, on medium to fairly long peduncles. It matures in November, at which time the color is velvet-black with almost no bloom.

The shape of the olive is similar to that of a typical plump Mission.

The pit is medium in size and uniform in shape. It is short, oval, and erect. The base is broad and rounded, rarely narrow; the apex is broad, regular, usually rounded, and ends in a small, thin, sharp point. The surface is densely crossed longitudinally with medium to long, fairly shallow, branched furrows, often reaching the apex-end. The apex-half is covered with a fine network of furrowing, and lacks the warty appearance generally observed on a Mission, though it is dotted toward this end with a moderate number of variably sized, prominent cavities.

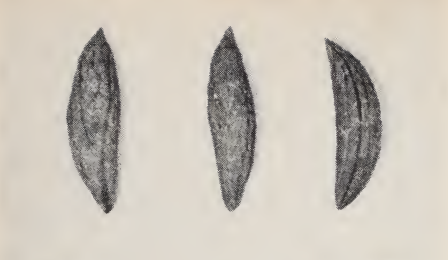
This variety is not likely to have commercial possibilities because of its relatively small size and low oil content.

MORCAL—Collected from the Citrus Experiment Station, Riverside.

Imported from Spain in 1933. This is not the variety Morcal or Morcaleno described by Fernandez (9). It may, however, be the same as the Mollar variety grown in Spain (9), as the fruit descriptions agree.

The tree consistently sets good crops of fair-sized fruit, which mature without shriveling under non-irrigated conditions.

The fruit grows singly, rarely in twos, on short- to medium-sized peduncles. It ripens unevenly and is reddish-black at



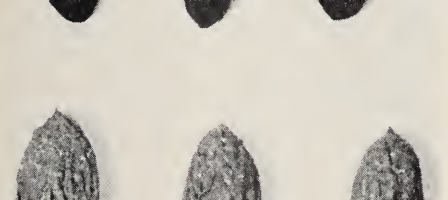
Lucques

Macrocarpa

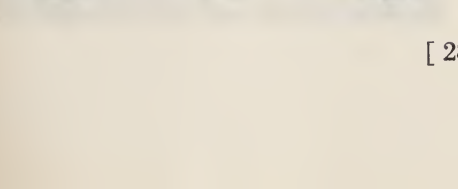
Manzanillo

Maurini

Menara



Mission



Morcal

medium-sized varieties

Yullutt

Zitoum

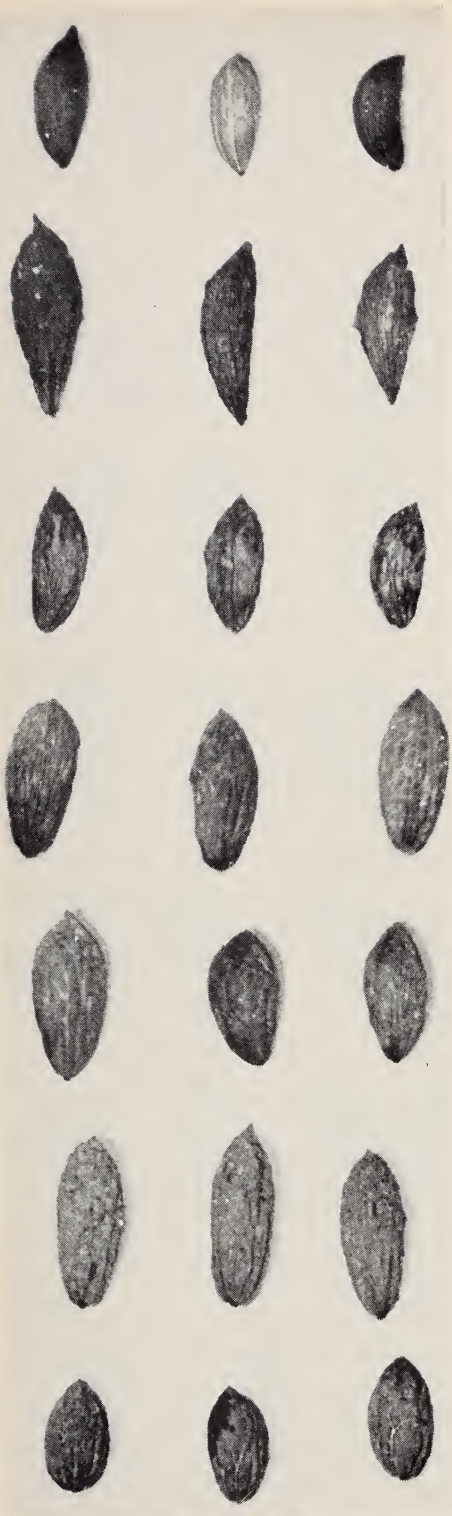
Bidh el Hammam

Dolce del Marocco

Gordo

Grossa di Spagna

Grosse Aberkan



Pits of medium-sized fruits

Nevadillo

Obliza

Pendulina

Rouget

Saiali Magloub

Saint Catherine

Salome

maturity, in November. The green fruit is regularly spotted with broad, whitish lenticels that become less pronounced toward maturity and finally disappear. The stigma is persistent.

The shape of the olive is variable—usually oval, but may be ovate or elongated and may be somewhat depressed on two sides. The base is usually rounded, often slanted; the apex is rounded; the stem-end cavity is narrow and quite deep.

The pit is large, variable in shape, erect, or prominently broad, protruding at one side—usually elongated oval. The base is broad as is the apex, the latter being slightly pointed. The surface is quite rough, especially toward the base.

This variety may have possibilities as a pickling olive for non-irrigated conditions.

NEVADILLO [Olivo Zorzaleno (9), Sir George Grey's Spanish]—Collected from Fall Brook.

Imported from Spain about 1885 (3, 13, 15), and now an established variety in California (fig. 16).

The tree is vigorous with spreading top. It has a slight tendency toward alternate bearing.

The fruit grows singly or in clusters on variably sized peduncles—usually medium to large. At maturity, in October, the color is shining velvet-black and the lenticels are obscure. The green stage of the fruit is followed by a yellowish-green one, which lasts a short time; the final stage of maturity commences at the apex-end with a reddish-purple shade and extends to the base-end; lenticels are prominent at this stage.

The shape of the olive is elongated-oval, slightly protruding at one side or slightly curved. The center is broadest; the base is narrow and rather slanted; and the apex usually tapers and is somewhat pointed.

The pit is medium in size and oblong, variably curved, somewhat twisted, or cylindroid, with one side slightly flat. The base is narrow and often pointed; the apex tapers, ending in a long, thick, sharp point—curved or straight. The surface is fairly smooth, crossed longitudinally by

Fig. 16. Nevadillo, from Oroville, California.

numerous very long, branched, and shallow furrows, extending to the apex end of the pit.

This variety is used at present for oil extraction but the trees are gradually being top-worked to pickling olives.

OBLIZA [Oblitza, Oblica (5)]—Collected from Strathmore.

Imported from Dalmatia about 1892 (15). It is grown at the present time in Yugoslavia (5). Very few trees are now found in California (fig. 17).

The tree is medium in size with prominently spreading top; the upper terminal shoots have an upright growth tendency. It bears good crops in most years.

The fruit sets singly or in clusters on variably sized peduncles. At maturity in November, the fruit is reddish-black. Small lenticels are conspicuous early in the season but are almost obscure at time of maturity.

Fig. 17. Obliza, from Strathmore, California.

The shape of the olive is irregularly ovate, usually slightly curved. The base-half is narrow with a tendency to become pointed; the apex-half is much wider than the base-half, distinctly protruding at one side and somewhat rounded or bluntly pointed at the end; the stem-end cavity is deep and prominent. The surface is rough with wart-like projections, more prominent on the apex-half; they may be scattered, or aggregated.

The pit is quite small and variable in shape—usually oblong, erect, or curved. The apex-half is much wider than the base-half, the latter being cylindroconical and prominently pointed at the end; the apex-end is usually rounded or tapered, frequently curved, terminating in a medium or long, thin, sharp point. The surface toward the base-half is smooth, densely crossed lengthwise by continuous, shallow furrows; the apex-half is variably warted.

This variety is believed by some growers to have commercial possibilities as a canning olive because of its good bearing characteristics.

PENDULINA—Collected at the California Agricultural Experiment Station, Davis.

Imported from France (3, 15) about 1880.

The tree at Davis is vigorous with a spreading top and upright terminal growth. The fruit drops from the trees prematurely.

The fruit is grown singly, rarely in twos or more, on variably sized peduncles. It matures in late October, becoming a bluish-black, with whitish lenticels quite prominent throughout the stages to maturity.

The shape of the olive is usually oval or elongated-oval, often slightly oblique. The base is rounded, rarely slanted. The apex is rounded or bluntly pointed.

The pit is medium in size, oblong and erect, cylindroid, or with the apex-half

much broader than the base. The apex tapers or is round, terminating in a small, thin, sharp point. The surface is rough, with numerous deep furrows—long and branched—scattered on the surface of the pit lengthwise from base to apex. In addition, it is dotted with deep cavities, more prominent in the center and apex-half.

This variety is strictly for oil production; most of the trees in the state have been top-worked to pickling varieties.

ROUGET [Rougette]—Collected at Vacaville.

Imported from France about 1890 (13) (fig. 18).

The tree is of medium size with a spreading top. It bears good crops regularly.

The fruit grows singly or in clusters and matures in November—becoming bluish-black. During maturation, the color change begins at the apex-end, attaining a reddish-purple shade. Lenticels are conspicuous at the green stage, but are obscure on the ripe fruit.

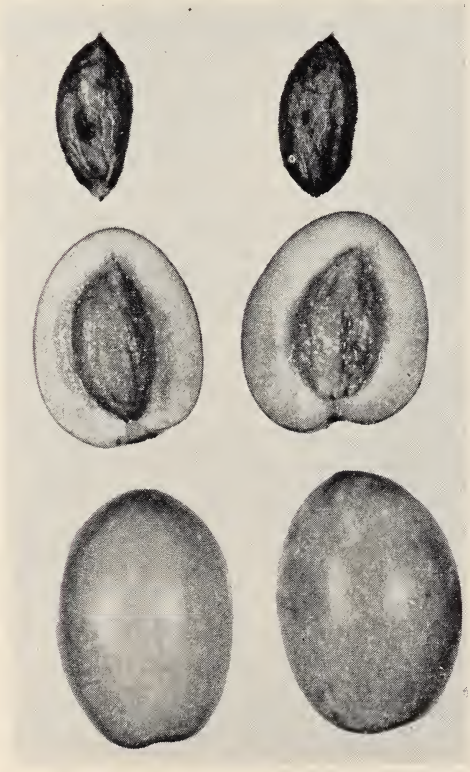


Fig. 18. Rouget, from Vacaville, California.

The shape of the olive is similar to that of Barouni—oval to elongated-oval, slightly protruding at one side. The base is broad, rounded, or somewhat truncated, and often slanted. The apex-half is wider than the base-half, rounded or slightly pointed. The stem-end cavity is deep and prominent.

The pit is large and oblong, cylindroid, or variably curved at the apex-end, often with the apex-half wider. It has much the same appearance as Barouni. The main furrows are not distinct on the base-half and often disappear entirely at the apex-half.

This variety may have some value as a canning olive. Its oil content is too low for use in oil production.

SAIALI MAGLOUB—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 12685.

Imported from Tunisia in 1905 [(5, 25) No. 11, p. 103].

The tree is of moderate size with an upright growth tendency and dense foliage. It bears good crops in most years.

The fruit grows singly, rarely in more than twos, on short- to medium-sized peduncles. It is black at maturity, in late September, with prominent bloom.

The shape of the olive is similar to that of Bidh el Hammam, with the exception of a narrower diameter and an earlier date of maturity.

The pit, too, is similar to Bidh el Hammam, though it is slightly longer and has a thicker point at the apex.

This variety may have some value as a canning olive.

SAINT CATHERINE [Santa Catarina (5)]—Collected from the Citrus Experiment Station, Riverside.

Imported from Adelaide, South Australia, in 1920 (28) by the U.S.D.A.

Division of Plant Exploration and Introduction. P.I. No. 50993. This variety is grown as a large-fruited olive throughout central Italy.

The tree at Chico bears good crops regularly.

The fruit ripens in November and is borne isolated or in twos, on short- to medium-sized peduncles.

The shape of the olive is elongated-oval, slightly protruding at one side. The base is somewhat variable, usually fairly broad. The apex is rounded or slightly pointed.

The pit is large, oblong, or erect, but generally curved at the apex-end. It is depressed at two of the sides, particularly toward the base, which is variable, usually broad or square, often rounded. The apex-half is broader than the base-half and is somewhat rounded, ending in a medium-sized, thin point. The surface is rough, the arrangement of the furrows and wart-like area on the apex-half being similar to that of Grossa di Spagna.

This variety may have value as a canning olive.

***SALOME*—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 50994.**

Imported from Adelaide, South Australia, in 1920 (28).

The tree is moderate in size, with a spreading top and narrow leaves. It bears fairly heavy crops in most years.

The fruit is borne singly, often in twos, on short peduncles. It matures in November. The ripe fruit is reddish-black with a prominent bloom. It has a true straw-color stage, at which time it is a light yellowish-green. The color change begins at the apex, attaining a red shade with prominent yellowish-green lenticels; these almost disappear at final maturity.

The shape of the olive resembles that of an oval Mission—erect, slightly depressed at two of the sides, with prominent ridges on each of the other sides. The base is usually broad, rounded, often slanted; the apex is round; the stem-end cavity is prominent.

The pit is medium in size and uniform in shape—erect, much shorter than that of a plump Mission, which it resembles somewhat, except that it is prominently depressed at two opposite sides. It is broad, being widest at the center. The base is rounded, rarely square or narrow; the apex tapers slightly, is fairly broad and rather flat on the two sides toward the end, terminating in a very short, thick point. The surface is crossed longitudinally with numerous long, well-branched, fairly smooth furrows; these are, however, more prominent at the sides paralleling the main ones that form the halves of the endocarp and extend over the whole surface of the apex-half. In the center of the base-half there is usually a smooth zone running longitudinally.

This variety has fruit too small for commercial pickling in California. It may be of some value, however, as an oil variety.

***YULLUTT [Yallut]*—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 105305.**

Imported from Damascus, Syria, in 1934 (32).

The tree, approximately 10 years old, bears fruit quite regularly.

The fruit grows on the inflorescence in much the manner of Macrocarpa and has the same sized peduncles. It matures in November.

The shape of the olive is similar to that of Macrocarpa, although slightly smaller.

The pit is the same shape as that of Macrocarpa, but is narrower and smoother and the furrowing extends over the surface as far as the terminal portion of the apex-half. The latter ends in a small, thin, sharp point.

This variety may be of value as a canning olive, although in California it appears to be rather susceptible to cold weather injury.

ZITOUM [Moroccan Picholine]—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 86754.

Imported from Marrakech, French Morocco in 1930, where it is the most commonly grown pickling variety (31).

The tree resembles Mission 26A except for minor differences. It bears fairly good crops.

The fruit is borne isolated, often in twos or threes, on medium to fairly long peduncles. The color at maturity, in November, is velvet-black with quite prominent, small, brownish lenticels.

The shape of the olive is very similar to that of Mission 26B.

The pit is rather large, uniform in shape—somewhat cylindroid, usually with a broad base.

This variety may be of value as a canning olive.

AND THESE ARE MINOR VARIETIES HAVING LARGE-SIZED FRUIT

AGHIZI SHAMI—Collected at the Citrus Experiment Station, Riverside.

Imported from Giza, Egypt, in 1940, by Professor W. V. Cruess (2, 6, 8). Experimental grafts of this variety have since been made in the major olive sections of California (fig. 19).

The tree has borne good crops consistently at Riverside and Lindsay.

The fruit is grown singly, often in twos or threes, on short- to medium-sized peduncles. At maturity in October it is reddish-black. The fruits color evenly.

The shape of the olive is round or oval, strongly protruding at one side, with a typical, pointed projection at the apex. The base is variably slanted or rounded; stem-end cavity is small and shallow.

The pit is of medium size, irregular, oblong, erect, protruding at one side. The base is variable—conical, narrow, or rounded; the apex is rounded, ending in a very long, thin, sharp point. This point is easily broken and can be observed only if the pit is carefully removed from the olive. The surface is crossed lengthwise by numerous branched, deep furrows—more prominent at the base-half and toward the sides. The two furrows forming the endocarp are not prominent. Occasional cavities can be found.

This variety can be pickled satisfactorily by the Spanish-green process. Cruess (6) has shown this variety to ferment and soften during ripe pickling, but with care, a firm, ripe-pickled fruit was obtained.

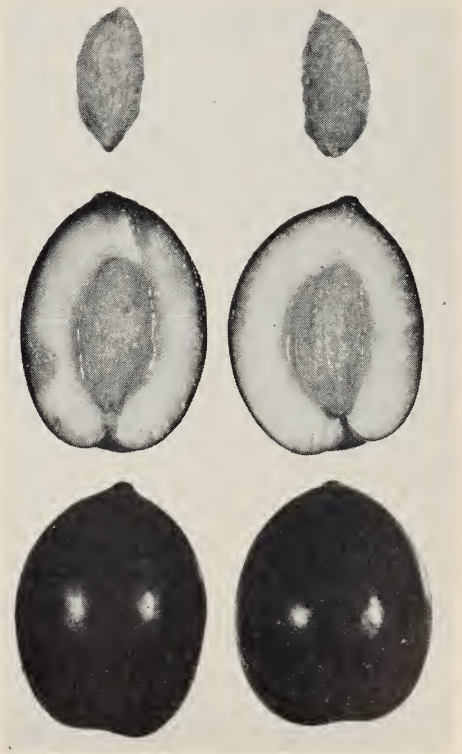


Fig. 19. Aghizi Shami, from Lindsay, California.

AMELLAU [Amenlaou, Amellenque (13, 21)]—Collected from Palermo.

Imported from France about 1885.

The tree is medium in size, with semi-erect main branches.

The fruit is similar to Bidh el Hammam. It is grown isolated, often in twos, rarely in threes, on medium-sized peduncles. It matures late in December or in January and the color of the ripe fruit is bluish-black, with conspicuous tiny whitish lenticels. Maturation is uneven on the various limbs of the same tree.

The shape of the olive is uniform—obovate, rather erect, fairly depressed on two sides, thus forming two prominent ridges. These run longitudinally from base to apex and are especially obvious before final maturity. The base is usually narrow, rounded, often truncated, or variably slanted; the apex is rounded; the stem-end cavity is fairly prominent.

The pit is large and uniform—oblong, erect, and prominently depressed on two sides. The apex-half is much broader than the base-half. The latter tapers strongly, ending in a narrow or pointed base. The apex tapers, ending in a small point.

This variety is unlikely to be of value for commercial canning because of its uneven maturity and the rough surface of the fruits.

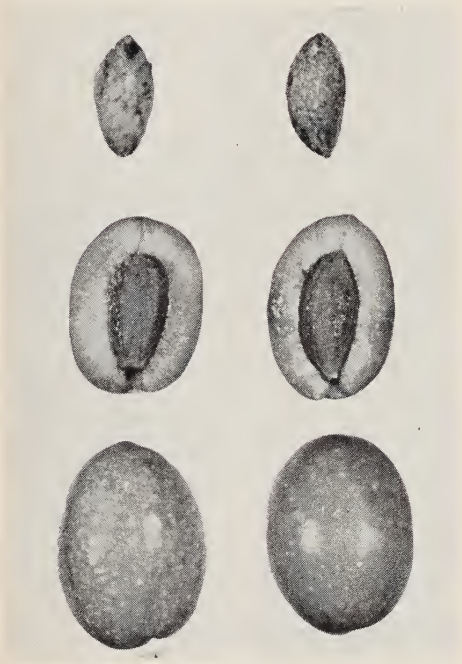


Fig. 20. Amellau, from Palermo, California.

BALADY [Baladi]—Collected from a graft on Mission rootstock at the Citrus Experiment Station, Riverside.

Imported from Giza, Egypt, in 1940, by Prof. W. V. Cruess (2, 6, 8) (fig. 21).

The tree bears good crops consistently at Riverside and Lindsay.

The fruit is grown isolated or in clusters on long peduncles, becoming bluish-black at maturity, in November. The color change begins at the apex-half and takes some time for completion.

The shape of the olive is ovate, variably protruding at one side, often with a prominent projection set laterally at the apex. The base usually slants.

The pit is variable in size and shape. It is usually short, slightly curved, and strongly protruding at one side, with the opposite side flat. The center is broadest, giving the pit a boat-shaped appearance. The base is narrow or slightly pointed, rarely rounded; the apex tapers somewhat, terminating in a small, thin, or thick, variably curved, sharp point. The surface is crossed longitudinally with numerous short and long, often branched, prominent furrows. The two furrows forming the halves of the endocarp are prominent.

This variety may be of value for pickling, behaving much like Mission (8) in processing and flavor.

CUCCO—Collected from the California Agricultural Experiment Station, Davis.

Imported from Italy about 1895 (14).

The tree is similar to the Sevillano—vigorous with a prominently spreading

top and lanceolate foliage. It is somewhat erratic in its bearing behavior. It has no advantage over the large-fruited varieties presently being grown in California.

The fruit grows isolated or in twos on short- to medium-sized peduncles. At maturity in November, it is velvet-black.

The shape of the olive is uniform—ovate, protruding at one side. The base is broad, with one shoulder variably raised. The apex-half tapers, terminating in a bluntly pointed or roundish apex. The stem-end cavity is narrow and fairly deep. The center and base-half are broadest. At the green stage, the olive is dotted with whitish, broad lenticels; these are not prominent at the final stage of maturity, however.

The pit is medium in size, and uniform in shape—rough, oblong, erect, or slightly curved at the upper half towards the apex end. It often protrudes at one side; otherwise, it is prominently depressed at two sides. The center is broadest. The base tapers, is narrow, or bluntly pointed; occasionally it is pointed, or broad and rounded. The apex-half is usually strongly tapered, terminating in a variably sized and shaped point—medium or small, thick or sharp, straight or curved, rarely absent. The surface of the pit is densely crossed longitudinally by long, branched, prominent furrows; the main furrows forming the halves of the endocarp are the longest, though only fairly prominent.

MACROCARPA—Collected from the California Agricultural Experiment Station, Davis.

Imported about 1890 (14, 15, 16).

The tree is vigorous with prominently spreading top. It bears good crops fairly regularly.

The fruit is grown isolated or in twos, rarely in threes, on short- to medium-sized peduncles. It matures in October, at which time it is black with faintly visible lenticels; the bloom is prominent.

The shape of the olive is oval to elongated-oval, almost erect and protruding at one side. The base is narrow, roundish or slanted, if observed from two of the sides. Observed from the other two sides, it seems somewhat broad or truncated. The apex is usually rounded, often bluntly pointed with a small projection set laterally at the apex. The stem-end cavity is narrow and deep.

The pit is large, oblong, erect, rather cylindroid, or slightly curved, especially toward the apex-end. The base-half is fairly broad, rounded at the end, but often tapers. The apex-half is broader than the base-half, almost conical, rather bluntly pointed at the end, somewhat curved, terminating in a small, thick, often sharp point. The surface is usually densely crossed longitudinally with long, branched, prominent furrows, except a portion toward the apex-end which is finely warted and a zone in the middle of the base-half, which is often smooth.

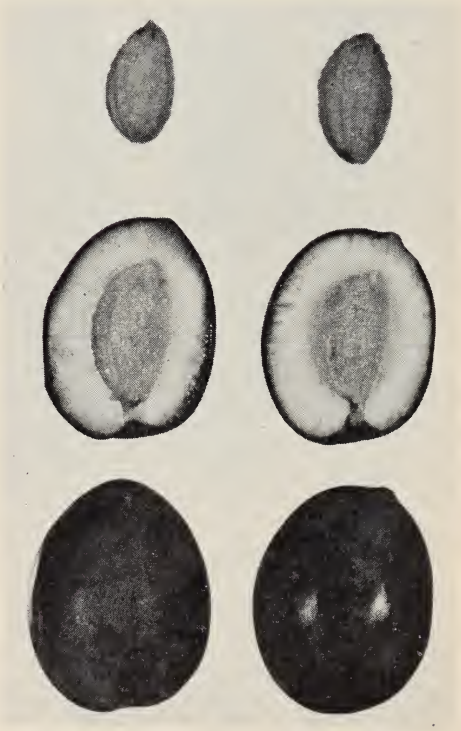


Fig. 21. Balady, from Lindsay, California.

These are the pits of large-fruited varieties

The olive pits shown in these photographs, as well as those shown on pages 18, 19, 28, 29, and 30, are, within a very small margin of error, actual size.

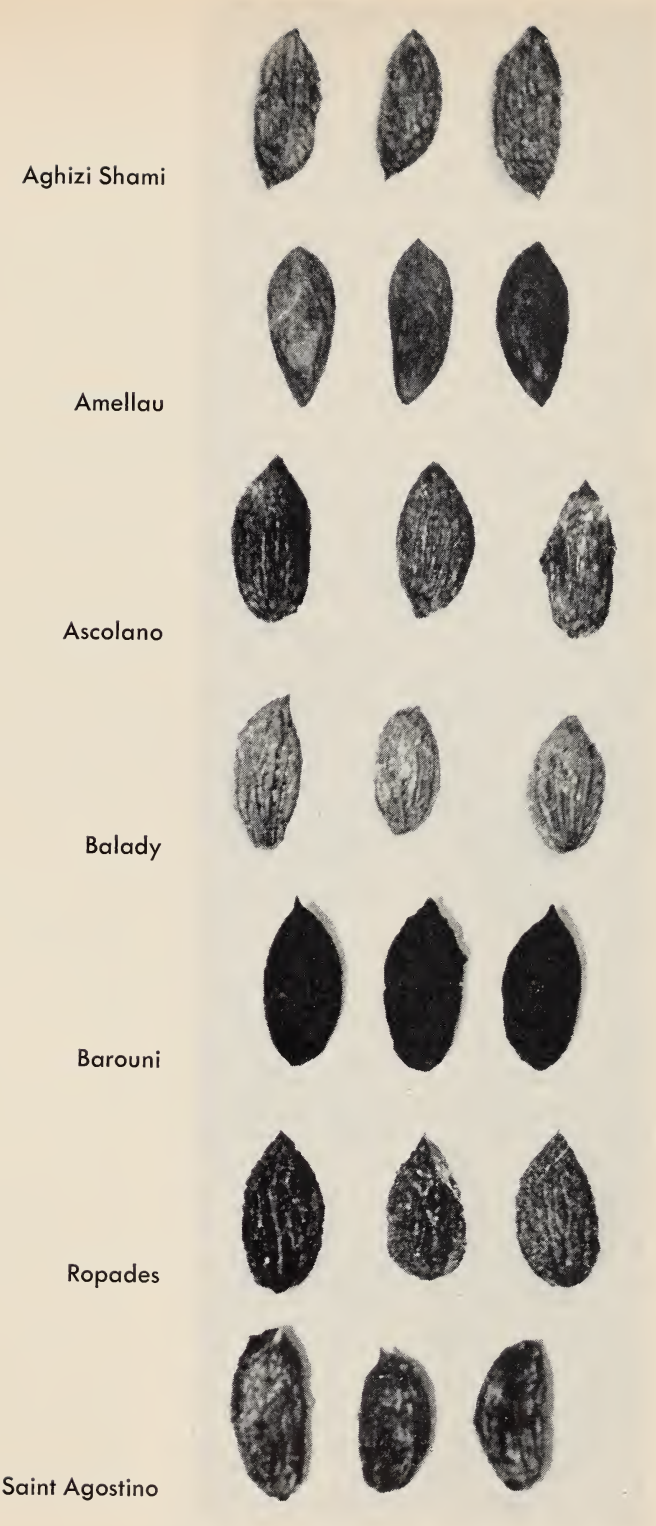
This applies to all photographs of individual fruit throughout the bulletin.

Cucco

Polymorpha

Tafahi

Sevillano


Aghizi Shami
Amellau
Ascolano
Balady
Barouni
Ropades
Saint Agostino

POLYMORPHA—Collected from the California Agricultural Experiment Station, Davis.

Imported from France about 1885, according to Klee (15).

The tree bears heavier crops than Macrocarpa in most years. It is of moderate size, about 15 feet tall, with a spreading habit of growth.

The fruit resembles that of Macrocarpa (15).

The pit also resembles that of Macrocarpa (15), though a conical base prevails in the Polymorpha pits.

This variety has been in California for many years, but has never been utilized commercially as a canning olive.

ROPADES—Collected from the U.S. D.A. Plant Introduction Garden, Chico. P.I. No. 66193.

Imported from the island of Mytiline, Greece (30), in 1926 (fig. 22).

The tree sets good crops regularly. Its characteristics are almost identical with those of Tafahi.

Fig. 22. Ropades, from Chico, California.

The fruit resembles the Tafahi, though it is larger and has a higher ratio of fruit to pit. It matures in late October.

The pit is practically identical with that of Tafahi.

This variety may have commercial possibilities for processing by the Spanish-green method, as indicated in tests conducted by the Lindsay Ripe Olive Company in 1946 and 1947 and by the Pacific Olive Company in 1948. It does not make a satisfactory product when processed by the black-ripe method because it fails to attain the desirable black color, remaining more of a grayish-brown. The flavor, too, is poor when processed by this method.

SAINT AGOSTINO [Olivo di S. Agostino]—Collected at Fair Oaks.

Imported from Italy about 1890. Very few trees are now in production in California. However, it is a standard pickling variety in Italy.

The tree attains a fairly large size, about 20 feet tall, with a growth habit similar to that of Ascolano. Its bearing habits in California are erratic.

The fruit is similar in appearance to Ascolano, although it is not quite as elongated.

The pit also resembles the Ascolano, although it also is less elongated. The surface of the pit is smooth in contrast to the rough surface of Ascolano.

TAFAHI [Tiffahi, Tefah (5, 23), Tefahi (21)]—Collected from the U.S.D.A. Plant Introduction Garden, Chico. P.I. No. 44709.

Imported from Fedimine, Egypt (27) in 1922. It is a common variety in North African olive-growing countries.

The tree bears crops regularly, blooming early in the season.

The fruit grows singly or in twos—rarely more—on large-sized, often com-

pound peduncles. The color at maturity in October, is bluish-black, with obscure lenticels and prominent bloom.

The shape of the olive is round, though often somewhat ovate. The base is broad, rounded; the apex is rounded; the stem-end cavity is prominent.

The pit is medium in size, rather variable in shape—usually cylindroconical, often erect, with a broad, rounded base and tapering apex that ends in a sharp, variably sized, straight point. The surface is densely crossed longitudinally with long, irregularly branched, prominent furrows and sharp ridges.

This variety is unsuitable for pickling by the California black-ripe process because of its failure to develop the required black color and its tendency toward undesirable softening and fermenting during the process (8). Without irrigation the fruits become shriveled.

IMPORTED VARIETIES NOW BEING TESTED ON MISSION ROOTSTOCK

The Division of Pomology of the University of California has brought scions of olive varieties from several Mediterranean countries between 1947 and 1950. These have been grafted to Mission rootstock at the University's Wolfskill Experimental Orchard, Winters, California. Varieties imported and successfully grafted, but not yet in bearing, are listed below under the country of origin. The descriptions are of their native characteristics and uses.

ALGERIA (*Importations in 1947*)

1. Bouchok is one of the common table olives in the province of Kabylie. The fruit is fairly long and terminates in a point. It is reported to be a good pickling variety.

2. Sigoise is the main olive variety grown in the Sig Valley, Algeria (5, 22). It is a fairly large olive with a small pit and is used for both oil and pickles.

CHILE (*Importations in 1950*)

1. Liguria is the main variety used in new plantings in Chile. The tree is large and vigorous and is grown for oil production. The fruit is small with an oil content of 17 to 20 per cent.

2. Azapa is a new variety grown in northern Chile. It is a table olive with fruits reported to be as large as the Sevillano.

CYPRUS (*Importations in 1949*)

1. Adrouppa produces large-sized fruits which are said to have a very high oil content. Cross-pollination gives better production.

2. Ascolano dura is a strain of the Ascolano variety and is well known in Italy. The flesh is not as tender as the Ascolano (Ascolano tenera) commonly grown in California. The fruits are medium to large in size. The trees bear fairly good crops.

3. Phinicoti ripens early and bears good crops consistently. It has a fairly large-sized fruit with an unusually small pit; the flesh to pit ratio is 10 to 1, on a fresh-weight basis. The tree is said to be resistant to olive scale. It is suited for the production of Spanish-green pickles.

FRANCE (*Importations in 1948*)

1. Grossane is used for pickling in various parts of France. It has fairly large fruits and is adaptable to different soil and climatic conditions.

FRENCH MOROCCO (*Importations in 1950*)

1. Meslala is a large-fruited table olive with a relatively low oil content. It is one of the main varieties grown in the Marrakech region.

2. Moroccan Picholine (Zitoum) is the leading variety of French Morocco.

It has an oil content of about 18 to 20 per cent.

3. Gordale, a large-fruited table olive, is a recent importation into French Morocco from Spain. It may be the same as the Sevillano.

GREECE (*Importations in 1947 and 1949*)

1. Carydolia is one of the large-sized pickling varieties grown in Greece. The weight of the fruit averages about 6 grams and is most suited for the Spanish-green type of pickles. It has about 14 per cent oil on a fresh-weight basis, and the flesh-to-pit ratio is 6.9 to 1 on a fresh-weight basis (1).

2. Tragolia is a small-fruited variety. Its principal use is for oil, averaging 27 per cent on a fresh-weight basis. The average weight of the fruit is 2.4 grams, and the flesh-to-pit ratio is 6.0 to 1 on a fresh-weight basis (1).

3. Vassiliki (Royal) has not yet been established as a commercial variety in Greece, although it is considered promising (20) there, suitable for making excellent-quality black and green pickles. The fruit is relatively large, oval in shape, with a fairly small pit. On a fresh-weight basis, the oil content is about 16 per cent and the flesh-to-pit ratio is 7.6 to 1 (1).

ITALY (*Importations in 1948 and 1950*)

1. Gigante di Cerignola was recommended along with Ascolano as valuable for exportations, according to a recent survey of olive varieties in Italy. The tree is said to be a shy bearer, requiring both irrigation and fertilization. It is quite susceptible to cold injury and peacock spot. The fruit resembles a prune in shape. The texture and flavor are reported to be excellent (6, 10); the flesh is tough. This olive is well adapted to processing.

2. Olivo a prugno is a table variety with fruits somewhat larger than Manzanillo and with a relatively small pit.

3. Santa Catarina, a pickling variety, is found generally throughout central Italy. The fruit is slightly smaller than the Ascolano, weighing about 9 grams.

4. San Francesco is a pickling variety grown in the Tuscany province of Italy.

5. Ascolano dura is a subvariety of the Ascolano. It has slightly smaller and less tender fruits.

JAPAN (*Importations in 1950*)

1. Verdale, originally a French variety. In that country it is commonly grown as one of the leading table olive varieties. It produces large fruit but is reported to be somewhat susceptible to cold injury.

PALESTINE (*Importations in 1947 and 1948*)

1. Merhavya, one of the leading table-olive varieties now being grown in Palestine, is a heavy, regular bearer (11), producing crops at 5 or 6 years of age. The fruit matures very early in the season, averaging 4.5 to 6.0 grams in weight. The flesh separates readily from the pit. Because of the relatively low oil content—10 to 17 per cent—the quality of the processed fruit is not considered high.

2. Nabali, one of the important varieties grown in Palestine (11), bears irregularly, alternating somewhat from year to year. The fruit is medium to large in size (about 27 × 18 mm) and is used for both pickling and oil. The oil content is relatively high—27 to 33 per cent.

3. Souri, the most common variety grown in Palestine (11), tends toward alternate bearing, but yields heavy crops. The mature tree is large and vigorous. The fruit is medium in size (about 15 × 22 mm) and is used for both pickling and oil extraction. The oil content is high—33 to 44 per cent.

PORTUGAL (*Importations in 1950*)

1. Galega is the most common variety of olive grown in Portugal. The fruit is

relatively small, weighing about 2 grams at harvest.

SICILY (*Importations in 1950*)

1. Ogliarola is one of the main varieties in Sicily. It produces abundantly and regularly if given good care. The tree is large but with rather small fruits.

2. Prunara is one of the common pickling varieties grown in Sicily.

SYRIA (*Importations in 1949*)

1. Jahlut (*Jallut*) is reasonably productive in Syria. The fruit is said to be larger than the Sevillano and to make an excellent-quality black-ripe olive.

2. Massabi is a large-fruited variety used in Syria principally for Spanish-green pickles.

3. Touffahi is reported to be an oil variety.

TUNISIA (*Importations in 1949*)

1. Barouni is the same table-olive variety that is grown in California. It is said not to be very productive in Tunisia.

2. Chemlali is an oil variety exclusively. There are about 10 million trees of this variety in Tunisia.

3. Chetoui is an oil variety grown widely in northern Tunisia. It is said to be very productive. The larger fruits are sometimes used for pickles.

4. Meski is reported to be a very good table-olive variety with a small pit and a large amount of pulp.

5. Ouslati is grown exclusively for oil production. The fruit is larger than that of the Chemlali.

6. Zarazi is one of the best table-olive varieties grown in Tunisia.

TURKEY (*Importations in 1948*)

1. Edremit is commonly cultivated in Turkey.

2. Hurma is one of the principal cultivated table-olive varieties in Turkey. It is generally used in green pickling processes (5).

3. Sam is an oil olive, bearing a fairly large fruit and yielding oil of good quality (5).

4. Tirilya is a commonly cultivated table olive in Turkey (5).

NOTE: Varietal tables developed during the work that went into preparation of this bulletin, together with an explanation of how the tables may be used, will be found on subsequent pages.

VARIETAL TABLES . . WHAT THEY MEAN AND HOW TO USE THEM

Samples of approximately fifty olive varieties were collected during the 1946 season. Each sample consisted of 100 fruits taken at random from a tree. No defective or abnormally small fruits were used. The following measurements were taken:

1. Length and width of the fresh fruit
2. Fresh and dry weights of the fruit
3. Length and width of the pit
4. Dry weight of the pit

The results are presented in tables 1, 2, and 3.

Oil content was determined by a modification of a method used with cottonseed (19). Tables 4 and 5 give data in percentages for the fresh and dry weights.

When more than one specimen of the same variety is listed, samples are of different strains, taken from trees in different orchards. Some of the processing difficulties may arise from the fact that various strains are all processed together. Bearing habits are summarized in table 6.

Place and date of collection. Olive fruits gradually increase in size until early winter. A record of the date and place of collection indicates the degree of maturity at the time of collection.

Color of fruit. As maturity proceeds, the fruit color changes from deep green to light green to straw color, cherry red, dark red, and finally black. Color, then, provides a valuable measure of degree of maturity and of oil content. The blacker the fruit, the higher the oil content.

Fresh weight of fruit. Moisture is constantly moving in and out of the fruit on the tree. Strong winds or lack of ir-

TABLE 1. SIZE AND WEIGHT MEASUREMENTS

Variety and specimen no.	Place and date of collection	Color of fruit	Mean fresh weight per fruit* (gms.)
Atroviolacea	Chico, Feb. 17, 1947	Black	1.38
Black Italian	Chico, Nov. 1, 1946	Straw	1.98
Bouquetier	Chico, Nov. 1, 1946	Cherry to straw	1.51
Bouteillon	Chico, Nov. 1, 1946	Black	1.77
Chemlali	Riverside, Nov. 22, 1946	Cherry to straw	0.76
Frantojo	Davis, Oct. 21, 1946	Black	1.32
Grappolo	Chico, Nov. 1, 1946	Cherry to straw	1.70
Late Blanquette	Chico, Nov. 1946	Cherry to straw	1.60
Lecci	Chico, Nov. 1, 1946	Cherry to straw	1.65
Lucca	Chico, Dec. 12, 1946	Black	2.43
Meslale	Chico, Nov. 1, 1946	Green	2.03
Moraioli	Chico, Dec. 12, 1946	Black	2.40
Redding Picholine	Winters, Nov. 11, 1946	Black	1.50
Rubra	Davis, Oct. 21, 1946	Black	1.98
Uvaria	La Habra, Oct. 25, 1946	Black	1.94

* Average of 100 fruits.
§ Standard error of the mean.

rigation may cause transpiration to exceed water uptake by the roots and thus lessen weight. Rains, fog, and cold weather may cause the fresh weight to fluctuate widely. This weight figure is used then to give only a general idea of the size of the fruit.

Length and width of fresh fruits. These size measurements give an indication of the shape of the fruit—long and narrow, or short and thick. Like fresh weights, the measurements fluctuate somewhat with the varying moisture level of the fruit. An olive fruit of some varieties, for example, shriveled from lack of water, may regain its turgor when water is added to the roots.

Dry weight of fruit. For comparison of varieties, this measurement is of great value. It is not affected by the fluctuating water content of the fruit.

Dry weight of pits. Since fruits with small pits are most desirable, this value permits comparison of varieties.

Ratio of flesh to pit. The olive with the highest ratio of flesh to pit is of course the most valuable economically.

Length and width of pits. These measurements give the actual size of the pit. The smaller the pit, the more desirable the fruit.

Oil in fruit on fresh-weight basis. This percentage is commonly used by growers in speaking of the oil content of olives. It has the disadvantage, however, of fluctuating according to the moisture content of the fruit. When olives shrivel severely in winter, a seeming—but not an actual—increase in oil takes place.

Oil in fruit on a dry-weight basis. Since there is no fluctuating moisture content in dry olives, this percentage is a more reliable one for comparing the oil content of several varieties.

Amount of fruit shriveled. If a large percentage of the fruit is shriveled—as it often is in midwinter—the oil content (fresh-weight basis) will be increased.

OF FRUITS AND PITS. (SMALL-SIZED FRUIT.)

Mean length of fresh fruit* (mm.)	Mean width of fresh fruit* (mm.)	Mean dry weight of fruit* (gms.)	Mean dry weight of pits* (gms.)	Ratio of flesh to pit (dry weight)	Mean length of pits* (mm.)	Mean width of pits* (mm.)
19.3±0.11§	11.5±0.06§	0.74	0.30	1.47 : 1	15.3±0.09§	6.5±0.10§
21.7±0.05	12.6±0.06	0.92	0.49	0.88 : 1	18.0±0.09	7.2±0.03
17.3±0.11	12.1±0.07	0.66	0.29	1.28 : 1	13.9±0.09	6.6±0.03
19.7±0.11	12.2±0.05	0.87	0.39	1.23 : 1	15.9±0.11	6.9±0.03
15.1±0.10	9.4±0.06	0.38	0.17	1.24 : 1	12.2±0.09	5.4±0.04
18.8±0.10	10.8±0.06	0.73	0.36	1.03 : 1	15.5±0.10	6.7±0.04
20.1±0.14	11.9±0.07	1.02	0.44	1.32 : 1	16.5±0.12	7.2±0.05
17.2±0.08	12.4±0.05	0.66	0.30	1.20 : 1	13.6±0.08	6.7±0.03
19.4±0.13	11.9±0.07	0.83	0.40	1.08 : 1	16.1±0.11	6.8±0.04
21.4±0.12	13.4±0.07	1.21	0.49	1.47 : 1	17.0±0.10	7.5±0.04
19.2±0.11	13.6±0.08	0.92	0.40	1.30 : 1	14.4±0.08	7.4±0.04
19.4±0.12	14.3±0.09	1.18	0.31	2.81 : 1	12.8±0.08	6.8±0.05
16.7±0.08	12.2±0.06	0.78	0.24	2.25 : 1	12.3±0.07	6.2±0.02
17.0±0.09	14.2±0.06	0.78	0.31	1.52 : 1	11.9±0.07	7.3±0.03
20.9±0.12	12.8±0.09	0.90	0.45	1.00 : 1	17.0±0.12	7.5±0.06

TABLE 2. SIZE AND WEIGHT MEASUREMENTS

Variety and specimen no.	Place and date of collection	Color of fruit	Mean fresh weight per fruit* (gms.)
Bidh el Hammam	Chico, Nov. 1, 1946	Straw	5.80
Dolce del Marocco	Chico, Nov. 7, 1946	Straw to cherry	3.45
Dolce del Marocco	Riverside, Oct. 26, 1946	Green	3.57
Gordo	Davis, Oct. 21, 1946	Green	3.05
Grosse Aberkan	Riverside, Oct. 26, 1946	Green	4.62
Grossa di Spagna	Chico, Dec. 12, 1946	Straw to cherry	5.91
Lucques	Vacaville, Dec. 10, 1946	Black	4.37
Macrocarpa	Davis, Oct. 21, 1946	Straw and cherry	5.70
Manzanillo	Davis, Oct. 21, 1946	Green	4.80
Maurini	Riverside, Oct. 26, 1946	Black	2.64
Menara	Chico, Dec. 13, 1946	Black	3.80
Mission No. 26A	Davis, Oct. 21, 1946	Mostly green	3.96
Mission No. 26B	Winters, Dec. 10, 1946	Black	6.27
Mission No. 26C	Vacaville, Dec. 10, 1946	Black	4.24
Morcal	Riverside, Oct. 26, 1946	Green	5.07
Nevadillo	Fall Brook, Oct. 29, 1946	Straw	2.70
Nevadillo	Chico, Dec. 12, 1946	Cherry	2.93
Obliza	Strathmore, Nov. 1, 1946	Straw	4.94
Pendulina	Davis, Oct. 21, 1946	Green	3.57
Rouget	Vacaville, Dec. 10, 1946	Straw to cherry	4.56
Saiali Magloub	Chico, Dec. 12, 1946	Black	5.84
Saint Catherine	Riverside, Oct. 26, 1946	Green	6.20
Salome	Chico, Dec. 12, 1946	Cherry	4.49
Yullutt	Chico, Nov. 1, 1946	Cherry	5.62
Zitoum	Chico, Dec. 12, 1946	Black	5.62

TABLE 3. SIZE AND WEIGHT MEASUREMENTS

Aghizi Shami	Riverside, Oct. 26, 1946	Cherry	9.57
Aghizi Shami	Lindsay, Oct. 28, 1946	Cherry	11.10
Amellau	Palermo, Dec. 12, 1946	Cherry	6.66
Ascolano No. 42A	Davis, Oct. 21, 1946	Straw	8.28
Ascolano No. 42B	Riverside, Dec. 19, 1946	Black	11.12
Ascolano (Asiolani) No. 42C	Chico, Nov. 1, 1946	Straw	7.62
Balady	Riverside, Oct. 26, 1946	Straw and cherry	8.58
Barouni	Chico, Nov. 1, 1946	Straw	7.42
Cucco	Davis, Oct. 21, 1946	Green	9.30
Polymorpha	Davis, Oct. 21, 1946	Green and straw	5.20
Polymorpha	Riverside, Oct. 19, 1946	Winey-black	8.86
Ropades	Chico, Nov. 1, 1946	Cherry	11.22
Sevillano No. 49A	Davis, Oct. 21, 1946	Green	9.68
Sevillano No. 49A	Davis, Dec. 1, 1946	Black	12.91
Sevillano No. 49B	Lindsay, Oct. 28, 1946	Straw and cherry	11.79
Sevillano No. 49C	Chico, Dec. 12, 1946	Black	11.33
Sevillano No. 49D	Riverside, Dec. 19, 1946	Black	17.81
Tafahi	Chico, Nov. 1, 1946	Straw	8.79

* Average of 100 fruits.
§ Standard error of the mean.

OF FRUITS AND PITS. (MEDIUM-SIZED FRUIT.)

Mean length of fresh fruit* (mm.)	Mean width of fresh fruit* (mm.)	Mean dry weight of fruit* (gms.)	Mean dry weight of pits* (gms.)	Ratio of flesh to pit (dry weight)	Mean length of pits* (mm.)	Mean width of pits* (mm.)
28.0±0.16§	19.7±0.12§	2.22	0.67	2.31 : 1	19.1±0.14§	9.0±0.05§
27.9±0.20	14.9±0.09	2.01	0.68	1.96 : 1	23.1±0.17	7.9±0.04
29.3±0.19	15.0±0.07	1.58	0.72	1.19 : 1	24.3±0.13	8.1±0.04
22.6±0.15	15.4±0.10	1.05	0.47	1.23 : 1	17.4±0.16	7.8±0.06
25.7±0.15	18.4±0.11	1.61	0.48	2.35 : 1	17.5±0.14	8.3±0.06
28.6±0.17	18.8±0.12	2.85	0.80	2.56 : 1	20.6±0.18	9.2±0.06
31.5±0.15	16.7±0.09	2.30	0.52	3.42 : 1	23.9±0.15	7.0±0.05
29.7±0.24	18.8±0.12	2.44	1.02	2.39 : 1	22.9±0.18	9.8±0.05
23.4±0.11	18.5±0.09	1.66	0.46	2.61 : 1	14.7±0.09	8.1±0.04
22.3±0.14	14.5±0.09	0.90	0.39	1.31 : 1	15.8±0.11	7.0±0.04
22.2±0.13	16.2±0.09	1.69	0.55	2.07 : 1	16.1±0.11	8.4±0.04
24.2±0.14	16.6±0.10	1.58	0.62	1.55 : 1	18.4±0.11	8.3±0.05
27.5±0.12	19.9±0.10	2.70	0.69	2.91 : 1	18.6±0.11	8.9±0.04
25.5±0.16	16.9±0.07	2.09	0.70	1.99 : 1	19.6±0.15	8.6±0.06
24.7±0.15	19.2±0.16	2.09	0.80	1.61 : 1	17.7±0.13	10.1±0.07
22.9±0.18	14.3±0.09	1.29	0.40	2.23 : 1	17.5±0.14	6.9±0.04
23.1±0.18	15.0±0.07	1.38	0.37	2.73 : 1	16.5±0.13	6.9±0.04
30.7±0.22	19.0±0.14	1.94	0.62	2.13 : 1	22.6±0.21	8.4±0.08
23.0±0.12	17.2±0.08	1.47	0.43	2.42 : 1	16.3±0.12	7.8±0.04
27.1±0.16	16.8±0.11	1.97	0.77	1.56 : 1	20.5±0.14	8.7±0.07
28.0±0.17	19.4±0.11	2.45	0.71	2.45 : 1	20.2±0.13	9.0±0.06
30.2±0.17	19.4±0.11	2.39	0.83	1.88 : 1	22.4±0.16	9.2±0.06
23.8±0.12	17.8±0.09	2.15	0.55	2.91 : 1	16.8±0.10	8.6±0.04
29.7±0.19	18.5±0.11	1.75	0.58	2.02 : 1	20.8±0.13	7.8±0.05
25.7±0.20	18.6±0.12	2.53	0.69	2.67 : 1	17.8±0.18	8.7±0.06

OF FRUITS AND PITS. (LARGE-SIZED FRUIT.)

33.1±0.22§	23.7±0.15§	2.39	0.70	2.41 : 1	¶ 19.9±0.16§	9.3±0.07§
35.2±0.21	24.5±0.15	2.53	0.70	2.61 : 1	21.3±0.16	8.2±0.07
29.4±0.16	20.4±0.09	2.81	0.71	2.96 : 1	20.7±0.13	9.0±0.06
30.9±0.24	21.5±0.17	2.80	0.81	2.46 : 1	20.8±0.17	9.1±0.07
31.9±0.36	26.0±0.18	4.19	0.93	3.51 : 1	18.3±0.17	10.3±0.09
31.2±0.27	20.9±0.15	3.30	0.81	3.07 : 1	21.1±0.27	8.8±0.06
30.4±0.18	23.2±0.16	2.46	0.71	2.47 : 1	19.3±0.14	9.4±0.06
30.0±0.17	20.8±0.11	3.04	0.98	2.10 : 1	21.8±0.14	9.8±0.06
33.1±0.18	21.5±0.19	2.92	0.96	2.04 : 1	24.0±0.17	10.2±0.10
28.8±0.15	18.2±0.15	1.86	0.71	1.62 : 1	21.3±0.15	8.6±0.06
33.2±0.22	22.3±0.13	3.34	1.04	2.21 : 1	24.0±0.17	11.4±0.13
31.1±0.16	26.0±0.12	3.37	1.00	2.37 : 1	20.4±0.14	10.7±0.06
34.3±0.29	22.9±0.25	3.18	1.30	1.45 : 1	20.6±0.26	11.3±0.11
35.6±0.18	26.8±0.15	4.76	1.69	1.81 : 1	25.2±0.19	12.4±0.07
.....	.....	....	1.41	....	24.8±0.24	11.4±0.10
33.6±0.15	24.9±0.12	3.89	1.03	2.80 : 1	22.7±0.14	10.5±0.06
37.4±0.30	30.5±0.22	5.26	1.59	2.31 : 1	24.3±0.26	13.2±0.13
28.9±0.19	23.2±0.14	2.61	0.89	1.93 : 1	20.4±0.15	10.4±0.09

¶ Does not include length of long point at apex of the pit.

TABLE 4. OIL CONTENT OF OLIVE VARIETIES. 1946.

Variety	Place and date of collection	Oil in entire fruit		Moisture content, per cent	Condition of fruit at time of oil analysis	
		Fresh-weight basis, per cent	Dry-weight basis, per cent		Color	Amount of fruits shriveled, per cent
Small-sized fruit						
Atroviolacea	Chico, Feb. 17, 1947	15.9	30.2	47.2	black	70
Black Italian	Chico, Feb. 17, 1947	19.6	35.3	44.5	black	45
Bouquetier	Chico, Feb. 17, 1947	16.8	34.8	51.8	95% black 5% cherry	50
Bouteillon	Chico, Feb. 17, 1947	18.3	36.5	44.7	90% black 10% cherry	0
Grappolo	Chico, Dec. 12, 1946	33.6	72.5	48.3	black	0
Grappolo	Lindsay, Dec. 10, 1946	15.5	35.5	56.2	39% straw 18% black 43% pink	50 (slt.)
Late Blanquette	Chico, Feb. 17, 1947	19.6	41.6	52.7	95% black 5% cherry	30
Lecci	Chico, Dec. 12, 1946	18.8	36.8	48.7	black	25 (slt.)
Lucca	Chico, Feb. 17, 1947	21.2	39.5	46.3	95% black 5% cherry	0
Meslale	Chico, Dec. 12, 1946	14.7	31.3	52.8	90% black 10% cherry	0
Moraioli	Chico, Feb. 12, 1947	32.0	46.1	30.4	black	100
Moraioli	Lindsay, Dec. 10, 1946	18.3	43.6	57.9	80% black 20% pink	0
Medium-sized fruit						
Bidh el Hammam	Chico, Dec. 12, 1946	20.6	49.2	57.9	black	8
Dolce del Marocco	Chico, Feb. 17, 1947	25.5	43.9	42.0	90% black 10% cherry	30
Grosse Aberkan	Chico, Feb. 17, 1947	23.4	47.9	51.2	black	40
Grossa di Spagna	Chico, Feb. 17, 1947	26.8	54.2	50.5	40% black 60% cherry	50

Lucques	Corning, Dec. 13, 1947	8.8	29.7	70.4	36% black 51% cherry 13% pink	0
Macrocarpa	Chico, Feb. 17, 1947	16.6	37.1	55.4	black	75
Manzanillo	Davis, Dec. 18, 1946	14.6	39.0	62.5	black	0
Maurini	Chico, Feb. 17, 1947	21.2	43.2	50.9	90% black 10% cherry	0
Maurini	Lindsay, Dec. 10, 1946	12.9	32.9	60.5	42% black 41% pink 17% green	0
Menara	Chico, Feb. 17, 1947	17.0	36.4	53.3	black	15
Mission	Oroville, Feb. 16, 1947	24.4	44.1	44.5	black	40
Mission	Corning, Feb. 18, 1947	24.3	42.2	42.4	black	50
Nevadillo	Oroville, Feb. 16, 1947	24.0	48.1	45.8	black	50
Nevadillo	Corning, Feb. 18, 1947	24.5	46.5	47.3	black	35
Nevadillo	Chico, Feb. 17, 1947	26.4	50.5	49.8	black	15
Saiali Magloub	Chico, Dec. 12, 1946	16.8	36.5	54.2	black	0
Saint Catherine	Chico, Feb. 17, 1947	20.8	42.0	50.5	85% black 15% cherry	20
Salome	Chico, Feb. 17, 1947	22.8	46.9	51.5	95% black 5% cherry	40
Yullutt	Chico, Dec. 13, 1946	12.5	34.5	63.8	black	25
Zitoum	Chico, Dec. 13, 1946	19.1	39.2	51.4	90% black 10% cherry	0
Large-sized fruit						
Aghizi Shami	Lindsay, Dec. 10, 1946	6.6	26.8	75.5	95% black 5% pink	0
Amellau	Palermo, Dec. 12, 1946	20.4	47.6	57.0	60% black 40% cherry	0
Ascolano	Chico, Feb. 17, 1947	18.8	47.5	60.3	black	80
Barouni	Chico, Dec. 12, 1946	18.5	40.7	54.6	84% black 16% cherry	40 (slt.)
Ropades	Chico, Dec. 12, 1946	10.3	31.4	67.2	black	(50 (slt.)
Sevillano	Lindsay, Dec. 19, 1946	11.7	35.3	68.4	black	75
Sevillano	Chico, Dec. 13, 1946	14.7	42.8	65.8	black	0
Tafahi	Chico, Dec. 13, 1946	12.5	35.2	64.4	black	0

TABLE 5. OIL CONTENT OF OLIVE VARIETIES. 1947.

Variety	Place and date of collection	Oil in entire fruit		Moisture content, per cent	Condition of fruit at time of oil analysis	
		Fresh-weight basis, per cent	Dry-weight basis, per cent		Color	Amount of fruits shriveled, per cent
Small-sized fruit						
Atroviolacea	Chico, Jan. 2, 1948	24.5	40.6	40.0	black	90
Black Italian	Chico, Jan. 2, 1948	18.4	33.7	45.2	black	0
Bouquetier	Chico, Jan. 2, 1948	21.5	42.7	49.5	50% black 50% cherry	75
Bouteillon	Chico, Jan. 2, 1948	18.7	31.5	40.5	black	15
Chemlali	Riverside, Dec. 12, 1947	27.5	49.2	48.2	black	40
Chemlali	Fresno, Dec. 17, 1947	26.2	44.9	41.4	black	5
Frantojo	Davis, Dec. 4, 1947	25.1	41.9	40.5	black	0
Grappolo	Chico, Dec. 8, 1947	23.0	44.3	48.0	black	0
Grappolo	Lindsay, Dec. 17, 1947	24.1	43.1	44.5	black	40
Late Blanquette	Chico, Jan. 2, 1948	23.7	41.6	43.1	black	70
Lecci	Chico, Dec. 8, 1947	20.0	42.6	53.2	black	5
Lucca	Chico, Jan. 2, 1948	27.7	49.7	44.4	cherry	50
Meslale	Chico, Jan. 2, 1948	20.0	36.6	54.7	black	15
Moraioli	Lindsay, Dec. 17, 1947	30.2	55.1	45.2	black	0
Redding Picholine	Winters, Dec. 9, 1947	14.6	28.9	49.6	black	0
Rubra	Davis, Dec. 2, 1947	14.7	33.7	56.4	black	0
Medium-sized fruit						
Bidh el Hammam	Chico, Dec. 8, 1947	20.5	49.2	58.5	black	0
Dolce del Marocco	Chico, Dec. 8, 1947	25.1	44.7	44.0	40% black 60% cherry	5
Grosse Aberkan	Chico, Jan. 2, 1948	23.3	45.3	48.5	black	75
Grossa di Spagna	Chico, Dec. 8, 1947	26.5	51.1	48.2	cherry	95
Lucques	Vacaville, Dec. 12, 1947	22.6	50.5	55.3	black	3
Macrocarpa	Davis, Dec. 4, 1947	14.4	29.1	50.5	black	0
Manzanillo	Vacaville, Dec. 12, 1947	25.5	49.4	48.6	black	0
Manzanillo	Davis, Dec. 29, 1947	19.3	44.8	59.8	black	50
Manzanillo	Corning, Dec. 8, 1947	22.0	43.6	49.2	black	0

Maurini	Chico, Dec. 8, 1947	21.8	46.2	52.7	black	100
Maurini	Lindsay, Dec. 17, 1947	25.2	50.1	50.0	black	90
Menara	Chico, Jan. 2, 1948	18.1	42.4	57.5	60% black 40% cherry	5
Mission	Bangor, Jan. 5, 1948	19.1	42.9	55.0	black	5
Mission	Winters, Dec. 5, 1947	19.4	45.5	56.5	black	0
Mission	Oroville, Jan. 2, 1948	22.3	43.5	49.0	black	0
Mission	Davis, Jan. 2, 1948	21.3	42.2	49.5	black	90
Morcal	Riverside, Dec. 12, 1947	16.2	41.4	61.0	black	30
Nevadillo	Oroville, Jan. 4, 1948	26.0	48.8	46.5	black	90
Obliza	Strathmore, Dec. 17, 1947	20.1	42.0	52.2	black	100
Pendulina	Davis, Dec. 5, 1947	22.0	50.9	56.5	reddish-black	0
Rouget	Vacaville, Dec. 17, 1947	15.2	37.3	59.3	black	90
Saiali Magloub	Chico, Dec. 3, 1947	19.6	44.9	56.3	black	0
Salome	Chico, Jan. 2, 1948	21.6	44.3	51.3	black	60
Saint Catherine	Chico, Jan. 2, 1948	27.7	48.4	42.8	cherry	50
Yullutt	Chico, Jan. 2, 1948	10.8	35.9	69.1	black	50
Zitoum	Chico, Jan. 2, 1948	23.9	42.2	49.4	black	15
Large-sized fruit						
Aghizi Shami	Riverside, Dec. 12, 1947	8.8	31.0	72.0	black	40
Balady	Riverside, Dec. 12, 1947	10.7	31.9	66.2	black	30
Barouni	Chico, Dec. 8, 1947	18.1	37.1	51.1	black	40
Barouni	Corning, Dec. 8, 1947	12.9	30.0	57.5	50% black 50% dark red	3
Cucco	Davis, Dec. 2, 1947	14.1	34.1	57.5	50% black 50% cherry red	90
Polymorpha	Davis, Dec. 29, 1947	13.9	33.4	58.4	60% black 40% cherry red	90
Ropades	Chico, Dec. 8, 1947	6.6	24.8	73.5	black	0
Saint Agostino	Fair Oaks, Feb. 1, 1949	17.5	37.3	53.1	50% brown 25% black 25% reddish-black	100
Saint Agostino	Palermo, Feb. 10, 1949	20.4	45.3	55.0	50% black 25% brown 25% red and green	100
Sevillano	Chico, Dec. 8, 1947	16.8	46.1	63.5	black	25
Tafahi	Chico, Dec. 8, 1947	7.9	25.8	70.5	black	50

TABLE 6. BEARING HABITS OF OLIVE VARIETIES.

Variety	Location	Amount of fruit set						
		1941	1945	1946	1947	1948	1949	1950
Small-sized fruits								
Atroviolacea	Chico	.....	light	heavy	light	heavy	medium	light
Black Italian	Chico	.....	heavy	medium	heavy	heavy	heavy	medium
Bouquetier	Chico	.....	none	heavy	none	heavy	none	heavy
Bouteillon	Chico	.....	medium	heavy	none	medium	medium	medium
Frantojo	Davis	.....	none	heavy	light	medium	heavy	light
Grappolo	Chico	light	heavy	medium	light	heavy	light	heavy
Late Blanquette	Chico	.....	heavy	heavy	medium	none	heavy	none
Lecci	Chico	heavy	medium	heavy	none	heavy	none	heavy
Lucca	Chico	.....	light	heavy	light	heavy	medium	heavy
Meslale	Chico	.....	heavy	medium	heavy	medium	heavy	medium
Moraioli	Chico	.....	heavy	none	heavy	none	heavy	medium
Redding Picholine	Winters	.....	medium	medium	medium	medium	medium	medium
Rubra	Davis	.....	heavy	heavy	heavy	heavy	heavy	heavy
Medium-sized fruits								
Bidh el Hammam	Chico	medium	medium	heavy	medium	heavy	medium	light
Dolce del Marocco	Chico	none	medium	heavy	heavy	none	heavy	light
Gordo	Davis	.....	none	heavy	none	heavy	none	heavy
Grosse Aberkan	Chico	heavy	light	heavy	none	heavy	medium	heavy
Grossa di Spagna	Chico	heavy	light	medium	medium	medium	medium	light
Lucques	Vacaville	.....	.....	medium	.....	heavy	heavy	heavy
Macrocarpa	Davis	.....	medium	medium	medium	light	heavy	medium
Manzanillo	Davis	.....	medium	heavy	light	heavy	light	heavy
Maurini	Chico	.....	heavy	heavy	heavy	heavy	medium	heavy
Menara	Chico	heavy	heavy	medium	light	heavy	none	medium

Mission	Davis	.....	none	medium	medium	medium	heavy	light
Nevadillo	Chico	.....	heavy	heavy	light	medium	light	heavy
Obliza	Strathmore	.....	heavy	heavy	heavy	heavy	medium	.....
Pendulina	Davis	.....	heavy	light	medium	medium	heavy	none
Rouget	Vacaville	.....	.....	heavy	heavy	heavy	heavy	heavy
Saiali Magloub	Chico	heavy	heavy	heavy	heavy	medium	heavy	none
Saint Catherine	Chico	.....	heavy	heavy	heavy	medium	medium	medium
Salome	Chico	.....	light	heavy	heavy	heavy	light	heavy
Yullutt	Chico	light	medium	heavy	medium	.....	medium	medium
Zitoum	Chico	medium	medium	medium	light	heavy	light	light
Large-sized fruits								
Aghizi Shami	Lindsay	.....	.....	.....	medium	heavy	medium	heavy
Ascolano	Davis	.....	heavy	medium	heavy	medium	medium	medium
Ascolano (Asiolani)	Chico	medium	.....	medium	light	medium	none	medium
Balady	Lindsay	.....	.....	.....	medium	heavy	medium	heavy
Barouni	Chico	heavy	.....	.....	heavy	heavy	heavy	medium
Cucco	Davis	.....	medium	medium	light	heavy	light	heavy
Polymorpha	Davis	.....	heavy	heavy	light	heavy	heavy	heavy
Ropades	Chico	light	heavy	medium	medium	heavy	medium	medium
Sevillano	Davis	.....	medium	light	light	heavy	medium	light
Sevillano	Chico	medium	.....	.....	light	medium	medium	medium
Tafahi	Chico	medium	heavy	light	heavy	medium	medium	light

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