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DESCRIPTION OF IMPORTANT CITRUS VARIETIES
GROWN IN LEBANON

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DESCRIPTION OF IMPORTANT CITRUS VARIETIES GROWN IN LEBANON

by

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Citrus fruits have constituted Lebanon's number one export cash crop for many years. The crop is grown along the coastal plain and occupies an area of about 9,500 hectares. A number of Citrus fruits are cultivated in Lebanon, however there has been no detailed description of varieties performing under local growing conditions.

This study was undertaken to bring out the characteristics of the 13 most important Citrus fruits. The fruits were divided into four groups namely, oranges, lemons, mandarins and miscellaneous.

At least twenty fruits purchased from two sources were used for each description. The description was done after the outline prepared by H.J. Webber⁺⁺

Percent juice was calculated on a weight basis, percent sugars were determined by the use of a refractometer and total acids were determined by titrating against a solution of 0.077 N Na OH.

Description of Varieties

I. THE SWEET ORANGES

1. Shammouti Orange

Fruit color: orange, flushed on side; surface: finely pitted, glossy, ribs and furrows none; shape: obovoid; size: medium, diameter 70 mm., height 80 mm., D/H (Diameter by height), average 1.1; base: rounded, basal area narrow, average diameter 16 mm., even; calyx: even, medium irregularly divided, long divisions, sharp pointed, medium, tips persistent; stem: medium;

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++ Webber, H.J. 1948. The Citrus Industry Vol. I, Chapter V. Edited by H.J. Webber and L.D. Batchelor. The Univ. of Calif. Press. Berkeley and Los Angeles.

apex: rounded; navel; absent; areole: inconspicuous, areolar area average diameter 14 mm., slightly depressed, surface very smooth, oil glands absent; styler scar: present, small, diameter 1 mm., depressed in small apical pit, dry; rind: medium thickness, average in median cross section 6 mm., leathery, medium to puffing, none adherence; primary oil glands: average diameter parallel to surface 1.0-1.2 mm.; oil: medium, mild, pleasant; glandular layer: medium, percent thickness of rind 22, tissue of glandular layer oil stained, orange in color; mesocarp (albedo): medium thickness, ivory white in color; axis: in median cross section round, sometimes rectangular, irregular, average mid-diameter 8 mm., average basal diameter 8 mm., average apical diameter 7 mm., semi-hollow; segments: 9-13 in number, average 11, slight adherence, thin septa; pulp: uniform, yellow in color, medium tender to firm texture, medium to slender shaped vesicle; juice: juicy, 46% by weight of the fruit, orange color, sugar 11% and average acidity of 1.2% with a range of 1% to 1.6%, attractive aroma, medium waste; seeds: none to few, average 5 per fruit, medium to plump with average length of 11 mm., and 7 mm. width, D-shaped, smooth weakly veined surface, cream color, white cotyledon, ivory white or light brown inner seed coat; chalazal spot: brown; season: mid season; rank of all characters considered: good to medium; most important use: domestic, export, dessert and juice.

2. Valencia Orange

Fruit color orange to deep orange; surface: finely papillated, general lack of ribs and furrows; shape: oblate to globose; size: medium, diameter 75 mm., height 77 mm., D/H .97; base: rounded and shouldered; basal area medium, average diameter 14 mm., even, sometimes depressed, with ribs or furrows extending to the collar; calyx: even or depressed, medium to small, tips drying out, blunt point and medium thickness; stem: medium to small; apex: slightly nipped, rounded; areole: inconspicuous; styler scar: small, even or depressed in small apical pit; rind: medium thickness, average median cross section 5 mm., firm, strong adherence, slight puffiness when late harvested; oil glands: numerous; oil: medium, mild aroma with pleasant flavor; glandular layer: 35 percent thickness of rind, oil stained, orange in color; mesocarp: medium thick, white to creamy color and vascular bundle generally inconspicuous, medium texture; axis: round, average mid-diam. 10 mm., average basal diameter 8 mm., average apical diameter 9 mm., semi-hollow; segments: generally 11, ranging from 8-12, strong adherence; rag from rind medium; septa: thin and concave in shape; pulp: uniform orange, medium texture; vesicles: slender and medium in size; juice: 53 percent of the weight of fruit, sugar 9-12 percent, acidity 0.8 to 0.9 percent, with attractive aroma and excellent flavor, waste from juice very little; seeds: few in number, 2-7 per fruit, medium in size, average length 12 mm., width 8 mm., D-shaped, surface smooth and weakly veined, cotyledons white, inner seed coat light brown; chalazal spot dark brown; season: late to very late, good shipping quality; use: mainly exported.

3. "Baladi Orange"

Fruit color yellow to light orange; surface: coarsely papillated, glossy and waxy; shape: oblate; size: medium, diameter 74 mm., height 66 mm., D/H index averaging 1.1; base: truncate, basal area medium, average diameter 30 mm., calyx: medium in size, even with the surface of fruit, irregularly divided; stem: medium in length; apex: truncate; areole: prominent; areolar area medium, diameter 12-15 mm., and even; styler scar: small, diameter 3 mm., even with dry style; rind: medium in thickness, firm, rather medium in adherence and general lack of puffiness; primary oil glands: ellipsoid in shape, average diameter parallel to surface 1.0-1.3 mm.; mesocarp: white colored and medium thickness; axis: median cross section irregular, average mid-diameter 16 mm., basal diameter 12 mm., apical diameter 6 mm., and solid; segments: mainly 10, ranging from 9-11, slight adherence; septa: thin, tough and convex dorsal contour; pulp uniform orange, fine and tender texture, vesicles large and slender; juice: 55 percent of total weight of fruit, orange in color, 11 percent sugar, 1.6 percent acidity, fair aroma, good flavor and little waste from strained juice; seeds: 12-14 per fruit in number, D-shaped, surface smooth, veined to weakly veined, cotyledons light green in color and cream colored inner seed coat; mid season fruit with good shipping quality.

4. "Blood Orange" (Damawi or Mawardi)

Fruit deep orange, sometimes with red strips or red more or less throughout; shape: mainly oblate to globose; size: medium, diameter 75 mm., height 80 mm., D/H index 0.94; base rounded with shoulder; basal area: medium, diameter 4 to 16 mm. (av. 11 mm.), depressed, radially furrowed; calyx: medium to small in size, blunt, drying out; stem: medium; apex: rounded, slightly nipped; areole: inconspicuous or absent; areolar area: medium, diameter 6 mm., smooth, on an elevated disk; oil glands: inconspicuous; styler scar: small to medium, diameter .5 to 1.5 mm., (larger diameters more prevalent) depressed in a small apical pit; rind: medium thick, 5 to 8 mm., firm leathery, strong adherence; oil glands: numerous; oil: medium to abundant with a pleasant odor; glandular layer: medium in thickness, 20 to 35 percent of rind, oil stained, cream light yellow to orange colored; mesocarp: medium thick, medium texture, vascular bundle inconspicuous; axis: round to rectangular, average mid-diameter 8-10 mm., basal diameter 7 mm., apical diameter 6-7 mm., semi-hollow; segments: mainly 9-12 (av. 11); rag from rind medium; septa: thin; dorsal contour slightly concave; pulp: orange in color, sometimes buff or pink; juice: 42 percent of the weight of fruit, reddish to dark orange in color, with 11 percent sugar and acidity of 0.9 percent, attractive aroma, excellent flavor; seeds: none to few (av. 2-6 per fruit), medium in size, length 12 mm., width 6 mm., fusiform shaped, surface smooth, weakly veined, cream in color; inner seed coat: light brown; chalazal spot: dark brown; season: late to very late; medium shipping quality; mainly for domestic consumption.

5. "Washington Navel"

Fruit color light green to light yellow; surface: pitted, glossy few ribs; shape: oblate; size: medium with a diameter of 91 mm. and a height of 92 mm., D/H index of 1; base: rounded; calyx: depressed, medium, irregularly divided; stem: medium; apex: slightly nipped; navel: 100 percent, large; areole absent; stylar scar: disrupted by navel, small, dry; rind: medium, cross section 6 mm.; firmness leathery, puffing none; medium adherence; primary glands: 1.3-1.5 mm.; oil: little, mild pleasant; mesocarp: white to ivory white, medium texture; axis: round to rectangular, medium, average mid-diameter 6-15 mm., average basal diameter 4-8 mm., average apical diameter 4-8 mm.; segments: 10-15 in number, average 12, slight to strong adherence; septa: thin; pulp: orange and uniform in color, medium texture, slender vesicles which are medium (some small); juice: 51 percent of the weight of fruit, sugar percentage 10.0, acid percentage 1.06, aroma weak to medium, good flavor, with medium amount of waste from strained fruit; seeds: none; season: early, good shipping quality; good rank of all characters considered; used mainly for shipping and dessert.

II. THE LEMONS

6. Malti

Fruit light yellow in color, sometimes orange, surface: smooth, finely papillate and waxy; shape: ellipsoid, 70 mm. in diameter and 85 mm in height; D/H .87; base: short-necked, narrow; basal area: average diameter 5 mm.; calyx: even, medium in size, irregularly divided with short divisions, sharp-pointed, drying out tips; apex: prominently nipped; navel: absent; areole: inconspicuous; stylar scar: small, 1.5 mm. in diameter, with a dry style; rind: 5 mm. in cross section, firm strong adherence; oil glands: 19 per one-fourth square cm., primary glands ovoid, 1.3-1.5 mm. in average diameter parallel to surface; oil: medium in quantity, strong in aroma, and pleasant; glandular layer 30 percent thickness of rind; mesocarp: thick, white, with vascular bundles inconspicuous and hard texture; axis rectangular with an average mid-diameter of 8 mm., average basal diameter of 7 mm., average apical diameter of 9 mm.; segments: 8-10 in number average 8, strong adherence, medium amount of rag from rind, thin tender septa, with concave dorsal contour; pulp: yellow, uniform in color, and light; medium and tender texture; vesicles large and slender in shape; juice: 40-50 percent by weight, greenish yellow to yellow in color, 8-9 percent sugars and 7.5-8.5 percent acids, strong attractive aroma, excellent flavor; seeds: one per fruit, 8 mm. in average length and 4 mm. in average width, rough surface, weekly veined, cream in color, with white cotyledons and dark brown or purplish seed coat; does not produce a summer crop; used mainly for juice; good shipping quality.

7. "Assasly Lemon"

Fruit color yellow flushed on side; surface: smooth, finely papillate to papillate, waxy (bloom), ribbed; shape: oblate to ovoid; size: 66-80 mm. in diameter and 75-100 mm. in height; D/H .85; base: truncate with an average diameter of 1.2-2 mm., even to depressed, furrowed with ribs or furrows extending to or through the collar; calyx: even to depressed, medium in size, irregularly divided, sharp-pointed, thick (fleshy), with persistent or drying out tips; stem: large in size; apex: prominently nipped, acute; navel: absent; areole: inconspicuous, 20 mm. in diameter, smooth surface, radially furrowed with oil glands inconspicuous (sometimes prominent); stylar scar: present, medium to large, 1.5-2.5 mm. in diameter, protruded with a dry style; rind: 6-9 mm. in cross section, firm, medium adherence and no puffing; primary glands: 1.1-1.2 mm. in diameter; oil: abundant, medium aroma and pleasant; glandular layer 17-25 percent thickness of rind, with oil stained tissue and cream light yellow to orange color; mesocarp: cream to light yellow, prominent to inconspicuous vascular bundles, medium to hard texture; axis: rectangular to irregular, 10-15 mm. in average mid-diameter, average basal diameter of 6-7 mm., average apical diameter of 6-9 mm., and hollow; segments 9-11 in number average 10, much rag from rind, thick concave septa; pulp: yellow to orange and uniform in color, fine tender texture and large slender vesicles; juice: 33-56 percent of the weight of the fruit, yellow in color, 8.5 percent sugar, 7-8 percent acids, attractive aroma, and good flavor; seeds: average per fruit 1-13, many imperfect seeds, 10-15 mm. in average length, and 5-6 mm. in average width, D-shaped, smooth surface, strongly veined, cream to yellowish in color, white cotyledons; inner seed coat light brown and purplish chalazal spot; produces a good summer crop; used mainly for juice; good shipping quality.

8. "Eureka Lemon"

Fruit yellow in color; surface: finely papillate, waxy, ribs and furrows inconspicuous; shape: ellipsoid; size: large, with a diameter of 65 mm. and a height of 80 mm. and average D/H index of 0.8; base: rounded, with a basal area of 12 mm. in average diameter, even, and no ribs, calyx: even, medium in size, irregularly divided, with short divisions, blunt and thick (fleshy); apex: prominently nipped and rounded; navel: absent; areole: inconspicuous; areole area: irregular, 25 mm. in diameter, protruded into nipple, smooth surface which is radially furrowed; oil glands; inconspicuous, stylar scar: large, 1.5 mm. in diameter, protruded; style: partially absent and dry; rind: 6 mm. in cross section, firm and strong adherence with no puffing; oil glands: 12 per one-fourth square cm.; primary glands 1.2-1.3 mm. in average diameter parallel to surface; oil: medium amount, strong in aroma and pleasant; glandular layer: 25 percent. thickness of rind; oil stained tissue, yellow in color; mesocarp: white and thick, with inconspicuous vascular bundles and hard texture; axis: rectangular with an average mid-diameter of 5 mm., average basal diameter of 5 mm. and average apical diameter of 6 mm.; segments:

9-11 in number, average 10, strong adherence, with medium amount of rag from rind, thin tender septa and concave dorsal contour; pulp: yellow uniform in color, medium texture and tender, large slender vesicles; juice: 36 percent of fruit weight, 7 percent sugar, 6.5-7 percent acids, strong and attractive aroma, with excellent flavor; seeds: few, average number per fruit one, no imperfect seeds, plump medium in size with an average length of 7 mm. and average width of 3 mm., D-shaped, rough surface which is weakly veined, cream color, with white cotyledons, inner seed coat dark brown or purplish; midseason; good shipping quality; used mainly for juice.

+ May not be the standard Eureka.

III. THE MANDARINS

9. "Yousef Afandi" (Mediterranean Mandarin)

Fruit color yellow to light orange; surface: papillate, glossy, waxy; shape: oblate to globose; size: medium, diameter 65 mm., height 55 mm., D/H index 1.2, base: mainly long necked, occasionally short necked, shouldered; basal area: broad, average diameter 32.5 mm.; calyx: medium in size and depressed, irregularly divided into short, sharp pointed divisions; stem: medium in length; apex: deeply depressed; areole: inconspicuous; styler scar: small, diameter 1 mm.; rind: thin, average in median cross section 2 mm., leathery, slight adherence to segments; mesocarp: thin and ivory white, with prominent vascular bundles; axis: round, average mid diameter 17 mm., basal diameter 8 mm., apical diameter 8 mm., semi-hollow; segments: mostly 10 per fruit with slight adherence to each other, and a convex dorsal contour; pulp: uniform orange, medium and tender texture, vesicles medium and stout; juice: 38 percent of fruit weight, 12 percent sugar, .75 percent acids, strong and attractive aroma, good flavor, medium amount of waste from strained juice; seeds: 19 per fruit, medium size, average length 10 mm., width 5 mm., D-shaped, surface smooth and weakly veined, cream in color, light green cotyledons, dark brown inner seed coat; mid-season fruit; poor shipping quality; mainly used for dessert and sometimes to flavor orange juice and lemonades.

10. "Clementine"

Fruit color light yellow flushed on side; surface: coarsely pitted, glossy with no ribs and furrows; shape: oblate; size: medium, diameter 70 mm., height 68 mm., D/H index average 1.0; base: truncate to shouldered; basal area: medium; calyx: medium in size and even, regularly divided with short divisions and sharp points, tips mostly persistent; stem: medium in length; apex depressed; areole: inconspicuous, areolar area: medium, diameter 20 mm.; styler scar: small and depressed in a small apical pit; rind: medium thick, average in median cross section 3-4 mm., leathery with medium adherence to segments; oil: medium, mild and pleasant; glandular layer: medium compared with the thickness of the rind, cream colored; mesocarp: white to ivory white in color, sometimes creamy; axis: average mid-diameter 16 mm., basal

diameter 8 mm., apical diameter 9 mm., and hollow; segments: average 9, ranging from 8-10 per fruit, with slight adherence to each other; thin septa with a convex dorsal contour; pulp: uniform orange in color, medium texture and slender medium vesicles; juice: 53 percent of weight of fruit, 10 percent sugar and 0.8 percent acidity, attractive aroma and good flavor; seeds: few to many, average 9 per fruit, with few imperfect seeds, uniform shape, average length 14 mm., average width 6 mm., smooth and weakly veined surface, light green cotyledons, light brown inner seed coat, brown chalazal spot; season early; used only for dessert.

11. Dancy Tangerine

Fruit color uniform reddish; surface: papillated to coarsely papillated, or sometimes coarsely pitted, glossy, waxy, shape: oblate; size: medium diameter 79 mm., height 66 mm., D/H index 1.2; base: short necked, sometimes truncate to shouldered; basal area: narrow, average diameter 5 mm., depressed and ribbed; stem: medium in length; apex: depressed; areole: almost inconspicuous; stylar scar: medium in size, diameter 2.5 mm., even; style: average length 2 mm.; rind: very thin to thin, average in median cross section 2 mm., soft and with slight adherence to segments; oil glands: average of 22 per 1/4 square cm.; primary glands: ellipsoid, average diameter parallel to surface 1.1-1.6 mm.; oil: abundant, medium and pleasant aroma; glandular layer: thick with almost 100 percent thickness of rind; mesocarp: very thin, with prominent vascular bundles; axis: round, sometimes rectangular, average mid-diameter 2.1 mm., basal diameter 1.5 mm., apical diameter 1.5 mm.; segments: generally 10 per fruit, adherence slight to each other; septa: thick; pulp: uniform orange, medium texture, small, stout vesicles; juice: 37 percent of fruit weight, orange in color, 10 percent sugar, 0.75 percent acidity, good flavor, quite a large quantity of waste from strained fruit; seeds: average 7 per fruit, medium in size and plump, average length 11 mm., average width 6.5 mm., ovate shaped, smooth surface, sometimes a little rough and cream in color, cotyledons light green, inner seed coat cinnamon; mid-season; mainly used for dessert; poor shipping quality.

IV. MISCELLANEOUS

12. "Thompson Seedless" Grape fruit

Fruit color uniformly yellow; surface: smooth, sometimes finely pitted, glossy, slightly waxy; shape: oblate to globose; size: large, diameter 90 mm., height 90 mm., D/H index 1.0; base: low collared; basal area: medium, average diameter 17 mm., ribbed or sometimes furrowed; calyx: even or slightly depressed, medium, irregularly divided with short division, blunt tips and drying out; apex: rounded; areole: inconspicuous, sometimes absent; stylar scar: medium, diameter 2 mm., depressed; rind: thick, average in median cross section 8 mm.; oil: little, weak aroma, rather unpleasant; glandular layer: medium thick, 20 percent thickness of rind, oil stained, yellow color; mesocarp: medium to thick, ivory white, soft

texture and prominent vascular bundle; axis: round in median cross section, average mid-diameter 9 mm., basal diameter 6 mm., apical diameter 8 mm.; segments: average 11, ranging from 10-13, slight adherence to each other, rag from rind not much; pulp: uniform light yellow, medium texture, medium slender vesicle; juice: 45 percent of the weight of fruit, 8.5 percent sugar, 1.5-1.7 percent acids, fair and medium aroma; seeds: few, average 2 per fruit, medium in size, plump, average length 12 mm., width 8 mm., smooth surface, weakly veined, cream in color, inner seed coat light brown, chalazal spot brown; mid-season fruit, medium shipping quality, used mainly for dessert and fresh juice.

13. Sweet Lime

Fruit color light yellow to yellow, uniform; surface: very smooth glossy, ribs and furrows none to few; shape: symmetrical; size: medium, diameter 67 mm., height 85 mm., D/H index 1; base: rounded to truncate; basal area: average diameter 10 mm., even, smooth; calyx: even or depressed, medium, irregular divided with short divisions, blunt point, thick flesh; stem: medium in size; apex: prominently nipped, rounded; styler scar: small with a diameter of 0.5 mm.; rind: thin to medium in thickness, average in median cross section 2-5 mm., leathery firmness, medium to strong adherence; primary oil glands: average diameter parallel to surface 1.0-1.1 mm.; oil: medium to abundant, mild, pleasant, distinctive; mesocarp: medium thickness, ivory white in color; axis: round in shape, average mid-diameter 10 mm., average basal diameter 6 mm., average apical diameter 7 mm., semi-hollow; segments: 10-12 in number with an average of 11, strong adherence, rag from rind medium, thick and tough, septa, convex dorsal contour; pulp: uniform, yellow light, medium texture, firm, medium slender shaped vesicles; juice: 45 percent of fruit weight, 8 percent sugar, 0.1 to 0.2 percent acids, fair aroma, fair flavor, little waste; seeds: 2-7 in number, few imperfect seeds, average length 10 mm., average width 3 mm., ovate shaped, smooth and weakly veined surface, cream color, white cotyledons, white to ivory white inner seed coat; season: mid-season; medium shipping quality; mostly used for dessert.

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