

The Major Citrus Cultivars in Spain

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CITRUS AREAS: SURFACES AND PRODUCTION

Most of the citrus fruit are grown in two regions of Spain: a) the Levante area, which extends along the East coast and includes the provinces of Castellón, Valencia, Alicante, and Murcia, with about 80% of the total plantations; and b) the Andalusian area, with plantings both along the Guadalquivir river in the provinces of Córdoba and Sevilla, and near the coast, mainly in the provinces of Huelva, Málaga, and Almería, the area representing about 15% of the country's total (4). The rest of citrus area is scattered in many other provinces of Spain (4), mostly near the coast (Fig. 1). Plantings of citrus by varietal groups are listed in Table 1 (5).

With respect to the location of production of citrus fruits by groups of varieties (Table 2), most of the sweet oranges and mandarins are grown in the Valencia region (Valencia, Castellón, and Alicante provinces), while lemons are produced mainly in Murcia. The total production is over 3×10^6 t (8).

CULTIVARS

Distribution of varieties according to production is shown in Fig. 2. The following describes the present situation in more detail (Table 3).

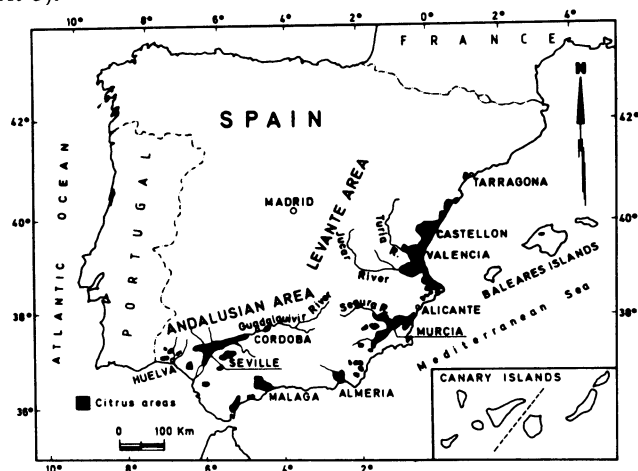


Fig. 1. Geographical location of the citrus areas in Spain.

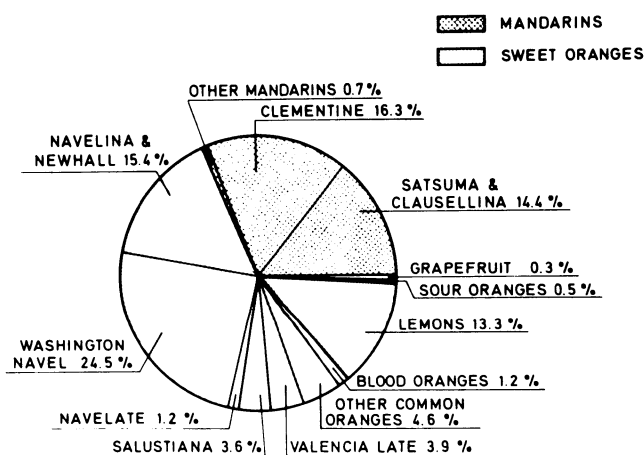


Fig. 2. Varietal distribution of Spanish Citrus fruits (1980-85 seasons average).

Sweet oranges [*Citrus sinensis* (L.) Osbeck]. These comprise the main group of citrus with the following subgroups:

a) Navel oranges. These include the early, 'Navelina' and 'Newhall', midseason, mostly 'Washington navel' and with minor importance 'Thomson', and late, 'Navelate'. Navels represent Spain's main production of sweet oranges and more than 40% of the total citrus.

b) Common oranges. The main common oranges are 'Salustiana' and 'Valencia late'. The rest include 'Comuna', 'Cadenera', 'Castellana', 'Berna', and other less important varieties.

c) Blood oranges. Although with less planted than some years ago, this group still has significant production, the main varieties being 'Doble fina', 'Entrefina', and 'Sanguinelli'.

Mandarins. The following subgroups are considered:

a) Satsumas [*C. unshiu* (Mak.) Marc.]. The main cultivar is 'Owari', which accounts for most of the production of satsumas. 'Clausellina', the first mandarin cultivar to reach the markets, is also important because of early maturity.

b) Clementines [*C. clementina* Hort. ex Tanaka]. 'Oroval', 'Fina', and 'Clemenules' are the main clementine cultivars presently grown. There are also early cultivars of minor importance and potential interest, such as 'Marisol', 'Esbal', 'Tomatera' and 'Arrufatina', and late types, 'Hernandina' and 'Clementard'.

c) Other mandarins and mandarin hybrids. Besides the two mentioned groups, there are minor plantings of the old 'Común' or 'Willowleaf' (*C. deliciosa* Ten.), a seedy mandarin, and the hybrids 'Wilking' and 'Kara'. Recently 'Nova', 'Fortune', and others have been introduced. Botanical nomenclature of these cultivars can be found in a recent paper (6).

Lemons [*C. limon* (L.) Burm. f.]. The two main cultivars are 'Verna', which accounts for about 75% of the production and 'Fino' with about 20%. Also, the foreign varieties 'Eureka', 'Lisbon', and 'Villafranca' are grown in some of the recently established orchards.

Other citrus varieties. Sour oranges (*C. aurantium* L.) are grown in the Andalusian area, near Sevilla, the main cultivar being the so called 'Sevilla'. The production is around 20,000 t per year. Grapefruits (*C. paradisi* Macf.) are also grown in several places, 'Marsh' and 'Redblush' being the predominant varieties. Production is low, about 10,000 t per year.

Table 1. Plantings of citrus in Spain by varietal groups.

Varietal group	Plantings	
	area (10 ³ ha)	%
Sweet oranges	125	53
Mandarins	58	25
Lemons	48	20
Other	5	2
Total	236	

Table 2. Production of citrus in Spain^a.

Area	Production (10 ³ t)			
	Sweet oranges	Mandarins	Lemons	Others
Levante				
Valencia, Castellón, and Alicante	1421.1	928.9	155.3	8.4
Murcia	64.2	19.6	201.2	0.7
Andalusian	260.5	30.2	78.1	19.7
Other	54.4	21.7	11.7	0.3
Total	1800.2	1000.4	446.3	29.1

^aAverage 1980 to 1985 seasons.

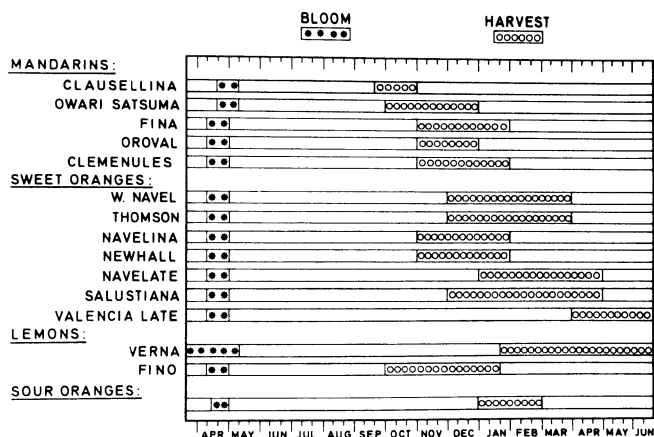


Fig. 3. Blooming and harvesting periods of Spanish citrus varieties.

ROOTSTOCKS

Since the outbreak of tristeza, tolerant rootstocks have been used for mandarins and sweet oranges, although the amount of citrus plantings on sour orange is still important. The principal rootstocks for sweet oranges and mandarins, at the present time are 'Troyer' and 'Carrizo' citranges [*C. sinensis* (L.) Osb x *Poncirus trifoliata* (L.) Raf.] and Cleopatra mandarin (*C. reshni* Hort. ex Tan.) For lemons, sour orange and *Citrus macrophylla* Wester are mainly used (3).

BLOOMING AND HARVESTING PERIODS

Most of citrus blooms between 15 Apr. and the end of the month, with slight variations according to climate and latitude. Satsumas bloom about 10 days later and 'Verna' lemons have a longer flowering period that extends from the end of March to the first part of May (Fig. 3).

Harvesting periods for the main cultivars are shown in Fig. 3. Within the mandarin group, satsumas are picked from October to the end of the year, although 'Clausellina' harvest is completed no later than the end of October. Clementines come afterwards, their harvest being completed by the end of January. The navel group extends from November to the end of April with different cultivars, while 'Salustiana' and 'Valencia' slightly overlap, covering the months

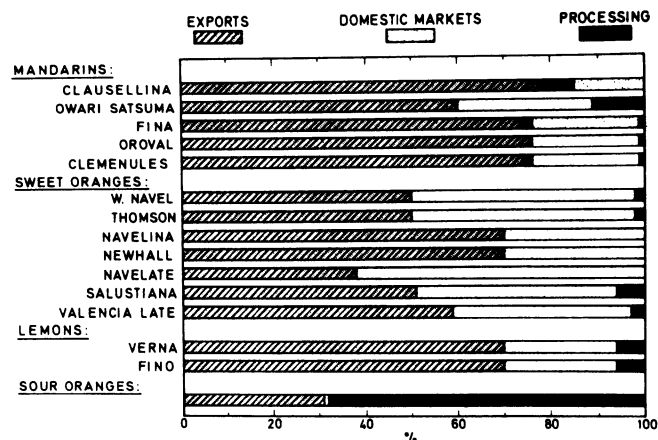


Fig. 4. Destination of Spanish citrus varieties.

of December to June. 'Verna' lemons main crop is harvested from February to June and a second crop ("rodrejos"), not shown in Fig. 3, is harvested from the end of August to October; 'Fino' is harvested from October to the end of January. Finally, sour oranges are picked in January and February. At the present time, there is a tendency to grow early and late cultivars, mainly of clementines, in order to expand the production period. (1, 2).

FRUIT DESTINATION

On the whole, about 60% of Spain's citrus production is exported, mostly to France, Germany, the United Kingdom, and some other European countries. Less than 10% of the production is processed and the rest, 30%, is domestically marketed.

Destination of fruit of the main cultivars is shown in Fig. 4. The data show that for all mandarins, lemons, and sweet oranges, with the exception of 'Navelate', 50% or more of the production is exported. Sour oranges are mainly processed, and 10% of 'Owari' is processed as canned segments. For the rest of the cultivars, only second class fruit or over production is destined for processing.

CLIMATE

Citrus is grown mostly in the coastal areas of Spain and in the basins of the Guadalquivir and Segura rivers (Fig. 1). The latitude

Table 3. Fruit characteristics of the main citrus cultivars grown in Spain.

Groups and cultivars	External color	Shape	Size (mm) ^a	Rind thickness (mm)	Segments ^a (no.)	Pulp color	Juice ^a (%)	TSS ^a in juice (%) ^a	TA ^a in juice (%) ^a	Seeds ^a (no.)
Mandarins										
Clausellina	light orange	oblate	55	2.5-3.0	10	deep orange	50	9.5	1.5	0
Owari	light orange	oblate	55	2.5-3.5	10	deep orange	48	9.5	1.2	0
Fina	reddish	oblate	50	2.5-3.0	9-10	deep orange	45	11.0	1.0	0
Oroval	reddish	oblate	56	2.5-3.5	8-9	deep orange	48	11.0	1.0	0
Clemenules	deep orange	oblate	56	2.5-3.5	9-10	deep orange	45	11.0	1.0	0
Sweet Oranges										
Washington navel	deep orange	globose	82	4.5-5.5	10-11	orange	45	12.0	1.0	0
Thomson	deep orange	globose	80	4.0-4.5	10-11	orange	42	12.0	1.0	0
Navelina	deep orange	globose	78	4.0-5.0	10-11	orange	45	12.0	1.0	0
Newhall	deep orange	globose	78	4.0-5.0	10-11	orange	45	12.0	1.0	0
Navelate	deep orange	globose	74	4.0-4.5	9-10	orange	48	12.0	1.0	0
Salustiana	deep orange	globose	72	4.0-5.0	10-11	orange	50	10.0	1.0	0
Valencia late	deep orange	globose	71	4.5-5.5	10-11	orange	50	10.0	1.0	0
Lemons										
Verna	light yellow	ellipsoid	60-65	6.0-6.5	9	light yellow	30-33	7.6	6.0	3-4
Fino	yellow	ellipsoid	55-60	5.5-6.0	10	light yellow	35-38	8.8	6.6	8-9
Sour Oranges										
Seville	reddish	oblate	75-85	8.0-9.0	10-11	orange	30	9.0-10.0	5.0	25-30

^aAverage per fruit

^aTSS = Total soluble solids

^aTA = Total (titratable) acid

of Spanish citriculture lies between 36°N and 40°N, although some plantings are located outside this zone. Summers are dry and hot in the citrus area, with a maximum average temperature around 25° to 27°C in August. Winters are rather dry and cool, the minimum temperature usually occurring in January with an average temperature of 10° to 12°. Some frost hazard exists. Rainfall is around 460 mm per year in Valencia, 320 mm in Murcia, and 640 mm in Sevilla with variations in some microclimates. The low and irregular distribution of rainfall makes irrigation a usual practice in almost all of the citrus areas (7).

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Major Commercial Citrus Varieties of the United States

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HISTORY

Citrus was introduced to Florida by the early Spanish explorers more than 400 years ago, and to Arizona and California about 200 and Texas about 150 years later by Spanish missionaries. Some of the varieties grown today are selections from seedlings planted by these early Spanish explorers and missionaries. Production was confined largely to local use until the development of effective rail transportation beginning about 100 years ago.

Citrus production in the United States, mostly oranges, was less than 10,000 t in 1883. Citrus were grown largely in Florida, but rapid expansion of plantings were beginning in California and elsewhere. Production peaked at nearly 15×10^6 t in 1979-80, but declined to about 9.5×10^6 t in 1984-85, largely as a result of a series of severe freezes in Florida and Texas in 1981-86.

DISTRIBUTION

The data in Table 1 provide a perspective on the rank the United States currently occupies among citrus producing countries of the world. In orange production, the United States is second to Brazil; in white grapefruit it is first; in lemons second; but in the production of mandarins and their hybrids it ranks fifth.

In the United States, almost two-thirds of the commercial citrus plantings occur in Florida with about 231,000 bearing ha in 1985, while California had 103,000 ha; Arizona, 15,400 ha; and Texas, 12,400 ha. At one time, there was a significant acreage of citrus extending along the gulf coast from the Florida panhandle through Alabama, Mississippi, and the Louisiana Delta. However, in these areas, except Louisiana south of New Orleans, citrus have been eliminated or severely reduced by freezes and other problems over the years. There is a small amount of citrus in Hawaii and Puerto Rico, where fruit is grown mostly for local consumption. Total citrus plantings in the United States, which in 1985 was about 361,600 ha, has declined by about 120,000 ha since 1975, due to freezes, urbanization, and other factors.

UTILIZATION

Climatic, marketing, and other conditions favor the production of citrus for the fresh fruit market in the western United States, and for the processed market in Florida. As shown in Table 2, for example, about 22% of the oranges grown in California and Arizona

were processed in the 1984-85 season, while about 94% of the oranges grown in Florida and two-thirds of the grapefruit were processed. There are certain technical problems in processing pigmented oranges and grapefruit, as well as unpigmented navel oranges that, until recently, have had a negative influence on the planting of such varieties, especially in Florida. A major portion of specialty cultivars like 'Temple', 'Dancy' tangerine, and various tangelos are sold mostly as fresh fruit. Somewhere between 40%

Table 1. U.S. and world citrus production.

1983-84 ²	
Country	Production (10 ³ t)
<i>Oranges</i>	
Brazil	9942
United States	7025
Italy	1752
<i>Mandarins + Hybrids</i>	
Japan	3239
Spain	1123
Brazil	405
<i>Grapefruit</i>	
United States	2606
Israel	534
Argentina	148
<i>Lemons</i>	
Italy	770
United States	741
Spain	517

²USDA Agriculture Statistics (1984).

Table 2. Utilization of U.S. citrus.²

Cultivar group	Processed, 1984-85			
	Florida	California (%)	Arizona	Texas ³
All oranges	94	22	21	41
Valencia	95	32	---	---
Navel	21	12	---	---
Grapefruit	66	30	28	30
Lemons	---	53	60	---
Limes	40	---	---	---

²Florida Agricultural Statistics, Citrus Summary 1985. Fla. Agr. Stat. Serv.

³1982-83 season data used because of subsequent severe freeze damage.

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