Modern Citrus Cultivars Descriptive Database

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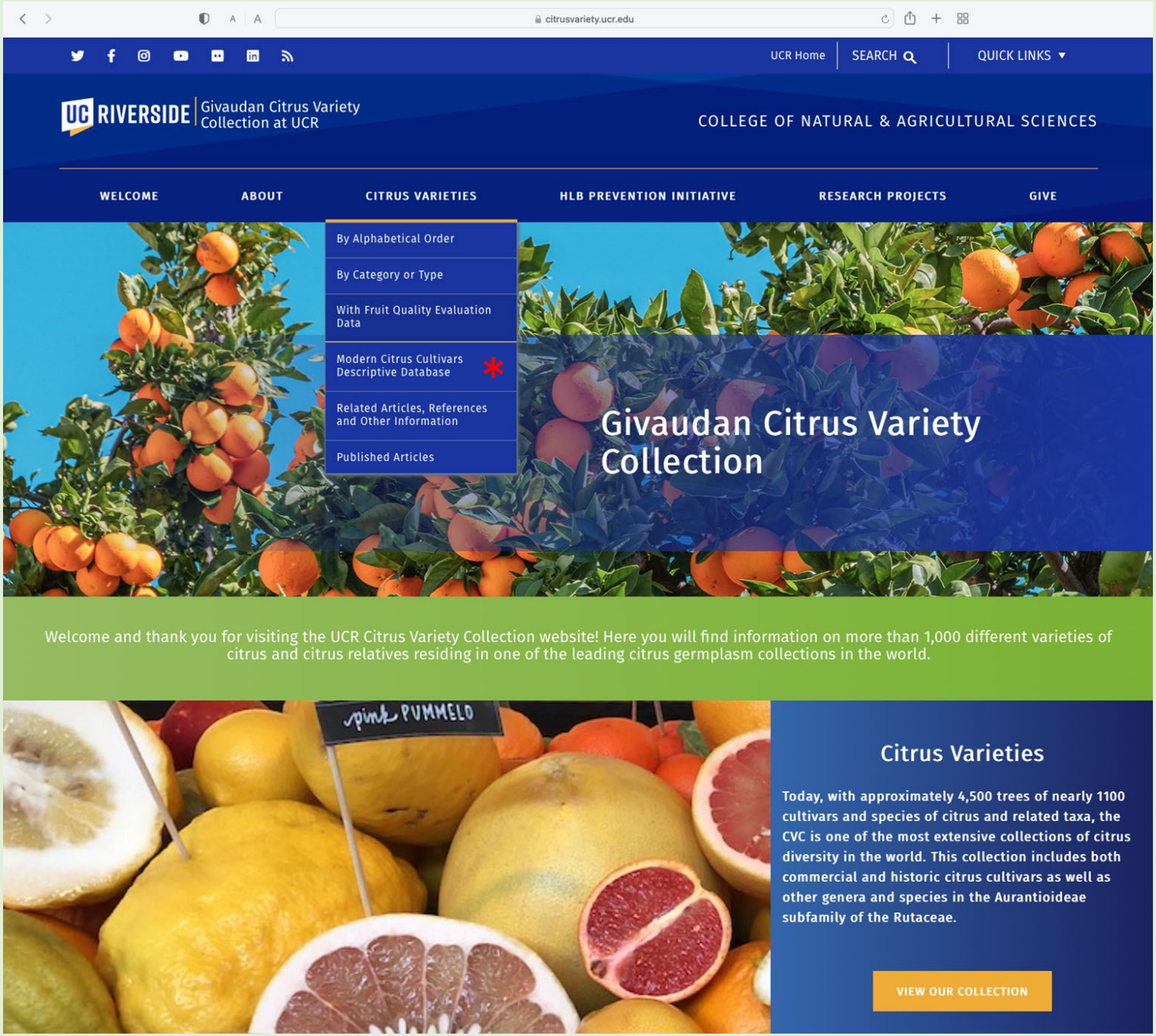
- Work started April 2020 from public sources, some private communications
- Combines information about nomenclature, fruit types, intellectual property protection, breeders and affilated institutions, pedigrees, descriptions, sources.
- 1,215 distinct cultivars covered so far; updated regularly
- Criteria for inclusion: 1) all citrus cultivars for which a plant patent or PBR application has been made; 2) all cultivars introduced after 1980-90

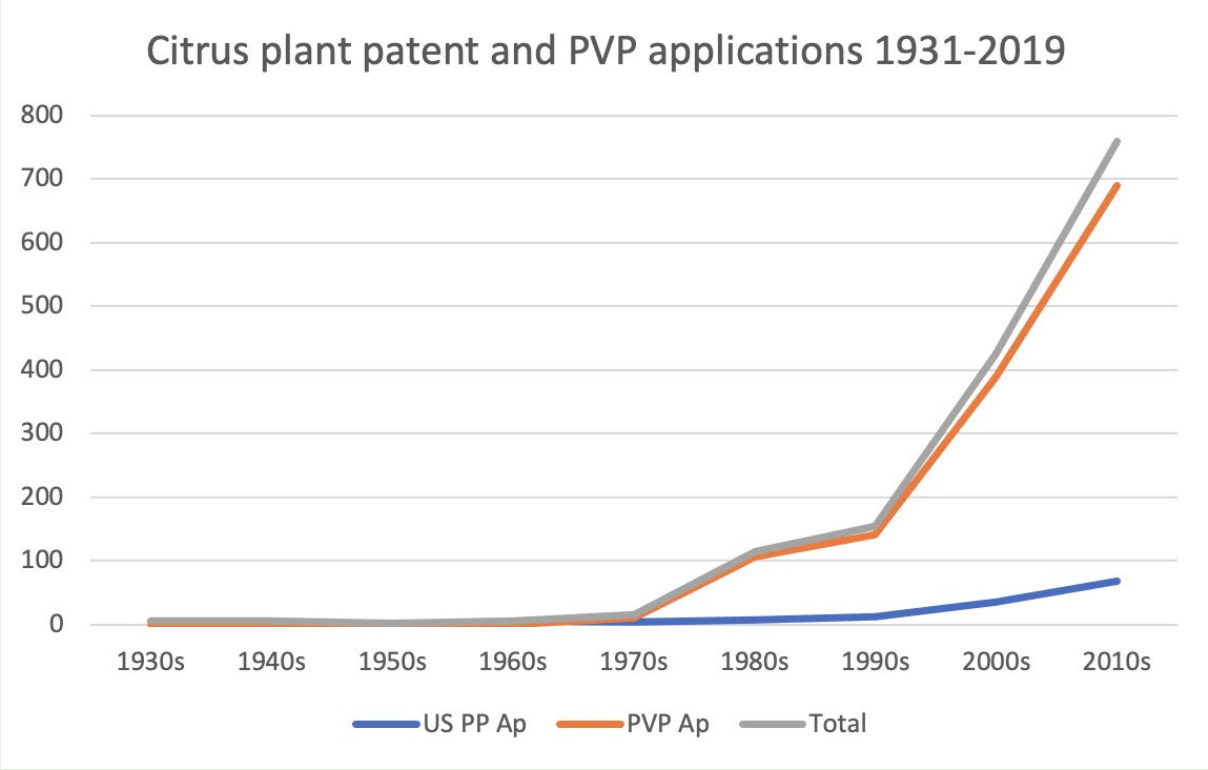
Appears on UCR CVC website: https://citrusvariety.ucr.edu/MCCDD.html



Background and origin of the work

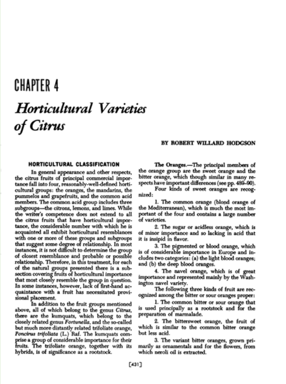
Trends since 1990s

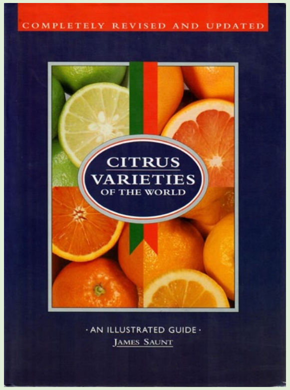
- Increase in number of cultivars introduced
- Increase in proportion of cultivars originating outside USA
- Increase in proportion of cultivars that are IP-protected

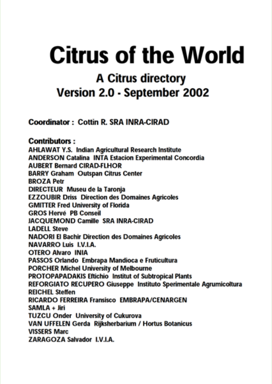


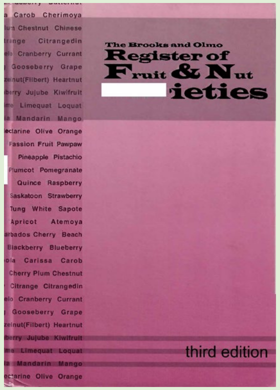
Background and origin of the work

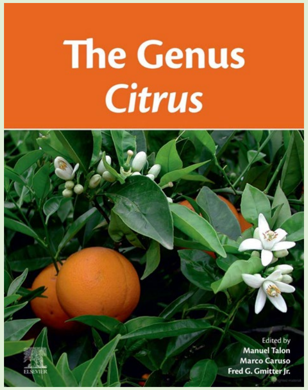
None of the major citrus cultivar information resources – TCI vol 1 [1967]; Saunt, Citrus Varieties of the World, 2nd ed. [2000]; Citrus of the World pamphlet [2002]; CVC website; GRIN website; Register of New Fruit and Nut Cultivars – include more than a small proportion of modern citrus cultivars.











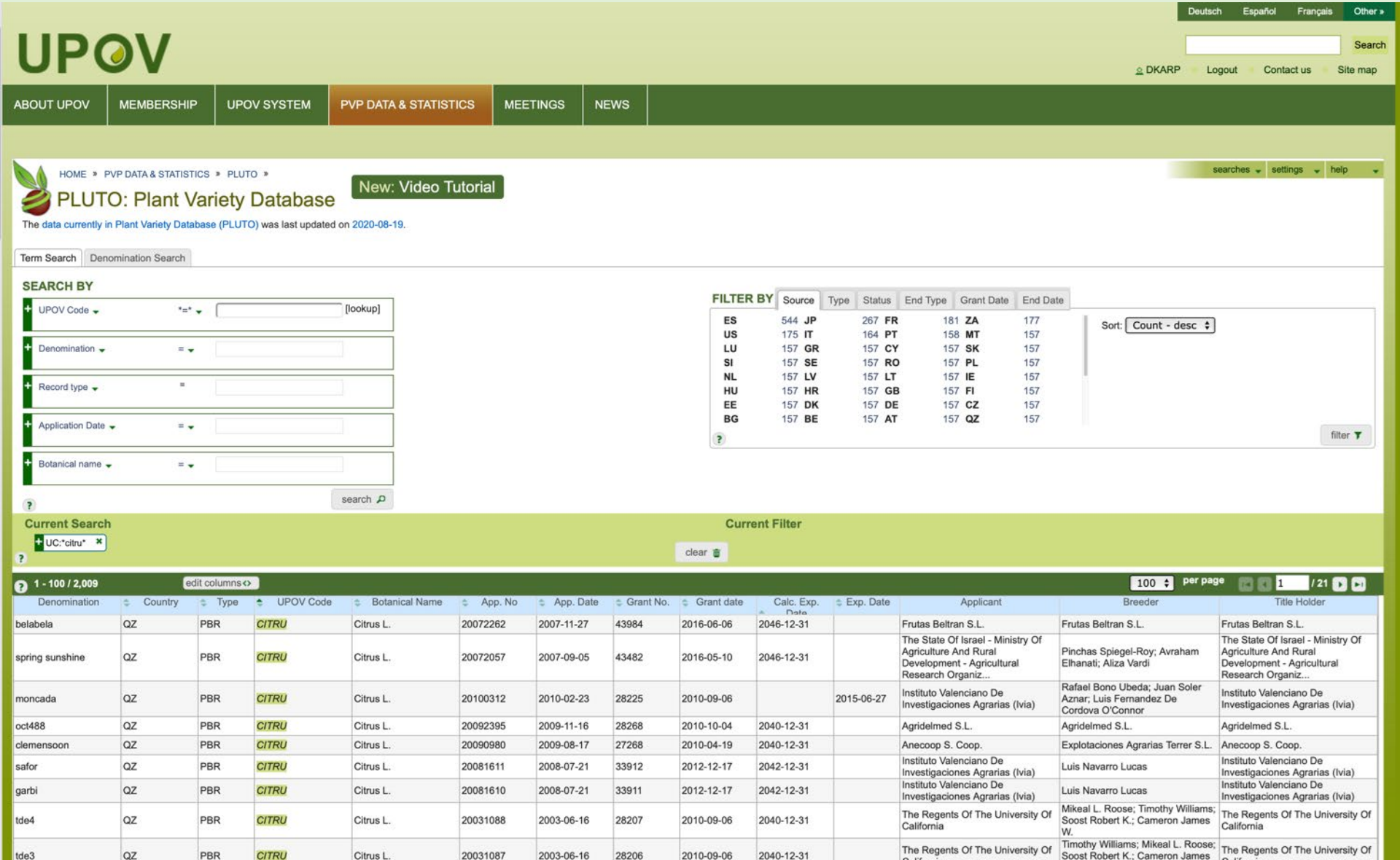
Modern Citrus Cultivars resulted from these interests:

- Citrus germplasm; CVC website
- Citrus genetics
- As one of two co-editors of the Register of New Fruit and Nut Cultivars, I wanted to know which cultivars existed….
- Intellectual property protection in fruit, and related nomenclatural issues

And so one fatal day in April 2020 I…

Keys to plant IP info:

- Intl Union for the Protection of New Varieties of Plants (UPOV)
- Plant Variety Database (PLUTO)



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PLUTO: Plant Variety Database

New: Video Tutorial

The data currently in Plant Variety Database (PLUTO) was last updated on 2020-08-19.

Term Search | Denomination Search

SEARCH BY

UPOV Code *=* [lookup]

Denomination =

Record type =

Application Date =

Botanical name =

search

FILTER BY Source | Type | Status | End Type | Grant Date | End Date

ES	544	JP	267	FR	181	ZA	177	
US	175	IT	164	PT	158	MT	157	
LU	157	GR	157	CY	157	SK	157	
SI	157	SE	157	RO	157	PL	157	
NL	157	LV	157	LT	157	IE	157	
HU	157	HR	157	GB	157	FI	157	
EE	157	DK	157	DE	157	CZ	157	
BG	157	BE	157	AT	157	QZ	157	

Sort: Count - desc

filter

Current Search

UC:*citru*

Current Filter

clear

1 - 100 / 2,009 edit columns

100 per page 1 / 21

Denomination	Country	Type	UPOV Code	Botanical Name	App. No	App. Date	Grant No.	Grant date	Calc. Exp. Date	Exp. Date	Applicant	Breeder	Title Holder
belabela	QZ	PBR	CITRU	Citrus L.	20072262	2007-11-27	43984	2016-06-06	2046-12-31		Frutas Beltran S.L.	Frutas Beltran S.L.	Frutas Beltran S.L.
spring sunshine	QZ	PBR	CITRU	Citrus L.	20072057	2007-09-05	43482	2016-05-10	2046-12-31		The State Of Israel - Ministry Of Agriculture And Rural Development - Agricultural Research Organiz...	Pinchas Spiegel-Roy; Avraham Elhanati; Aliza Vardi	The State Of Israel - Ministry Of Agriculture And Rural Development - Agricultural Research Organiz...
moncada	QZ	PBR	CITRU	Citrus L.	20100312	2010-02-23	28225	2010-09-06		2015-06-27	Instituto Valenciano De Investigaciones Agrarias (Ivia)	Rafael Bono Ubeda; Juan Soler Aznar; Luis Fernandez De Cordova O'Connor	Instituto Valenciano De Investigaciones Agrarias (Ivia)
oct488	QZ	PBR	CITRU	Citrus L.	20092395	2009-11-16	28268	2010-10-04	2040-12-31		Agridelmed S.L.	Agridelmed S.L.	Agridelmed S.L.
clemensoon	QZ	PBR	CITRU	Citrus L.	20090980	2009-08-17	27268	2010-04-19	2040-12-31		Anecoop S. Coop.	Explotaciones Agrarias Terrer S.L.	Anecoop S. Coop.
safor	QZ	PBR	CITRU	Citrus L.	20081611	2008-07-21	33912	2012-12-17	2042-12-31		Instituto Valenciano De Investigaciones Agrarias (Ivia)	Luis Navarro Lucas	Instituto Valenciano De Investigaciones Agrarias (Ivia)
garbi	QZ	PBR	CITRU	Citrus L.	20081610	2008-07-21	33911	2012-12-17	2042-12-31		Instituto Valenciano De Investigaciones Agrarias (Ivia)	Luis Navarro Lucas	Instituto Valenciano De Investigaciones Agrarias (Ivia)
tde4	QZ	PBR	CITRU	Citrus L.	20031088	2003-06-16	28207	2010-09-06	2040-12-31		The Regents Of The University Of California	Mikeal L. Roose; Timothy Williams; Soost Robert K.; Cameron James W.	The Regents Of The University Of California
tde3	QZ	PBR	CITRU	Citrus L.	20031087	2003-06-16	28206	2010-09-06	2040-12-31		The Regents Of The University Of	Timothy Williams; Mikeal L. Roose; Soost Robert K.; Cameron James	The Regents Of The University Of

Information categories

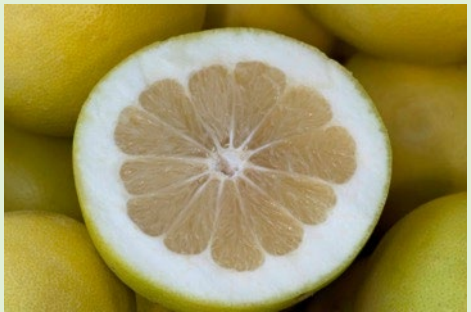
1) Nomenclature and taxonomy
- Cultivar name
- Synonym(s), including foreign script
- Trademark(s)
- Common name
- Botanical names: Swingle & Reece
- Botanical names: Tanaka/USDA

2) Intellectual property
- IP country
- Application #
- Application date
- Grant #
- Grant date
- Expiration

3) Breeding
- Breeder(s)
- Affiliated organization(s)
- Cultivar origin

4) Description
- Scion / rootstock / ornamental
- Description / notes

5) Sources
- Register of New Fruit & Nut Cultivars List
- Source 1
- Source 2
- Source 3
- *Contributors?*

Nomenclature: Cultivar name

= “variety denomination”, “cultivar epithet”
derived from:

- 1) name received from PLUTO < national plant variety gazettes
- 2) guidelines provided by:
- 2a) International Code of Nomenclature for Cultivated Plants, Ninth Edition, 2016 [ICNCP]<https://www.ishs.org/scripta-horticulturae/international-code-nomenclature-cultivated-plants-ninth-edition>
- 2b) CPVO nomenclature guidelines 2021<https://cpvo.europa.eu/sites/default/files/documents/cpvo_guidelines_on_art_63_with_explanatory_notes.pdf>
- 2c) Register of New Fruit and Nut Cultivars Style Guidelines
- 3) prevalent use in scientific and commercial texts
- Cultivar epithets can be “fancy names” (e.g. ‘Tango’) or “codes” (‘Sg-Lxx 055’).

1299	Sonet
1300	Southern Red
1301	Southern Yellow
1302	Sowanokaori
1303	SPB-7
1304	Spring Sunshine
1305	Standout
1306	Star Ruby
1307	Sublime
1308	Success
1309	Suitangi
1310	Sukumokonatsu
1311	Summer Fresh
1312	Summer Gold Late Navel
1313	Summer Prim
1314	Summer Prim
1315	Summer Prim
1316	Summer Red
1317	Summerina
1318	Summerina
1319	Summerina
1320	Sun Eat
1321	Sun Gold
1322	Sun Red
1323	Sunburst
1324	Sunburst Seedless
1325	Sunking
1326	Sunrise Navel
1327	Sunset
1328	SunSmooth Early Navel

Nomenclature: Cultivar name

- Names can differ from country to country: ‘G-6’ mandarin in Australia, ‘G 6’ in EU; ‘Gold Nugget’ is ‘Calnugget’ in New Zealand
- Capitalization: first letter of each word (‘Southern Red’), except for codes and acronyms: UF 900, US Furr, TDE3
- Challenge: when cultivar name contains fruit type : ‘Australian’ finger lime or ‘Australian finger lime’?
- This is common in Japanese and Chinese cultivar names; following ICNCP, I’ve excluded common names from cultivar epithets except where it would leave the name unrecognizable (‘Top Mandarin Seedless’) or “where linguistic custom demands” (ICNCP 21.20).
- ICNCP recommendation 35A: “The liberty of correcting the spelling of a cultivar… epithet should be used with reserve.”
- I distinguish by font between accepted (Gill Sans **semibold**) and unaccepted (Gill Sans regular) names.

		Cultivar name
1		**Cultivar name**
2		**7B97**
3		**7ELS1**
4		**A2LC**
5		**AB1**
6		**AC41114**
7		**AC4916**
8		**Adachi Navel**
9		**Addo Early Navel**
10		**Admoni**
11		**Aeco1**
12		African shaddock × Rubidoux trifoliate
13		**African Sunset**
14		**African Sunset**
15		**African Sunset**
16		**Ainokaori**
17		**Aiotome**
18		**Aisan**
19		**Aitana**
20		**Akemi**
21		**Akimarin**
22		**Akinokagayaki**
23		**Akragas**
24		**Al Gharbaouia**
25		**Al Hamra**
26		**Al Maamora**
27		**Al Mehdia**
28		**Al Merzaka**
29		**Alata**
30		**ALB14R6T190**
31		**ALB2R11T52**
32		**Alberina**

Nomenclature: Synonym(s) and name(s) in original script

- other names for same cultivar
- test names
- original primary cultivar epithet in local script (Japanese, Chinese, and Korean, Hebrew)
- synonyms that appear elsewhere in list as primary name are underlined: TDE3 = Tai Hao Jin Tde3 (China)
- When appropriate I also provide the English translation of the original Asian name, 'Benimadoka' = 紅まどか = "Red Madoka"

Wonkyoah Danbaiseo	원교아단배성1호
Wonkyoah Danbaiseo	원교아단배성2호
Wonkyoah Danbaiseo	원교아단배성3호 = Wonkyoah Danbaiseong 3ho
Wonkyoahdanbaiseon	원교아단배성4호
Workman Navel	Summernavel
Wu He You Li Ke	Eureka SL; 无核尤力克 = "Seedless Eureka"
Xie Shan	Wakayama; VI 621
Xlo	
Yafit	יפית
Yamakawawase	山川早生 = "Yamakawa Early"; Yamakawa
Yamamizaka Navel	山見阪ネーブル; Yamami-han
Yamashitabeniwase	山下紅早生
Yang Guang	阳光 = "Sunshine"
Yanov	ינוב
Yellow	Yellow Pummelo; Yellow Pomero; イエローポメロ = "Yellow pummelo"
Yellow Bell	イエローベル
Yellow Star Seedless	Lemox, C3869
Yifat	"splendor" = יפעת ; Vol Yifat
YN26	
Yoichiro	陽一郎
Yoko	陽香; Youkou
Yong Hong Ai Wan Y	永红矮晚柚 = Yonghong Dwarf pummelo
Yosemite Gold	TDE4 (USA, EU, and most other countries); TDE 4 (Paraguay); TDEfour (Isr
Yoshinagawase	吉永早生
You Sheng Mei Di Jin	TDE4 (USA, EU, and most other countries); TDE 4 (Paraguay); Yosemite Go
Youkou	
Young Eleven	행가래
Yubeni	勇紅 = "Crimson Courage"
Yumemiraimurakamiw	夢未来村上早生 = "Dream Future Early Murakami"
Yumichannohoppe	ゆみちゃんのほっぺ = "Yumi's Cheek"; Yumichan-no-hoppe
Yurawase	ゆら早生; Yura; Yura Wase
Yuyakehime	夕焼け姫 = "Sunset Princess"
Yuzao	渝早橙 = Yu Zao Cheng
Zahra	Mandarine Zahra
Zenkuro	善九郎
Zhenong Seedless	Zhe Nong Wu He Cheng You
Zhong Gan Suo 5 Hao	中柑所5号; 金秋砂糖桔 = "Golden Autumn Sugar Orange"; Jinqiusha Tangju

Nomenclature: Trademark(s)

- Not as popular with citrus as for some other fruits, but increasingly prevalent
- Often pairing a code name + brand: 'TDE2' mandarin = Shasta Gold® mandarin
- 2 types: common law (™) and registered (®)
- Generally listed as ® only if trademark is in WIPO
- Only listed if there's a 1-to-1 correspondence between cultivar and trademark
- My list is not perfect; no database confirms for which cultivar or cultivars a trademarked name is intended to apply
- In Europe and perhaps other areas the ® symbol is sometimes used mistakenly to indicate that a cultivar is IP-protected by PBR

Cultivar name	Trademark(s)
Nadorcott	Afourer®; Delite®; ClemenGold®; Morocco Nadorcott Seedless®
Nadorcott	Afourer®; Delite®; ClemenGold®; Morocco Nadorcott Seedless®
Nadorcott	Afourer®; Delite®; ClemenGold®; Morocco Nadorcott Seedless®
Nadorcott	Afourer®; Delite®; ClemenGold®; Morocco Nadorcott Seedless®
Arccit1519	African Sunset® (inactive)
Arccit1519	African Sunset® (inactive)
Sg-Lxx 055	Ana Claudia; INIA Ana Claudia
Gremoy79	Arctic Frost™
Carruquina	Avasa Pri® 21
Clementardal	Avasa Pri® 22
Clemenrubí	Avasa Pri® 23
Clementina Marin	Avasa Pri® 24
Clementina Marin	Avasa Pri® 24
Marina	Avasa Pri® 24
Marina	Avasa Pri® 24
Clemenval	Avasa Pri® 40
Clemencar	Avasa Pri® 54
Clemencalig	Avasa Pri® 59
Clemenaurea	Avasa Pri® 60
Ehimekashi Dai28	Beni Madonna
B-1	Beri®
US Furr	Clemcott®
Andes 1	Clemenluz®
Andes 1	Clemenluz®
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Carninka	Dansweet™, Dan Sweet™, DanSweet™
Karninka	Dansweet™, Dan Sweet™, DanSweet™
Shiranuhi	Dekopon® = デコポン; Sumo Citrus®; Hallabong = 한라봉;
M 4	Dolci™
M 4	Dolci™
Eureka Seedless	Eureka! Seedless™, Lemon Heaven®

Nomenclature: Common names

No one system of categorization serves all purposes:

- for scientists, nurseries, wholesale fresh fruit, retail, processing, phytosanitary regs, trade, ag statistics…
- there are multiple preexisting category assignments, by Florida Fruit Classification and Standards Committee, plant IP authorities (USPTO, CPVO, etc.)

Assigning common names to cultivars I have considered:
1) citrus genetics;
2) morphology, sometimes different from pedigree;
3) convention.

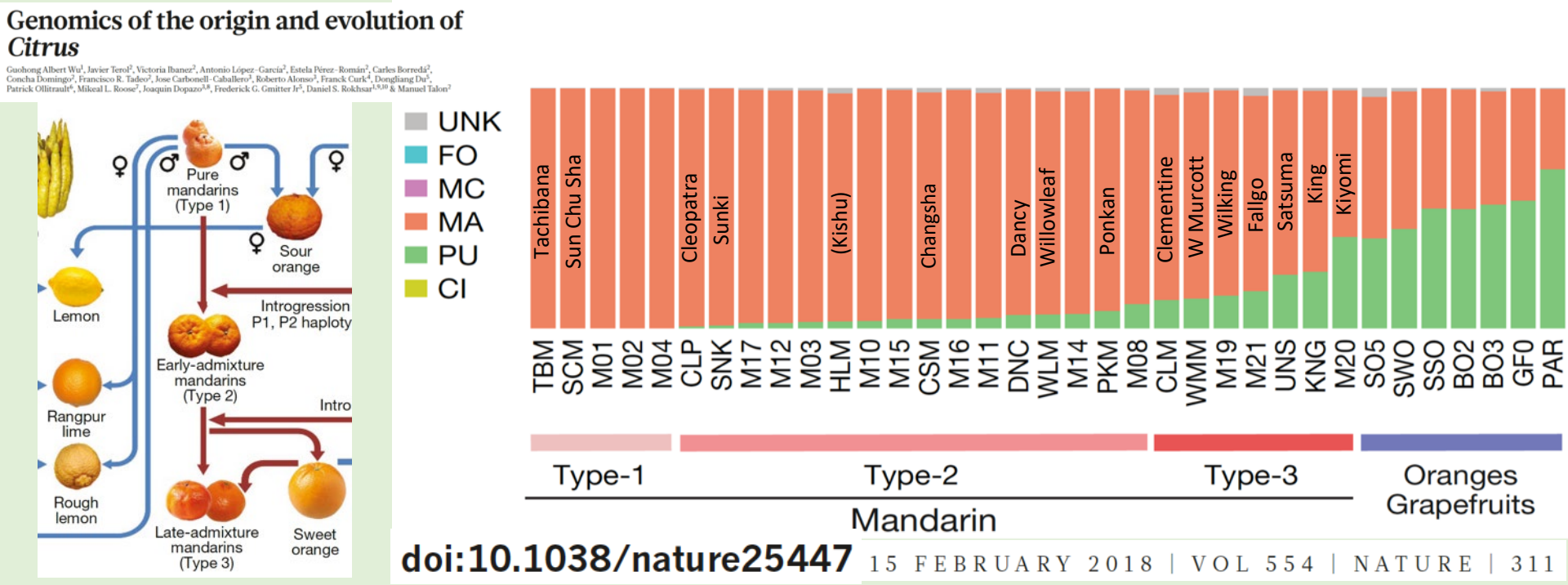
- Purpose: provide citrus scientists, growers, nurseries, marketers, and other citrus stakeholders with basic information concerning what type each cultivar is.
- Aim: logical, consistent, and useful.
- Common names important as taxonomic nomenclature becomes unfamiliar
- Categories and subcategories: “sweet orange-navel”, “sweet orange-Valencia”, etc

172		Belalate	mandarin hybrid—satsuma
173		Belasweet	mandarin hybrid—satsuma
174		Beli SL	sweet orange-Valencia
175		Bella	mandarin hybrid
176		Bellini	tangelo
177		Benedetta Dello Jo	sweet orange
178		Benedicto	lemon
179		Benedicto	lemon
180		Benibae	mandarin hybrid
181		Benimadoka	pummelo
182		Benio	kumquat
183		Benisawaka	mandarin hybrid?
184		Benjamin Andes	lemon
185		Bennie	sweet orange-Valencia
186		Benny	sweet orange-Valencia
187		Bétera	lemon
188		Bingo	mandarin hybrid
189		Bitters	trifoliate hybrid–citrandarin (ma
190		Blushing Lemon	lemon
191		Brasiliano N.L. 92	sweet orange-navel
192		Breegold	lime
193		Brown Select	mandarin hybrid—satsuma
194		BRS Rubra Cara	sweet orange-navel
195		Bruce	mandarin hybrid
196		Burgundy Red	grapefruit
197		C 1867	tangor
198		C 66 75	tangor
199		C37	mandarin hybrid
200		C37	mandarin hybrid
201		C4-15-19	mandarin hybrid
202		California Rojo	sweet orange-navel
203		Callosa	lemon
204		Calnugget	mandarin hybrid
205		Caloma	sweet orange-navel
206		Cambria	sweet orange

Nomenclature: Common names

- When a common name exists for direct hybrids of two types, e.g. tangelo, tangor, I use it.
- When no such name is commonly used, I list the two types: pummelo x grapefruit, Rangpur lime × sour orange, etc.
- When a fruit results from a backcross (or series of crosses) in which one fruit type is predominant in genetics and morphology, I call it a hybrid of that predominant type: e.g. mandarin hybrid, orange hybrid, pummelo hybrid.
- Japanese citrus hybrids, including yuzu, sudachi, kabosu, hyuganatsu, natsudaidai, etc., are each considered to be fruit groups, as are lemon, orange, grapefruit, etc.

	Common name
2	citron-fingered
3	Citrus chimera
4	desert lime
5	finger lime
6	finger lime hybrid
7	grapefruit
8	hassaku x natsudaidai
9	hyuganatsu
10	hyuganatsu hybrid
11	Ichang papeda × pummelo
12	kabosu
13	kumquat
14	lemon
15	lemon × clementine
16	lemon hybrid
17	lemon-Meyer
18	lime-true
19	lime-Persian
20	limelike hybrid
21	mandarin
22	mandarin hybrid
23	mandarin hybrid—acid
24	mandarin hybrid—clementine
25	mandarin hybrid—satsuma
26	mandarin-ponkan
27	mandarin-tachibana
28	mandarinquat
29	natsudaidai
30	orange × pummelo
31	orange hybrid
32	orangelo
33	pummelo
34	pummelo × grapefruit
35	pummelo × mandarin
36	pummelo hybrid
37	sudachi
38	sudachi x yuzu
39	sweet orange
40	sweet orange hybrid
41	sweet orange-blood
42	sweet orange-navel
43	sweet orange-Valencia
44	sweet orange–like hybrid
45	tangelo
46	tangor
47	trifoliate hybrid–citrandarin (mandarin × trifoliate)
48	trifoliate hybrid: citrange (orange x trifoliate)
49	trifoliate hybrid: pummelo × trifoliate
50	Volkamer lemon
51	yuzu



Now for the tricky part: mandarins. According to Wu et al., 2018, Genomics of the origin and evolution of Citrus, the fruits commonly called mandarins fall into three categories:

- Type-1: ancestral mandarins, pure *Citrus reticulata*. These are few and very rare today, especially among recently bred cultivars. Examples: Tachibana, Sun Chu Sha.
- Type-2: early-admixture mandarins contain a small amount of pummelo admixture that can be traced back to a common pummelo ancestor: Cleopatra, Sunki, Kishu, Changsha, Dancy, Willowleaf, ponkan. This is almost certainly what Blanco meant by *C. reticulata*.
- Type-3: late-admixture mandarins contain a larger proportion of introgression from pummelo, and from a greater diversity of pummelo genotypes: clementine, W. Murcott, Wilking, Fallgo, satsuma, King.

After much reflection I have decided to call type-1 “ancestral mandarins”; call type-2 “mandarins”; and call type-3 “mandarin hybrids”.

Comparison of citrus taxonomy systems

Common name	Swingle and Reece (1967)	Tanaka (1961)	Zhang and Mabberley (2008)	Ollitraut, Curk, and Krueger (2020)	USDA GRIN (Schori)
citron	*C. medica* L.	*C. medica* , *C. limonimedica* Lush.	*C. medica* L.	*C. medica* L.	*C. medica* L.
pummelo	*C. maxima* Merr.	*C. maxima* Merr.	*C. maxima* (Burm.) Merr.	*C. maxima* (Burm.) Merr.	*C. maxima* (Burm.) Merr.
mandarin–Cleopatra	*C. reticulata* var. *austera*	*C. reshni* hort. ex Tanaka	*C. reticulata* Blanco	["needs deeper analysis"]	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin–Dancy	*C. reticulata* Blanco	*C. tangerina* hort. ex Tanaka	*C. reticulata* Blanco	*C. × aurantium* var. *tangerina* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin–Kishu	*C. tachibana* Makino	*C. kinokuni* hort. ex Tanaka	*C. reticulata* Blanco	*C. × aurantium* var. *kinokuni* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin–ponkan	*C. reticulata* Blanco	*C. poonensis* Yu. Tanaka	*C. reticulata* Blanco		*C. reticulata* Blanco
mandarin–Tachibana	*C. tachibana* Makino	*C. tachibana* (Makino) Tanaka	*C. reticulata* Blanco	*C. reticulata* var. *tachibana* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin–Willowleaf	*C. reticulata* Blanco	*C. deliciosa* Ten.	*C. reticulata* Blanco	*C. × aurantium* var. *deliciosa* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin hybrid–clementine	*C. reticulata* Blanco	*C. clementina* hort. ex Tanaka	*C. reticulata* Blanco	*C. × aurantium* var. *clementina* ined.	*C. ×aurantium* L.
mandarin hybrid–King	*C. reticulata* Blanco	*C. nobilis* Lour.	*C. ×aurantium* L.	*C. × aurantium* var. *nobilis* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
mandarin hybrid–satsuma	*C. reticulata* Blanco	*C. unshiu* Marcov.	*C. reticulata* Blanco	*C. × aurantium* var. *unshiu* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
Ichang papeda	*C. ichangensis* Swing.	*C. ichangensis* Swingle	*C. cavaleriei* H. Lév. ex Cavalerie	*C. cavaleriei* H. Lév. ex Cavalerie	*C. cavaleriei* H. Lév. ex Cavalerie
small-flowered papeda	*C. micrantha* Wester.	*C. micrantha* Wester.	*C. hystrix* DC.	*C. micrantha* Wester	*C. hystrix* DC.
kumquat–Marumi	*Fortunella japonica* (Thunb.) Swing.		*C. japonica* Thunb.		*C. japonica* Thunb.
kumquat–Nagami	*Fortunella margarita* (Lour.) Swing.		*C. japonica* Thunb.		*C. japonica* Thunb.
trifoliate	*Poncirus trifoliata* (L.) Raf.		*C. trifoliata* L.		*C. trifoliata* L.
desert lime	*Eremocitrus glauca (Lindl.) Swing.*		*Citrus glauca* (Lindl.) Burkill		*C. glauca* (Lindl.) Burkill
finger lime	*Microcitrus australasica* (F. Muell.) Swing.		*Citrus australasica* F.Muell.		*C. australasica* F. Muell.
round lime	*Microcitrus australis* (Planch.) Swing.		*Citrus australis* (Mudie) Planch.		*C. australis* (A. Cunn. ex Mudie) Planch.
grapefruit	*C. paradisi* Macf.	*C. paradisi* Macf.	*C. ×aurantium* L. Grapefruit Group	*C. × aurantium* var. *paradisi* ined.	*C. ×aurantium* L. var. *racemosa* (Risso) ined.
lemon	*C. limon* (L.) Burm.	*C. limon* (L.) Burm. f.	*C. ×limon* (L.) Osbeck	*C. × limon* var. *limon* (L.) Burm. f.	*C. ×limon* (L.) Osbeck
lemon–Meyer	*C. limon* (L.) Burm.	*C. meyeri* Yu. Tanaka		*C. × limon* var. *meyeri* ined.	*C. ×limon* (L.) Osbeck
lime-Mexican, Key, West Indian	*C. aurantiifolia* (Christm.) Swing	*C. aurantifolia* (Christm.) Swingle	*C. ×aurantifolia* (Christm.) Swingle	*C. × aurantiifolia* var. *aurantiifolia*	*C. ×aurantiifolia* (Christm.) Swingle
lime-Persian	*C. aurantiifolia* (Christm.) Swing	*C. latifolia* Tan.	*C. ×latifolia* Tanaka ex Yu. Tanaka	*C. × latifolia* var. *latifolia*	*C. ×latifolia* (Yu. Tanaka) Tanaka
sour orange	*C. aurantium* L.	*C. aurantium* L.	*C. ×aurantium* L.	*C. × aurantium* L. var. *aurantium*	*C. ×aurantium* L.
sweet orange	*C. sinensis* (L.) Osbeck	*C. sinensis* (L.) Osbeck	*C. ×aurantium* L. Sweet Orange Group	*C. × aurantium* var. *sinensis* L.	*C. ×aurantium* var. *sinensis* L.
tangelo	*C. sinensis* × *C. paradisi*		*C. ×aurantium* L.		*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
tangor	*C. sinensis* × *C. reticulata*	*C. temple* hort ex Y. Tanaka	*C. ×aurantium* L.	*C. × aurantium* var. *temple* ined.	*C. ×aurantium* L. var. *chrysocarpa* (Hassk.) ined.
sweet lime	*C. aurantiifolia* (Christm.) Swing	*C. limettioides* Tanaka		*C. × limon* var. *limettioides* ined.	*C. ×lumia* Risso
limetta	*C. limon* (L.) Burm.	*C. limetta* Risso		*C. × limon* var. *limetta* ined.	*C. ×limon* (L.) Osbeck
rough lemon	*C. limon* (L.) Burm.	*C. jambhiri* Lush.	*C. ×taitensis* Risso	*C. × limonia* var. *jambhiri* ined.	*C. ×granulata* Raf.
rangpur lime	*C. limon* (L.) Burm.	*C. limonia* Osbeck		*C. × limonia* Osbeck var. *limonia*	*C. ×limon* (L.) Osbeck
Volkamer lemon	*C. limon* (L.) Burm.	*C. limonia* Osbeck		*C. × limonia* var. *volkameriana* Pasquale	*C. ×limon* (L.) Osbeck
calamondin	*C. reticulata* var. *austera* × *Fortunella* sp.	*C. madurensis* Lour.	*C. ×microcarpa* Bunge	*C. × microcarpa*	*C. ×microcarpa* Bunge
yuzu	*C. ichangensis* × *C. reticulata* var. *austera*	*C. junos* Sieb. ex Tanaka	*C. ×junos* Siebold ex Tanaka		*C. ×junos* Siebold ex Tanaka
sudachi	*C. ichangensis* × *C. reticulata* var. *austera*	*C. sudachi* hort. ex Shirai			*C. ×sudachi* hort. ex Shirai
kabosu	*C. aurantium* L.	*C. sphaerocarpa* hort. ex Tanaka			*Citrus* spp.
hassaku	*C. paradisi* Macf. x *C. reticulata* Blanco	*C. hassaku* hort. ex Tanaka			*C. ×aurantium* var. racemosa
hyuganatsu	*C. sinensis* (L.) Osbeck	*C. tamurana* hort. ex Tanaka			*C. ×aurantium* L.
natsudaidai	*C. paradisi* Macf.	*C. natsudaidai* Hayata			*C. ×aurantium* L. var. racemosa (Risso) ined.

IP details: IP country

- 90% of cultivars in MCCDD are or were IP-protected via plant patent (USA), PBR/PVP (others), or applied for IP rights
- Details are important for anyone interested in these cultivars
- Patent and PBR documents are crucial sources of information
- Many cultivars are protected in multiple jurisdictions (as many as 21); there's a separate line for each

	Cultivar name	IP country	Application #	App date	Grant #	Grant date	Expiration
2	Jin Xia Tao Ye Cheng	China	20140999.3	2014-09-15	CNA20140999.3	2018-01-01	2038-01-01
3	Jin Xiang Yu	China	20150901.9	2015-06-18	CNA20150901.9	2017-05-01	2037-05-01
4	Jin Yu Man Tang	China	20090309.5	2009-05-18	CNA20090309.5	2015-11-01	2035-11-01
5	Jingchu Xiangyou 1	China	20170281.7	2017-02-19	CNA20170281.7	2019-07-22	2039.07-19
6	Joe's Early	Australia	2005042	2005-02-21	4151	2010-11-16	2035-11-16
7	JPP	Spain	20205562	2020-08-04			
8	JR13	EU	20121063	2012-06-19	50985	2019-01-28	2049-12-31
9	JR13	South Africa	PT 6650	2012-05-11			
10	JR13	USA	20130347155	2012-06-22	25454	2015-04-21	2032-08-08
11	Ju Xiang Hong	China	20140106.3	2014-01-17	CNA20140106.3	2018-01-02	2038-01-02
12	Ju Xiang Long	China	20140105.4	2014-01-17	CNA20140105.4	2018-01-02	2038-01-02
13	Jutaro	Japan	779	1983-03-22	642	1984-09-05	2002-09-06
14	Jutopeiyu	Japan	31185	2016-05-30			
15	Kabuokawase	Japan	25121	2010-08-24	22558	2013-04-18	2013-04-18
16	Kagayaki	Japan	26406	2011-10-17	22468	2013-03-25	2043-03-25
17	Kagoshimawase	Japan	10607	1998-03-18	9126	2001-07-27	2026-07-27
18	Kamarina	—	—	—	—	—	—
19	Kamimurawase	Japan	25097	2010-08-18	22557	2013-04-18	2043-04-18
20	Kaminokawa	Japan	1369	1984-12-24	1144	1986-08-26	1994-08-27
21	Kanazawawase	Japan	107	1980-03-24	115	1981-05-27	1984-05-29
22	Kankitsu Chukan Bohon No 5	Japan	8728	1996-04-02	7508	1999-11-25	2024-11-25
23	Kankitsu Chukanbohon No 1g	Japan	7749	1995-03-31	5666	1997-07-28	2015-07-29
24	Kanoshizuku	Japan	23172	2008-11-20	19676	2010-08-13	2017-08-15
25	Kanpei	Japan	18355	2005-05-16	15548	2007-08-07	2037-08-07
26	Kantachirinpei	Japan	14848	2002-07-16	12721	2005-02-07	2011-02-08
27	Kantaro	Japan	18848	2005-10-03	16774	2008-03-18	2011-03-19
28	Karatachichukanbohonno 1go	Japan	3822	1990-03-31	4841	1996-01-19	2014-01-20
29	Karen	Japan	25720	2011-03-23	23037	2014-02-27	2044-02-27
30	Karninka	South Africa	PT 5749	2009-08-03	ZA 20125177	2012-11-06	2037-11-06
31	Katsuyamaiyokan	Japan	1568	1985-05-31	1442	1987-11-12	2005-11-13
32	Kawahara	Japan	12307	2000-01-26	10885	2002-12-16	2027-12-16
33	Kawai	Japan	726	1983-01-21	739	1985-01-23	1991-01-24
34	Kazuko	Japan	27953	2013-03-04	25119	2016-03-25	2017-03-28
35	Kedem	USA	9716479	2000-11-20	13612	2003-03-04	2020-11-20
36	Kepco	Australia	2010134	2010-06-29	—	—	—
37	KinnowLS	Argentina	16357	2016-01-12	3989	2017-06-16	2037-06-16
38	KinnowLS	Australia	2017097	2017-04-18			
39	KinnowLS	Brazil	218060003352015	2015-12-28	—	—	—
40	KinnowLS	Chile	1555	2015-11-09	55/16	2016-05-09	2034-05-09

IP details: Application #; Application date

- Application number is usually taken from PLUTO, but I have updated for some recent ones, and added entries PLUTO missed. I usually use the PLUTO format, to make enties easier to find if one goes back to that database.
- Application date is either the date an application was filed, or the date that it was published. I did not realize the distinction when I started the project. Maybe I'll have the energy to split this into two columns and revise/repopulate the data; but probably this distinction is not critical.

	Cultivar name	IP country	Application #	App date
2	Jin Xia Tao Ye Cheng	China	20140999.3	2014-09-15
3	Jin Xiang Yu	China	20150901.9	2015-06-18
4	Jin Yu Man Tang	China	20090309.5	2009-05-18
5	Jingchu Xiangyou 1	China	20170281.7	2017-02-19
6	Joe's Early	Australia	2005042	2005-02-21
7	JPP	Spain	20205562	2020-08-04
8	JR13	EU	20121063	2012-06-19
9	JR13	South Africa	PT 6650	2012-05-11
10	JR13	USA	20130347155	2012-06-22
11	Ju Xiang Hong	China	20140106.3	2014-01-17
12	Ju Xiang Long	China	20140105.4	2014-01-17
13	Jutaro	Japan	779	1983-03-22
14	Jutopeiyu	Japan	31185	2016-05-30
15	Kabuokawase	Japan	25121	2010-08-24
16	Kagayaki	Japan	26406	2011-10-17
17	Kagoshimawase	Japan	10607	1998-03-18
18	Kamarina	—	—	—
19	Kamimurawase	Japan	25097	2010-08-18
20	Kaminokawa	Japan	1369	1984-12-24
21	Kanazawawase	Japan	107	1980-03-24
22	Kankitsu Chukan Bohon No 5	Japan	8728	1996-04-02
23	Kankitsu Chukanbohon No 1g	Japan	7749	1995-03-31
24	Kanoshizuku	Japan	23172	2008-11-20
25	Kanpei	Japan	18355	2005-05-16
26	Kantachirinpei	Japan	14848	2002-07-16
27	Kantaro	Japan	18848	2005-10-03
28	Karatachichukanbohonno 1go	Japan	3822	1990-03-31
29	Karen	Japan	25720	2011-03-23
30	Karninka	South Africa	PT 5749	2009-08-03
31	Katsuyamaiyokan	Japan	1568	1985-05-31
32	Kawahara	Japan	12307	2000-01-26
33	Kawai	Japan	726	1983-01-21
34	Kazuko	Japan	27953	2013-03-04
35	Kedem	USA	9716479	2000-11-20
36	Kepco	Australia	2010134	2010-06-29
37	KinnowLS	Argentina	16357	2016-01-12
38	KinnowLS	Australia	2017097	2017-04-18
39	KinnowLS	Brazil	218060003352015	2015-12-28
40	KinnowLS	Chile	1555	2015-11-09

IP details: Grant #, Grant date

- Grant # = number of the patent or PBR that was issued by a national IP authority.
- Blank squares indicates that info is not available, usually because a grant has not yet been made.

	Cultivar name	Grant #	Grant date	Expiration
2	Jin Xia Tao Ye Cheng	CNA20140999.3	2018-01-01	2038-01-01
3	Jin Xiang Yu	CNA20150901.9	2017-05-01	2037-05-01
4	Jin Yu Man Tang	CNA20090309.5	2015-11-01	2035-11-01
5	Jingchu Xiangyou 1	CNA20170281.7	2019-07-22	2039.07-19
6	Joe's Early	4151	2010-11-16	2035-11-16
7	JPP			
8	JR13	50985	2019-01-28	2049-12-31
9	JR13			
10	JR13	25454	2015-04-21	2032-08-08
11	Ju Xiang Hong	CNA20140106.3	2018-01-02	2038-01-02
12	Ju Xiang Long	CNA20140105.4	2018-01-02	2038-01-02
13	Jutaro	642	1984-09-05	2002-09-06
14	Jutopeiyu			
15	Kabuokawase	22558	2013-04-18	2013-04-18
16	Kagayaki	22468	2013-03-25	2043-03-25
17	Kagoshimawase	9126	2001-07-27	2026-07-27
18	Kamarina	—	—	—
19	Kamimurawase	22557	2013-04-18	2043-04-18
20	Kaminokawa	1144	1986-08-26	1994-08-27
21	Kanazawawase	115	1981-05-27	1984-05-29
22	Kankitsu Chukan Bohon No 5	7508	1999-11-25	2024-11-25
23	Kankitsu Chukanbohon No 1g	5666	1997-07-28	2015-07-29
24	Kanoshizuku	19676	2010-08-13	2017-08-15
25	Kanpei	15548	2007-08-07	2037-08-07
26	Kantachirinpei	12721	2005-02-07	2011-02-08
27	Kantaro	16774	2008-03-18	2011-03-19
28	Karatachichukanbohonno 1go	4841	1996-01-19	2014-01-20
29	Karen	23037	2014-02-27	2044-02-27
30	Karninka	ZA 20125177	2012-11-06	2037-11-06
31	Katsuyamaiyokan	1442	1987-11-12	2005-11-13
32	Kawahara	10885	2002-12-16	2027-12-16
33	Kawai	739	1985-01-23	1991-01-24
34	Kazuko	25119	2016-03-25	2017-03-28
35	Kedem	13612	2003-03-04	2020-11-20
36	Kepco	—	—	—
37	KinnowLS	3989	2017-06-16	2037-06-16
38	KinnowLS			
39	KinnowLS	—	—	—
40	KinnowLS	55/16	2016-05-09	2034-05-09

IP details: Expiration

- If a PBR grant has expired, I give that date. It is usually taken from PLUTO, but often looked up independently in the national plant variety bulletins/gazettes.
- If a PBR grant has not expired, I try to give a date for when it is estimated that it will expire. Sometimes this information appears in PLUTO, but very often it does not, and in such cases I try to take the duration of PBR for woody trees and vines for particular countries, as indicated in relevant legal documentation found on the UPOV website, and add that number of years to the date of grant.

	Cultivar name	Grant #	Grant date	Expiration
2	Jin Xia Tao Ye Cheng	CNA20140999.3	2018-01-01	2038-01-01
3	Jin Xiang Yu	CNA20150901.9	2017-05-01	2037-05-01
4	Jin Yu Man Tang	CNA20090309.5	2015-11-01	2035-11-01
5	Jingchu Xiangyou 1	CNA20170281.7	2019-07-22	2039.07-19
6	Joe's Early	4151	2010-11-16	2035-11-16
7	JPP			
8	JR13	50985	2019-01-28	2049-12-31
9	JR13			
10	JR13	25454	2015-04-21	2032-08-08
11	Ju Xiang Hong	CNA20140106.3	2018-01-02	2038-01-02
12	Ju Xiang Long	CNA20140105.4	2018-01-02	2038-01-02
13	Jutaro	642	1984-09-05	2002-09-06
14	Jutopeiyu			
15	Kabuokawase	22558	2013-04-18	2013-04-18
16	Kagayaki	22468	2013-03-25	2043-03-25
17	Kagoshimawase	9126	2001-07-27	2026-07-27
18	Kamarina	—	—	—
19	Kamimurawase	22557	2013-04-18	2043-04-18
20	Kaminokawa	1144	1986-08-26	1994-08-27
21	Kanazawawase	115	1981-05-27	1984-05-29
22	Kankitsu Chukan Bohon No 5	7508	1999-11-25	2024-11-25
23	Kankitsu Chukanbohon No 1g	5666	1997-07-28	2015-07-29
24	Kanoshizuku	19676	2010-08-13	2017-08-15
25	Kanpei	15548	2007-08-07	2037-08-07
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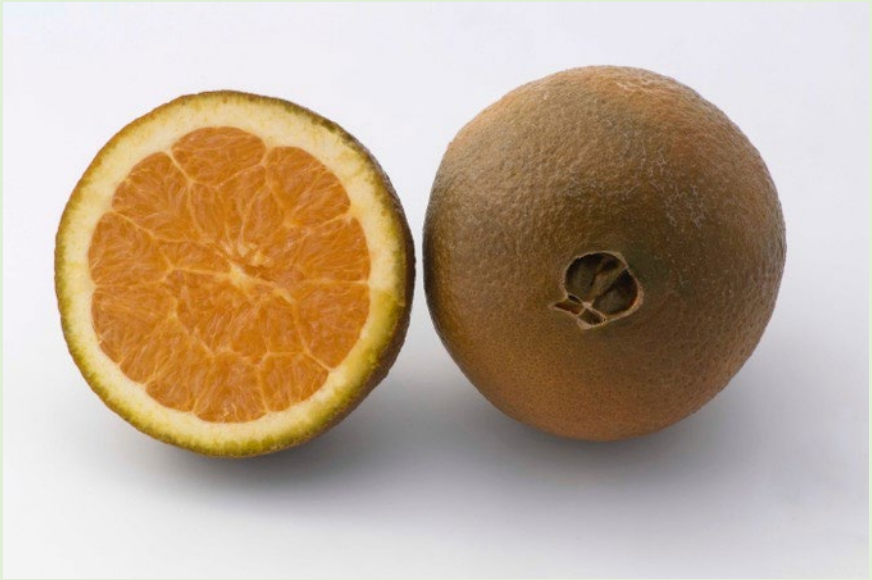
30	Karninka	ZA 20125177	2012-11-06	2037-11-06
31	Katsuyamaiyokan	1442	1987-11-12	2005-11-13
32	Kawahara	10885	2002-12-16	2027-12-16
33	Kawai	739	1985-01-23	1991-01-24
34	Kazuko	25119	2016-03-25	2017-03-28
35	Kedem	13612	2003-03-04	2020-11-20
36	Kepco	—	—	—
37	KinnowLS	3989	2017-06-16	2037-06-16
38	KinnowLS			
39	KinnowLS	—	—	—
40	KinnowLS	55/16	2016-05-09	2034-05-09

IP details: Expiration

- Germplasm collections, nurseries or growers can search the database to see which cultivars are about to go off patent/PBR in their jurisdiction.

	Cultivar name	Common name	IP country	Expiration	Description / notes
2	Hadass	mandarin hybrid	Israel	2019-01-02	Ellendale O.P. 1971; tree vigor strong; fruit sli
3	Pinalate	sweet orange	Spain	2019-02-08	Navelate navel orange mutation disc. San Pedr
4	MGJ14	mandarin hybrid	Spain	2019-02-12	Mutation of Clemenvilla (syn. Nova) mandarin
5	Basol	mandarin hybrid–	Spain	2019-04-11	Oronules mutation disc. 1999 in Castellón; fr
6	Carruquina	mandarin hybrid–	Spain	2019-04-11	Nules mutation 1993; ripens late.
7	Bétera	lemon	Spain	2019-04-12	Fino mutation. similar to Fino, but almost thor
8	Albir	mandarin hybrid?	Spain	2019-07-08	Fortune × Kara; tree triploid, resistant to Alte
9	Mistral	mandarin hybrid	Spain	2019-07-08	Triploid mandarin hybrid, ripens early, mid-No
10	G-6	mandarin hybrid	Australia	2019-07-25	Imperial mandarin bud mutation, disc. Nangilo
11	Cami	mandarin hybrid	Italy	2019-12-30	50-15A-6 (Comune clementine × Avana mand
12	Florina	mandarin hybrid?	EU	2020-01-08	Tree triploid; PBR surrendered 2020-01-08.
13	Vered	mandarin hybrid	Israel	2020-02-03	Satsuma mandarin (cultivar unspecified) × Mic
14	Andes I	mandarin hybrid–	Chile	2020-03-14	Clemenules mutation ripening 2-3 weeks earli
15	TDE2	mandarin hybrid	Brazil	2020-04-06	(Temple tangor × Dancy [4x] mandarin) [4x] ×
16	TDE3	mandarin hybrid	Brazil	2020-04-06	(Temple tangor × Dancy [4x] mandarin) [4x] ×
17	TDE4	mandarin hybrid	Brazil	2020-04-06	(Temple tangor × Dancy [4x] mandarin) [4x] ×
18	Mor	tangor	Israel	2020-04-24	Gamma irradiation–induced bud mutation of M
19	Nectar	mandarin hybrid	Israel	2020-04-24	Wilking × Wilking, 1979; tested as 56/4; tree r
20	Rishon	mandarin hybrid	Israel	2020-04-24	Temple tangor × Michal mandarin, crossed 19
21	Winola	mandarin hybrid	Israel	2020-04-24	Wilking mandarin × Minneola tangelo, crossed
22	Chas	lemon	Spain	2020-06-23	Verna 51 mutation, ripens late. ES PBR surren
23	Ravit	mandarin hybrid	Israel	2020-07-07	Parthenocarpic; fruit oblate, no neck; rind dark
24	Merav	mandarin hybrid	Chile	2020-07-15	Wilking mandarin × Michal mandarin, crossed
25	Summer Prim	lemon	Spain	2020-07-28	Spontaneous tree mutation of Primofiori (syn.
26	Cambria	sweet orange-nav	South Africa	2020-09-04	Rustenburg navel mutation disc. 1989, Cambri
27	Edelgard	mandarin hybrid	South Africa	2020-09-04	Ellendale O.P., more vigorous and productive,
28	Dity	mandarin hybrid	USA	2020-11-20	Gamma irradiation–induced bud mutation of E
29	Kedem	mandarin hybrid	USA	2020-11-20	Gamma irradiation–induced bud mutation of R
30	Merav	mandarin hybrid	USA	2020-11-20	Wilking mandarin × Michal mandarin, crossed
31	Moria	tangor	USA	2020-11-20	Gamma irradiation–induced bud mutation of M
32	Nectar	mandarin hybrid	USA	2020-11-20	Wilking × Wilking, 1979; tested as 56/4; tree r
33	Nora	mandarin hybrid	USA	2020-11-20	Gamma irradiation–induced bud mutation of N
34	Orri	mandarin hybrid	USA	2020-11-20	Gamma irradiation–induced bud mutation of C
35	Tami	mandarin hybrid	USA	2020-11-20	Temple tangor × Michal mandarin, crossed 19
36	Vered	mandarin hybrid	USA	2020-11-20	Satsuma mandarin (cultivar unspecified) × Mic
37	Yanov	mandarin hybrid	USA	2020-11-20	Gamma irradiation–induced bud mutation of N
38	Shani	mandarin hybrid	USA	2020-12-04	Wilking mandarin × Michal mandarin, crossed
39	Weller Red	sweet orange	Australia	2021-08-01	Washington navel orange spontaneous mutati
40	TDE 2	mandarin hybrid	Paraguay	2022-01-27	(Temple tangor × Dancy [4x] mandarin) [4x] ×

1st U.S. Plant Variety Protection application for citrus: ‘M 4’ navel orange, grant 202000300, issued 2021-07-30



Application #	Variety Name	Experimental Name	Scientific Name	Common Name	Applicant	Application Date	Certified Seed	Certificate Status	Status Date	Issued Date	Years Protected
202100483	MATAN	4/9	Prunus dulcis (Mill.) D. A.	ALMOND	The State of Israel, Ministry of Agriculture & Rural Development, Agricultural Research Organization	08/24/2021	No	Application Pending	08/24/2021		
202100419	MAKAKO	D98-693	Prunus dulcis (Mill.) D. A.	ALMOND	Consejo Superior de Investigaciones Científicas (CSIC)	06/28/2021		Application Pending	06/28/2021		
202100367	Kuemsil		Fragaria X ananassa	STRAWBERRY	Gyeongsangnam-do Agricultural Research & Extension Services	06/17/2021	No	Application Pending	06/17/2021		
202100233	TP 15 41		Pyrus L.	PEAR	Ben-Dor Fruits and Nurseries	03/09/2021	No	Application Pending	03/09/2021		
202100204	ARCCIT9		Citrus reticulata	MANDARIN	Agricultural Research Counsil	02/03/2021	No	Application Pending	02/03/2021		
202100046	WMJ63		Malus domestica Borkh.	APPLE	Willashben Pty Ltd	11/09/2020	No	Application Pending	11/09/2020		
202100027	Kizuri	33/1/77	Malus domestica Borkh.	APPLE	Better3fruit N.V.	10/22/2020		Application Pending	10/22/2020		
202000435	ALEXA	9-353-65	Rubus idaeus	RASPBERRY	SPLENDOR PRODUCE, S. DE R.L. DE C.V.	09/25/2020	No	Application Pending	09/25/2020		
202000434	MAYA	SP-OS	Rubus idaeus	RASPBERRY	SPLENDOR PRODUCE, S. DE R.L. DE C.V.	09/25/2020	No	Application Pending	09/25/2020		
202000433	MALU	8-353-14	Rubus idaeus	RASPBERRY	SPLENDOR PRODUCE, S. DE R.L. DE C.V.	09/25/2020	No	Application Pending	09/25/2020		
202000428	Fujino Kagayaki		Vitis vinifera L.	GRAPEVINE	Tomio Shimura	09/17/2020	No	Application Pending	01/12/2021		
202000358	C3335		Vitis vinifera L.	GRAPEVINE	Agricultural Research Council	08/13/2020	No	Application Pending	08/13/2020		
202000302	BPN02		Malus domestica	APPLE	Julie Apple Pty LTD	07/22/2020	No	Application Pending	07/22/2020		
202000300	M 4		Citrus sinensis	ORANGE	Pacific Fresh Enterprises PTY LTD	07/16/2020	No	Certificate Issued	07/30/2021	07/30/2021	25
202000248	FRIDA	912-20B	Rubus idaeus	RASPBERRY	Black Venture Farm SA de RL de CV	04/07/2020	No	Application Pending	04/07/2020		
202000247	AMELALI	601-67	Rubus subgen rubus	BLACKBERRY	Black Venture Farm SA de RL de CV	04/07/2020	No	Application Pending	08/19/2021		
202000246	AKETZALI	2000-182 Update Address 7/1/2021	Rubus subgen rubus	BLACKBERRY	Black Venture Farm SA de RL de CV	04/07/2020	No	Certificate Issued	06/04/2021	06/04/2021	20

Plant Variety Protection compared with Plant Patents

The 2018 Farm Bill (Public Law 115-334, Sec. 10108; Dec. 20, 2018) expanded the scope of the U.S. Plant Variety Protection Act (PVPA) to include protection for asexually reproduced plant varieties[1]. A draft rule proposing revisions was published for comment in the Federal Register in July 2019. A final rule published January 6, 2020 (Fed. Reg. 85-3:422-433) revised Plant Variety Protection (PVP) regulations to allow the Plant Variety Protection Office to issue certificates of protection for asexually reproduced plant varieties.

Before the PVPA amendment, intellectual property protection on asexually reproduced plants in the United States was available chiefly in the form of plant patents (used for most fruits and nuts) and utility patents (used for a few genetically modified fruit trees). Only seven fruit cultivars propagated by seed, four papayas, two peaches and one plantain[2], received PVP certificates; 19 PVP applications were pending as of Nov. 14, 2021.

These are the most important differences between PVPs and plant patents:

1) A breeder who commercializes a new asexually reproduced plant cultivar outside the U.S. has four and six years for non-woody and woody species[2], respectively, to apply for variety protection under the PVPA. If the cultivar has been sold outside of the U.S. more than one year previously, an application for a plant patent is barred, but one can still file for PVP protection.

2) PVP may provide a longer term of protection, 20 and 25 years from date of issue for non-woody and woody species, respectively, for PVP vs. 20 years from date of filing of U.S. plant patent applications.

3) PVP certificates provide broader protection for breeders than do plant patents. In addition to covering the variety owned by the titleholder, PVP certificates also require the titleholder's permission before commercialization of any variety that has been "essentially derived" from the titleholder's variety.

4) PVP rights owners are obliged to deposit propagating material with the USDA within three months of notice of certificate issuance. The implementation of this requirement has been delayed until Jan. 6, 2023 so that the PVPO can examine the technical feasibility of making deposits for asexually reproduced plants. (Plant patent applications do not require a deposit.)

5) The deposited propagating material will become publicly available once the term of protection expires. Since plant patent titleholders are not obliged to deposit propagating material, they can if they wish structure commercialization so as to keep the cultivar proprietary after the expiration of the patent term.

6) PVP applications cost $5,150 per certificate, plus a fee of $3,000 for the deposit of propagating material; the official fees for a plant patent typically total less than half of that amount.

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[1]The PVPA defines "asexually reproduced" as "produced by a method of plant propagation using vegetative material (other than seed) from a single parent, including cuttings, grafting, tissue culture, and propagation by root division."

[2]The Register of New Fruit and Nut Varieties/Cultivars described BY520-9 (Guardian®) peach in List 39, and TruGold peach in List 44 ("PVP 200400055; 7 Aug. 2006.").

[3]For definitions of non-woody and woody species see the USDA's "Growth Habits Codes and Definitions."

Breeder(s)

- Often from PLUTO, but more frequently I went back to the original sources.
- I always list all the names that are credited in my sources, even when as many as 16 breeders appear.
- Format: last name, given name, middle name(s) or initials; each breeder is separated by a semicolon.
- Hispanic and Latin American names: penultimate name, when 3 or more names are given, is typically the paternal family name, placed first for searching; thus, “Navarro Lucas, Luis”.

	Cultivar name	Breeder(s)
2	Daisy SL	Roose, Mikeal L.; Williams, Timothy E.
3	DaisySL	Roose, Mikeal L.; Williams, Timothy E.
4	Dajung	Park, Dong-Man; Kim, Ho-Yeol; Kim, Sung-jong; Hwang, Hae
5	DalKomi	Park, Youngchul; Kim, Jin Young; Lee, Chang Hoon; Park, Mo
6	Dana	Carmi, Nir; Neuman-Leshem, Hanna; Frydman-Shani, Ahuva;
7	Danit	Carmi, Nir; Frydman-Shani, Ahuva; Vardi, Aliza; Yaniv, Yosef;
8	Danit	Carmi, Nir; Frydman-Shani, Ahuva; Vardi, Aliza; Yaniv, Yosef;
9	Daysy SL	Roose, Mikeal L.; Williams, Timothy E.
10	De Wet	De Wet Du Preez, E.
11	Del Obispo	Hernandez-Ros, C.
12	Delizia	Bertolami, Carmelo; Presti, Francesca
13	Dity	Vardi, Aliza; Spiegel-Roy, Pinchas; Frydman-Shani, Ahuva; Elch
14	Dowakiwase	Dowaki, Yoshinobu
15	Dream Navel	Nicholson, Donald J.
16	Dunbrody 1	Smith, H.J.
17	DV	Davidson, John
18	Early Gold	Castle, William
19	Early Sicily	Reforgiato Recupero, Giuseppe; Russo, Giuseppe; Recupero,
20	Early Sicily	Reforgiato Recupero, Giuseppe; Russo, Giuseppe; Recupero,
21	Early St. Ann	Brown, Ralph T.
22	Ecriec 109	Owada, Atsushi; Wakizuka, Takumi; Nagao, Toshiro; Sugawa
23	Ecriec 118	Owada, Atsushi; Wakizuka, Takumi; Nagao, Toshiro; Sugawa
24	Edelgard	Breedt, Hannes J.; Snyman, J.C.
25	Edit	Spiegel-Roy, Pinchas
26	Ehimekashi Dai14go	Kita, Keiji; Shigematsu, Yukinori; Yakushiji, Hiromichi; Ishikav
27	Einav	Carmi, Nir; Yaniv, Yosef; Kanonich, Joshua; Amit, Tal
28	Elna	Nieuwoudt, Hermias C.
29	Elule	Rozowski, B.
30	Emmie	Esser, A.J.
31	Empress-A	Robinson, Francis H. and Allison G.
32	Erice	Calabrese, Francesco; De Michele, Andrea; Barone, Francesc
33	Esbal	Escrig Ballester, Antonio
34	Eureka Seedless	Breedt, Hannes
35	Excalibur	Wilson, Richard and Lynda
36	Eylul	Uzun, Aydin; Gulsen, Osman; Kafa, Gucer; Seday, Ubeyit
37	F17	Grobler, Linda
38	F6 P12	Reforgiato Recupero, Giuseppe; Russo, Giuseppe; Recupero,
39	Fairchild LS	Roose, Mikeal L.; Williams, Timothy E.
40	Fayosant	Fayos Espana, Salvador

Affiliated organization(s)

- a university (stating which campus, when there's more than one: "University of Florida, Lake Alfred")
- a government institute or research branch ("Instituto Valenciano de Investigaciones Agrarias"; "USDA-FL" including the state
- a farm ("2PH Farms"; "Goldup Farms")
- a nursery ("Excalibur Rare Fruit Tree Nursery")
- an intellectual property organization ("Citrogold", "CGACC")
- a private corporation ("Yandilla Park Ltd.")
- In theory I'd like to distinguish between organizations involved in the breeding of a cultivar, such as a university or government institute, and commercial organizations that are distributors of intellectual property. In practice however there is a continuum between the extremes, and I'm not always sure whether for example INIA in Spain is one or the other.

	Cultivar name	Breeder(s)	Affiliated organization
2	Daisy SL	Roose, Mikeal	University of California, Riverside
3	Dajung	Park, Dong-Ma	National Horticultural Research Institute, Rural Development Administration
4	DalKomi	Park, Youngch	Jeju Agricultural Research and Extension Services
5	Dana	Carmi, Nir; Ne	ARO–Volcani Center
6	Danit	Carmi, Nir; Fr	ARO–Volcani Center
7	Danit	Carmi, Nir; Fr	ARO–Volcani Center
8	Daysy SL	Roose, Mikeal	University of California, Riverside
9	De Wet	De Wet Du P	CGACC
10	Delizia	Bertolami, Car	A. Bertolami Nursery
11	Dity	Vardi, Aliza; Sp	ARO–Volcani Center
12	Dowakiwase	Dowaki, Yoshi	?
13	Dream Navel	Nicholson, Do	Smith, E. D. & Sons
14	Dunbrody I	Smith, H.J.	Stargrow
15	DV	Davidson, John	Variety Access
16	Early Gold	Castle, Willian	University of Florida, Lake Alfred
17	Early Sicily	Reforgiato Rec	CRA-ACM
18	Early Sicily	Reforgiato Rec	CRA-ACM
19	Early St. Ann	Brown, Ralph	Louisian State University Citrus Research Station
20	Ecriec 109	Owada, Atsush	Ehime Citrus Research Institute, National Federatio of Agricultural Co-operative Association
21	Ecriec 118	Owada, Atsush	Ehime Citrus Research Institute, National Federatio of Agricultural Co-operative Association
22	Edelgard	Breedt, Hanne	Agricultural Research Council
23	Edit	Spiegel-Roy, Pi	ARO–Volcani Center
24	Ehimekashi Dai14go	Kita, Keiji; Shig	Ehime Fruit Tree Experiment Station
25	Einav	Carmi, Nir; Ya	ARO–Volcani Center
26	Erice	Calabrese, Fra	Instituto di Coltivazioni Arboree; Instituto di Patologiz Vegetate
27	Esbal	Escrig Balleste	INIA; IVIA
28	Eureka Seedless	Breedt, Hanne	Agricultural Research Council
29	Excalibur	Wilson, Richar	Excalibur Rare Fruit Tree Nursery
30	Eylul	Uzun, Aydin; C	Alata Horticultural Research Institute (Alata Bahçe Kültürleri Araştırma Enstitüsü Müdürlüğü
31	F17	Grobler, Linda	Citrogold
32	F6 P12	Reforgiato Rec	CRA-ACM
33	Fairchild LS	Roose, Mikeal	University of California, Riverside
34	FEI	Esselen, D. Le	Esselen Nursery
35	Femminello Adamo	?	Istituto Sperimentale per l'Agrumicoltura (now CREA-ACM)
36	Femminello Cerza	?	Istituto Sperimentale per l'Agrumicoltura (now CREA-ACM)
37	Femminello Continella	Continella, Sav	University of Catania
38	FF 1-22-79	Stover, Ed; Mc	USDA-FL
39	Finolate	Porras, Ignacio	Murcian Institute of Agriculture and Food Research and Development (IMIDA)
40	First Canadian	Nair, Madhava	—

Cultivar origin

- This is the country in which a cultivar was bred or discovered. When that country was also where the IP claim was first filed, its name appears on its own: “Spain”.
- If a line details the IP info and names for a country other than the country of origin, I have place a dash in front of the name: “—Australia”.
- For cultivars bred in Spain or Italy, I make a EU listing primary (without the dash) if both the it and the country of origin have granted PBR; more often the country’s grant is surrendered when EU goes into effect.
- The dashes help sort out the duplicate entries.
- For the USA I list the state of origin (“USA-FL”, “USA-TX”).

	Cultivar name	Origin
1	**Cultivar name**	**Origin**
2	Daisy SL	—USA-CA
3	Dajung	South Korea
4	DalKomi	South Korea
5	Dana	—Israel
6	Danit	—Israel
7	Daysy SL	—USA-CA
8	De Wet	South Africa
9	Delizia	Italy
10	Dity	—Israel
11	Dowakiwase	Japan
12	Dream Navel	USA-FL
13	Dunbrody 1	South Africa
14	DV	Australia
15	Early Gold	USA-FL
16	Early Sicily	—Italy
17	Early Sicily	Italy
18	Early St. Ann	USA-LA
19	Ecriec 109	Japan
20	Ecriec 118	Japan
21	Edelgard	South Africa
22	Edit	Israel
23	Ehimekashi Dai14go	Japan
24	Einav	Israel
25	Erice	Italy
26	Esbal	Spain
27	Eureka Seedless	—South Africa
28	Excalibur	USA-FL
29	Eylul	Turkey
30	F17	—South Africa
31	F6 P12	Italy
32	Fairchild LS	—USA-CA
33	FE1	South Africa
34	Femminello Adamo	Italy
35	Femminello Cerza	Italy
36	Femminello Continella	Italy
37	FF 1-22-79	USA-FL
38	Finolate	Spain
39	First Canadian	Canada
40	First Canadian	—Canada
41	First Canadian Golden	Canada
42	First Canadian Golden	—Canada
43	FJ	Australia
44	FJ	—Australia

Description / notes

- This is the most original, challenging, laborious, and important part of the project: a description of the origin, tree and fruit for each cultivar. It follows a framework which is similar to the order in the Register of New Fruit and Nut Cultivars.
- Compiling these descriptions took a lot of time, often an hour of more per cultivar, but if one person assembles this information, it will be readily available to thousands of citrus stakeholders: breeders, researchers, germplasm curators, IP rights purveyors, nurseries, growers, marketers, and anyone curious about modern citrus cultivars.

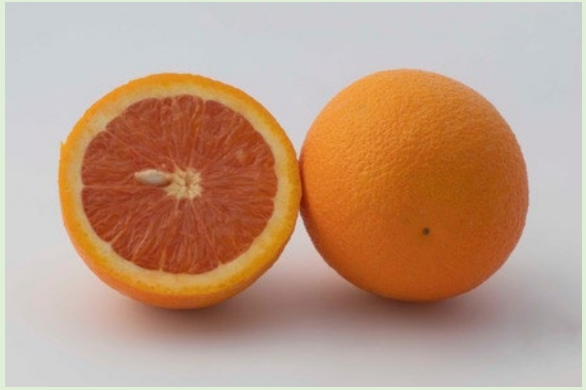
	Cultivar name	Description / notes
2	Ronit	Orah mandarin hybrid × Shani mandarin hybrid; yield high; fruit oblate, midsize; rind orange, glossy, peels easily; flesh orange, 18.8 °Brix, TA 1.2%, TSS/TA ratio 15.67; seedless; ripens Feb.-Mar. in Israel; shelf-life long.
3	Rosalina	Lina sweet orange branch mutation, disc. 2009; stable clone selected after 6 generations; tree growth habit upright, more spherical and compact than parent; fruit: small, round, less oblong than parent; stalk end depression deep; navel midsize; rind dark orange to red, texture medium to rough; rind thickness me
4	Rosalina	Lina sweet orange branch mutation, disc. 2009; stable clone selected after 6 generations; tree growth habit upright, more spherical and compact than parent; fruit: small, round, less oblong than parent; stalk end depression deep; navel midsize; rind dark orange to red, texture medium to rough; rind thickness me
5	Rouge La Toma	Ruby [syn. Henninger Ruby] grapefruit mutation, disc. La Toma Plantation, Salta Province, Argentina; fruit oblate, height 87 mm, diameter 91 mm, 318 g; rind yellow, texture fine, soft, thick; segments 9-10; flesh deep red, similar to Burgundy, very juicy, juice content 41.7%, 17 °Brix, acidity high, 5.51 g/L, pH 2.83;
6	Royal Late	Tree compact; ripens late, with or 1 week before Witkrans. ZA PBR application rejected 2002-06-21.
7	Ru Yi Jie	?
8	Rubidoux #1	Unknown pummelo × unknown grapefruit, possibly Siamese Sweet pummelo × pigmented grapefruit, bred at USDA Date and Citrus Station, Indio, released to UCR when that station closed; left in the Citrus Clonal Protection Program Rubidoux (CCPP) screen house when Ed Nauer retired in 1990; released b
9	Ruby	Branch mutation of Olinda Valencia sweet orange, disc. 1992 in Nelspruit, Mpumalanga, South Africa; tree midsize to large; dense, similar to other Valencia Late cultivars; production good; suited to warmer districts, where higher lycopene levels result and excessive cropping is less prevalent; trees tend to bear
10	Ruby	Thompson grapefruit bud mutation disc. 1929 in McAllen, TX; rind blushed pink to red; flesh pink, deeper red than Thompson, fine-grained; seeds few to none. Ruby and Redblush are considered identical, for all practical purposes.
11	Ruby Pomelit	Gamma irradiation–induced bud mutation of Pomelit; fruit spheroid to slightly oval; rind light yellow to yellow-green, thin; flesh pinkish-white to pinkish, deeper colored along segment walls; seedless when grown in isolation, seedy when cross-pollinated.
12	Ruby SL	Gamma irradiation–induced bud mutation of Ruby Valencia, obtained 2013 in Nelspruit, Mpumalanga, South Africa; tree midsize to large, canopy dense; fruit spheroid, 65-80 mm, fairly firm; rind bright orange, slightly pebbly; flesh deep pink to red, with a closed to slightly open core; seedless in mixed variety bloc
13	Ruby Valencia	Branch mutation of Olinda Valencia sweet orange, disc. 1992 in Nelspruit, Mpumalanga, South Africa; tree midsize to large; dense, similar to other Valencia Late cultivars; production good; suited to warmer districts, where higher lycopene levels result and excessive cropping is less prevalent; trees tend to bear
14	Ruby Valencia SL	Gamma irradiation–induced bud mutation of Ruby Valencia, obtained 2013 in Nelspruit, Mpumalanga, South Africa; tree midsize to large, canopy dense; fruit spheroid, 65-80 mm, fairly firm; rind bright orange, slightly pebbly; flesh deep pink to red, with a closed to slightly open core; seedless in mixed variety bloc
15	Ruby Valencia SL	Gamma irradiation–induced bud mutation of Ruby Valencia, obtained 2013 in Nelspruit, Mpumalanga, South Africa; tree midsize to large, canopy dense; fruit spheroid, 65-80 mm, fairly firm; rind bright orange, slightly pebbly; flesh deep pink to red, with a closed to slightly open core; seedless in mixed variety bloc
16	RubyGS	Daisy mandarin mutation, induced from two budwood irradiations, in 1999 and 2006; tree vigorous, same as Daisy; sprawling and open with first production in second year from planting, becoming more spherical and drooping in subsequent years; tends to alternate bear, especially if fruit is held late on tree; fru
17	RubyGS	Daisy mandarin mutation, induced from two budwood irradiations, in 1999 and 2006; tree vigorous, same as Daisy; sprawling and open with first production in second year from planting, becoming more spherical and drooping in subsequent years; tends to alternate bear, especially if fruit is held late on tree; fru
18	Saebyeolbong	Nucellar mutation of Shiranui mandarin hybrid × Palsak [팔삭] hassaku [pummelo type × Kunenbo-A (sweet orange × Kishu mandarin)], seedling planted 2003, fruited 2013, selected 2016; tree vigorous, growth habit upright; self-incompatible; fruit spheroid to slightly pyriform, with a distinctive short rounded n
19	Safor	Fortune mandarin (2n) × Kara mandarin (4n), crossed 1996, selected 2004, tested as IVIA Tri 2; tree triploid, vigorous, growth habit erect-drooping, shape commonly obloid-ellipsoid; tolerant to CTV and alternaria; leaves dark green; fruit obloid with a convex base, height 52 mm, diameter 56 mm, 98 g; rind da
20	Safor	Fortune mandarin (2n) × Kara mandarin (4n), crossed 1996, selected 2004, tested as IVIA Tri 2; tree triploid, vigorous, growth habit erect-drooping, shape commonly obloid-ellipsoid; tolerant to CTV and alternaria; leaves dark green; fruit obloid with a convex base, height 52 mm, diameter 56 mm, 98 g; rind da
21	Safor	Fortune mandarin (2n) × Kara mandarin (4n), crossed 1996, selected 2004, tested as IVIA Tri 2; tree triploid, vigorous, growth habit erect-drooping, shape commonly obloid-ellipsoid; tolerant to CTV and alternaria; leaves dark green; fruit obloid with a convex base, height 52 mm, diameter 56 mm, 98 g; rind da
22	Safor	Fortune mandarin (2n) × Kara mandarin (4n), crossed 1996, selected 2004, tested as IVIA Tri 2; tree triploid, vigorous, growth habit erect-drooping, shape commonly obloid-ellipsoid; tolerant to CTV and alternaria; leaves dark green; fruit obloid with a convex base, height 52 mm, diameter 56 mm, 98 g; rind da
23	Safor	Fortune mandarin (2n) × Kara mandarin (4n), crossed 1996, selected 2004, tested as IVIA Tri 2; tree triploid, vigorous, growth habit erect-drooping, shape commonly obloid-ellipsoid; tolerant to CTV and alternaria; leaves dark green; fruit obloid with a convex base, height 52 mm, diameter 56 mm, 98 g; rind da
24	Saga	Konioshi satsuma mandarin × Fairchild mandarin hybrid, crossed 1976; tree midsize, vigor medium, open, shoots slightly thin; leaves long-ovate, slightly small; pollen almost absent; susceptible to citrus scab; fruit oblate, apex flat, 110-120 g; rind red-orange (fades in sunlight), texture medium, thin, weak, easy to
25	Sagakashi 34go	Nucellar mutation of Shiranui mandarin hybrid × Beni- Amanatsu natsudaidai [紅甘夏; pummelo type × Kishu mandarin], obtained 1996, selected 2002; tree midsize, vigorous, stronger than Shiranui, spreading; thorny when young, disappearing when fruiting starts; biennial bearing lower than Shiranui; fruit pyriform
26	Sagakashi 35go	Nishinoka tangor [西之香; Kiyomi × Trovita sweet orange] × Ota ponkan; tree midsize, vigor moderate, weakening when fruiting begins; branches short and dense; thorns occur on treetops in summer and autumn, but almost disappear when tree vigor subsides; coldhardiness similar to Kiyomi; fruit oblate, diar
27	Sagakashi 6go	Nucellar mutation of Yamashita Beni [山下紅早生] satsuma mandarin × Fairchild mandarin hybrid, obtained 1991, selected 2002, tested as Y-1; tree open, midsize, vigor stronger than Yamashita Beni; shoots extremely long, internode length long; shoots thorny until fruiting begins, then thorns decrease and almo
28	Sagakashi 9go	Nucellar mutation of Ueno satsuma mandarin × Kawano natsudaidai (pummelo type × Kishu mandarin), obtained 1995, selected 2013; tree midsize, vigor very strong compared to Ueno; thorns present on immature branches but disappear with age; internode length long; fruit oblate, height 49 mm, diameter 61
29	Sagakashi35go	Nishinoka tangor [西之香; Kiyomi × Trovita sweet orange] × Ota ponkan; tree midsize, vigor moderate, weakening when fruiting begins; branches short and dense; thorns occur on treetops in summer and autumn, but almost disappear when tree vigor subsides; coldhardiness similar to Kiyomi; fruit oblate, diar
30	Saganta	? ES PBR application withdrawn 1994-03-14.
31	Saint Andre	Four-year-old tree disc. in US Furr (syn. Furr) mandarin hybrid orchard, Kirkwood area, Eastern Cape Province, South Africa ("origin is still being established," according to CGACC brochure); tree ~25% smaller than parent; fruit spheroid to slightly oblate, midsize, diameter 55-72 mm, smaller than US Furr; rinc
32	Sakamura 1go	Tree midsize, open, vigor medium, thornless; leaves spindle-shaped, small; pollen scanty; fruit oblate, apex flat; rind dark orange, slightly smooth, thickness medium, easy to peel, resists puffing; flesh dark orange, juiciness moderate, sugar content slightly high, acidity low, aroma moderate; seedless; ripens midsea
33	Sakitsu	Banpeiyu pummelo × Chandler pummelo, crossed 1986; tree triploid, large, vigorous, shoots thick, internode length long; leaves oval, very large; pollen abundant; fruit oblate, very large; rind pale yellow, smooth, difficulty of peeling medium; oil glands midsize, sparse; core open; segment membrane tough; flesh
34	Samba	Introd. in South Africa 2016; fruit 50-64 mm, 100-110 g; rind red-orange, peelability between clementine and Nova; segments separate easily; flesh deep orange, flavor excellent; low-seeded when not cross-pollinated; ripens early to midseason, immediately after Nova, Apr-June in South Africa.
35	San Hong	Spontaneous bud mutation of Red-fleshed Guanximiyou disc. by Cai Huocheng, a farmer in Pinghe County, Fujian Province; tree upright when young, semi-spreading when mature, crown semi-spheroid; fruit obovoid to pyriform, height 161-183 mm, diameter 154-177 mm, 1,300-1,800 g; rind naturally orange yel
36	San Hong Mi You	Spontaneous bud mutation of Red-fleshed Guanximiyou disc. by Cai Huocheng, a farmer in Pinghe County, Fujian Province; tree upright when young, semi-spreading when mature, crown semi-spheroid; fruit obovoid to pyriform, height 161-183 mm, diameter 154-177 mm, 1,300-1,800 g; rind naturally orange yel
37	Sando	Spontaneous mutation of Fina clementine mandarin, disc. 1999 in Almenara, Castellón, Spain; tree vigor strong, thornless; self-incompatible, parthenocarpic, pollen viable; productive, tends to alternate bear; fruit slightly oblate, diameter/height ratio 1.1, diameter 55-65 mm, 80-100 g; rind intense red-orange, thic
38	Sangdojosaeng	Sasaki satsuma mandarin bud sport, disc. 1996, selected 1998, tested as Jares108; tree vigor medium, growth habit open, spreading; fruit oblate, height 27 mm, diameter 37 mm, fruit shape index 130; rind yellowish orange; flesh orange, 10.5 °Brix, TA 0.96, TSS/TA 11; seedless; ripens late Oct. in Jeju, 25 days bef
39	Sanzo	Fina (Commune) clementine mandarin branch mutation, disc. in Sanzo district near Corigliano Calabro, Cosenza Province, Italy; tree vigorous, shape spheroid, growth habit weeping once fruiting starts; leaves wider than Fina; not subject to alternate bearing; not susceptible to Phytophthora citrophthora; fruit sp
40	Sarahyang	Nucellar mutation of Setoka tangor × natsudaidai [하귤]; tree vigor medium, growth habit intermediate; self-incompatible; resistant to canker, but very sensitive to viruses; fruit flattened sphere, 206 g; rind orange, smooth, thin, thickness 2.3 mm, easy to peel, dry; flesh orange, very sweet and rich, 14 °Brix (1-1
41	Sasakiunshu	Bud or single-tree mutation of Yamazaki satsuma mandarin (Yamakazi descended from Miyagawa); tree open, size and vigor medium, slightly stronger than Miyagawa; leaves oval, small but larger than Miyagawa; parthenocarpic; fruit oblate, midsize, similar to Miyagawa except rind dark orange, very smooth, thin,
42	Sashika 1go	Tree vigor strong, interbnde length long, shoots thorny, leaves oval; pollen abundant; cold tolerant; rind yellow, smooth, somewhat thick; flesh pink, somewhat juicy, sweet, acidity low; seeds few; ripens Dec.-Apr., ships Apr.-June; shelf life long; used in cider and skin care products.
43	Sasshu	Nucellar mutation of F-2428 ponkan mandarin × Maltese Blood orange; tree midsize, vigorous, growth habit upright; fruit oblate spheroid, shape index 120-130, 160 g; compared to Morita and Ota ponkans, there are fewer radial grooves in the fruit stalk; rind dark orange in late Dec., easily peeled; flesh dark or
44	Satonokaori	Kiyomi tangor × Murcott mandarin hybrid, crossed 1980, selected 1995; tree midsize, growth habit intermediate, vigor a little weak, thorny, internode length short; leaves lanceolate, very small; pollen scanty; fruit short-ovate, apex depressed, 180 g; rind orange, rough, thick, easy to peel; segment membrane so

Description format

- Origin: pedigree (female/seed parent x male parent; alternatively details of a mutation, whether induced or natural); date crossed (or discovered), date selected, test name(s), date introduced;
- tree: ploidy (if other than diploid), size, vigor, growth habit, bearing (productive, regular, subject to alternate bearing), disease resistance or susceptibility;
- fruit shape, size (length/ height, diameter, weight);
- rind color, texture, thickness, ease of peeling; albedo color (if distinctive); segment number, membrane texture;
- flesh color, texture, flavor, ºBrix, TA, TSS/TA ratio;
- number of seeds (or seedless); monoembryonic or polyembryonic
- ripens (including where [e.g., “ripens mid-Nov to mid-Dec. in Ehime Prefecture”]), and comparisons with well-known cultivars (“2 weeks after ‘Lane Late’ ”);
- postharvest (“stores >2 months”);
- and anything else of interest.

Sample description: ‘Ruby Valencia’ sweet orange

Branch mutation of Olinda Valencia sweet orange, disc. 1992 in Nelspruit, Mpumalanga, South Africa; tree midsize to large; dense, similar to other Valencia Late cultivars; production good; suited to warmer districts, where higher lycopene levels result and excessive cropping is less prevalent; trees tend to bear alternately, crop manipulation is required in on-years; fruit tend to crease and split when the crop is heavy; trees and fruit can develop chimeras; fruit spheroid, midsize to large, diameter 60-80 mm, but tends to overcrop, producing smaller fruit; rind bright orange, smooth to slightly pebbly, moderately easy to peel; flesh deep pink to red, pigmented by lycopenes, with a closed to slightly open core; juice content 49-59%; 10- 12 ºBrix, TA 1.0-1.4%, TSS/TA ratio 7.2-10.0; seeds 0-3.2 in a mixed block; for fresh market and for juice, for blending with other orange juices to provide a deeper orange color; ripens with other Valencias; hangs well due to firmness and high internal quality.



Sources: Register

- Here I provide the list number of and DOI link to the Register of New Fruit and Nut Cultivars (previously the Register of New Fruit and Nut Varieties) in which a description of the cultivar was published. These are articles in *HortScience*.
- If a cultivar description appeared before 1996 and was included in Brooks & Olmo, Third edition (1997), the annotation “B&O” appears. (The MCCDD descriptions are often revised and expanded from B&O.)
- A recently completed online Register (with all cultivars, 1944-2020) appears at: https://www.fruitandnutlist.org

85	Cultivar name	List
86	914	47
87	950	47
88	3 ELS 0	50
89	3X97	50
90	5-1-99-5	50
91	7 ELS I	50
92	7 ELS C3	50
93	7B97	50
94	7ELS I	50
95	Ariake	40
96	Armstrong Seedless	B&O
97	Armstrong Seedless Valencia	B&O
98	Asuki	50
99	Australian finger lime	47
100	Australian Outback	
101	Australian Sunrise	
102	Autumn Gold Late Navel	45
103	B9-65	48
104	Barnfield Late Navel	45
105	Barnfield Late Navel	45
106	Barnfield Late Navel	45
107	Barnfield Late Navel	45
108	Barnfield Summer Navel	45
109	Belalate	51
110	Bingo	50
111	Bitters	45

Register of New Fruit and Nut Cultivars List 51

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Crop listings. Almond, Apple, Apricot, Avocado, Avocado rootstock, Blackberry, Blue Honeysuckle, Blueberry, Cacao, Cherimoya, Cherry–sweet, Cherry–tart, Cherry rootstock, Chestnut, Citrus, Citrus rootstock, Cranberry, Currant, Elderberry, Goji, Grape, Hazelnut, Kiwifruit, Mango, Mulberry, Nectarine, Passion Fruit, Peach, Pear, Pecan, Pineapple, Pistachio, Pistachio rootstock, Plum and interspecific hybrids, Raspberry, Red Bayberry, Strawberry, Sugar Apple, Walnut.

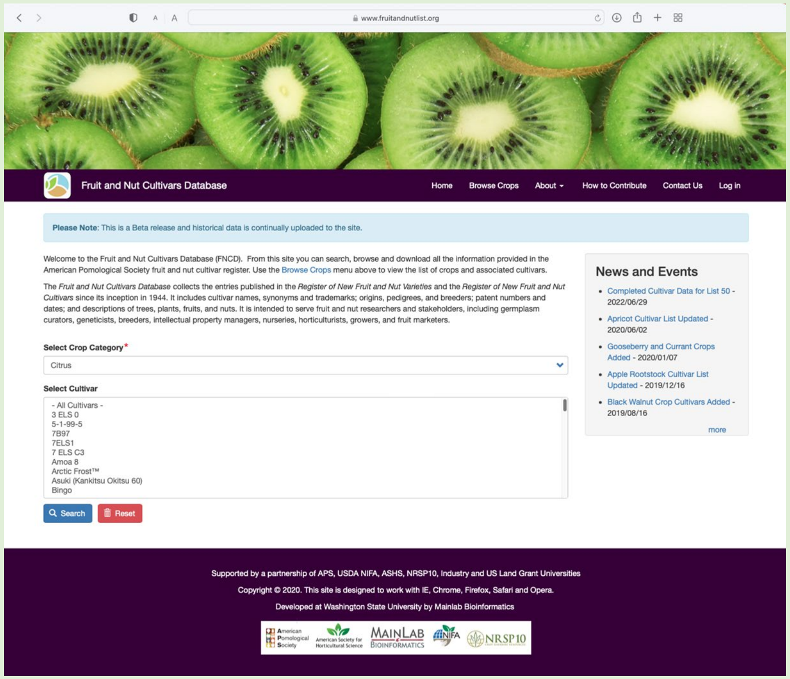
ALMOND

Thomas M. Gradziel, Dept. of Plant Sciences, University of California, Davis, CA

Pentacebas Csic (Penta). Self-fertile, S-genotype, kernel-to-shell ratio 33%. **Origin:** Centro de Edafología y Biología Aplicada del Segura Consejo Superior de Investigaciones Científicas, Espinardo, Murcia, Spain, by F. Dicenta, T. Cremades, P.J. Martínez-García, ...

APPLE

HortScience Vol. 57(9) September 2022 1175



CITRUS

Fred Gmitter, Jr. and Jude Grosser, Citrus Research and Education Center, University of Florida, Lake Alfred, FL

Tracy L. Kahn and David Karp, Dept. of Botany and Plant Sciences, University of California, Riverside, CA

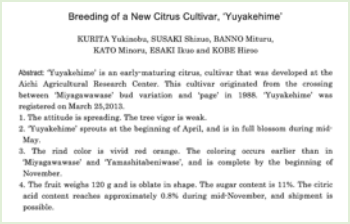
11C017R (Premier Murcott™). Low-seeded, easy-peeling tangor with low acidity. **Origin:** Bundaberg Research Station, Queensland Department of Agriculture and Fisheries, Queensland, Australia, by M.W. Smith. Ellendale tangor × Murcott (syn. Honey Murcott) tangor, crossed 2001, seed subjected to two rounds of gamma irradiation to create a stable mutation that maintained high fruit quality and production, and few seeds. USPP 34,166; 26 Apr. 2022. **Fruit:** oblate, height 55 mm, diameter 85 mm, 210 g, neck absent; firm; rind orange, smooth, thickness 3.3 mm, easy to peel; segments 10-12; flesh deep orange; 12.6 °Brix, TA 0.48% in mid-June; flavor suited to Asian markets that prefer non-acidic fruit; seeds 0-5, monoembryonic; ripens midseason, end of May to early July in central Queensland; suitable for long-distance shipping. **Tree:** medium to large; vigorous when young, but early and heavy cropping restrain subsequent vigor; growth habit elliptic to oblong, canopy density light to medium; very productive from an early age, with no sign of alternate bearing; susceptible to *Alternaria (Alternaria alternata)*.

Aecol. Induced Clemenules mutation with fruit that ripens earlier, is deeper colored, and is virtually seedless even when cross-pollinated. **Origin:** Gestion Ecosistemas Agricolas, Valencia, Spain, by E. Gara-

Sources with hyperlinks

Cultivar name	Source 1	Source 2	Source 3
Rishon	USPP 8377	Yaniv, Yossi, and Nir Carmi. 2011. The Israeli Citrus improvement progra	Goldenberg, L., Yaniv, Y., Porat, R. and Carmi, N., 2014. Effects of gamma-ir
Rishonit	Israeli Citrus breeding program	Yaniv, Yossi, and Nir Carmi. 2011. The Israeli Citrus improvement progra	Nir Carmi CV
RM10			
Robertson Navel	USPP 126	UCR Citrus Variety Collection: Robertson	Hodgson, R.W. 1967. Horticultural varieties of citrus. In The citrus industry
Robin	Miller, J.E., Breedt, H.J., Maritz, J.G.J. and Froneman, I.J. 1996. Promising Citrus	Sippel, A.D., Bijzet, Z., Froneman, I.J., Combrink, N.K., Maritz, J.G., Hannweg, K.F., Severn-Ellis, A.A. and Manicom, B.Q., 2015. Citrus breeding in Sout	
Robyn	UCR Citrus Variety Collection: Robyn	USDA GRIN: Robyn	Mupambi, Giverson. 2010. Studies to reduce the size of the navel-end openi
Rohde Summer Navel	AU Plant Varieties Journal, Volume 11, Issue 1: Rohde Summer Navel	USPP 6733	Chislett Farms cultivar information for Rohde Summer Navel
Rojo Blanco	UCR Citrus Variety Collection: Rojo Blanco	USDA GRIN: Rojo Blanco	
Roma	Miller, J.E., Breedt, H.J., Maritz, J.G.J. and Froneman, I.J. 1996. Promising Citrus hybrids selected from the South African Breeding Programme. Proc. Int. Soc. Citriculture (1):181-184.		
Ronel	Carstens, Karin. 1990. Determination of distinctness among citrus cultivars using biochemical and molecular markers. MS thesis, Rhodes University, p. 41.		
Ronit	Israeli Citrus breeding program	Nir Carmi CV	
Rosalina	USPP 31258		
Rouge La Toma	Foguet, J.L., A.S. Blanco, J.L. González, and H.F. Vinciguerra. 1999. Variedades	Guarrasi, Valeria. 2011. Electronic olfactory system to evaluate the fruit q	Da Graca, J.V., Louzada, E.S. and Sauls, J.W., 2004. The origins of red pigme
Royal Late	Citrogold cultivar information for Witkrans	South African export standards for oranges	
Ru Yi Jie	China: Announcement of plant variety rights authorization, 2017-05-01: Ruyi orange		
Rubidoux #1	UCR Citrus Variety Collection: Rubidoux 1	USDA GRIN: Rubidoux	
Ruby	Citrogold cultivar information for Ruby Valencia	Chaires, Peter. 2019. Mission is on to mine blood orange-like variety in Flo	Spain: Start of red-fleshed Ruby Valencia orange harvest. FreshPlaza, 2016-0
Ruby	USPP 53	Friend, W.H. 1934. The origin of a superior red-fleshed grapefruit: bud mu	UCR Citrus Variety Collection: Redblush
Ruby Pomelit	Sippel, A.D., Bijzet, Z., Froneman, I.J., Combrink, N.K., Maritz, J.G., Hannweg,	Barry, Graham. 2014. Citrus cultivars – their lineage and nomenclature.	
Ruby SL	USPP 31794		
Ruby Valencia	Citrogold cultivar information for Ruby Valencia	Chaires, Peter. 2019. Mission is on to mine blood orange-like variety in Flo	Spain: Start of red-fleshed Ruby Valencia orange harvest. FreshPlaza, 2016-0
Ruby Valencia SL	USPP 31794		
RubyGS	USPP 30662		
Rusty	AU Plant Varieties Journal, Vol. 30 Number 1: application for Rusty		
Saebyeolbong	Park, Jae Ho; Yun, Su Hyun; Park, Suk Man; Koh, Sang Woog. 2017. A new citr	KR PVP application: Saebyeolbong	Woo, Jin-Kyu; Yun, Su-Hyun; Yi, Kyung Uk; Park, Young Chul; Lee, Hye-Yo
Safor	Cuenca, J., Aleza, P., Juárez, J., Pina, J.A., Navarro, L., 2010. 'Safor' mandarin: a	USPP 21581	Sdiri, S., Navarro, P., Monterde, A., Salvador, A., Cuenca, J., Aleza, P. and Be
Saga	JP PVP	Masao Iwamasa, Japan Fruit Association cultivar information for Saga.	
Sagakashi 34go	Yatsuda, S., Matsuo, Y., Nakamura, N., Sakai Oohara, Y. and Suetsugu, N. 2007	JP PVP	Saga Prefecture cultivar description for Sagakashi 34go mandarin hybrid
Sagakashi 35go	Matsumoto, Atsushi. 2020. Saga Prefecture original citrus 'Saga Fruit Test No.	Matsumoto, Atsushi. 2020. Saga Prefecture original citrus 'Saga Fruit Test I	JP PVP
Sagakashi 6go	Characteristics of the red-based early-maturing Citrus unshiu variety 'Saga Fru	Matsuo, Yoichi et al. 2012. New citrus variety 'Saga Fruit Test No. 6' = カ	JP PVP
Sagakashi 9go	Cultivation of a new variety of satsuma mandarin, 'Saga Fruit Test No. 9' = 温	Yield and fruit quality in multi-cultivation of 'Saga Fruit Test No. 9' = '佐賀	JP PVP
Sagakashi35go	Matsumoto, Atsushi. 2020. Saga Prefecture original citrus 'Saga Fruit Test No.	Matsumoto, Atsushi. 2020. Saga Prefecture original citrus 'Saga Fruit Test I	JP PVP
Saint Andre	CGACC cultivar information for Saint Andre	Landbouweekblad 2014-11-28: Hennie Ehlers	
Sakamura 1go	JP PVP Gazette	JP PVP	
Sakitsu	JP PVP	Japanese PVP Gazette 2005-10-24	
Samba	XLnT Citrus to release Samba mandarin in South Africa. FreshPlaza, 2016-05-2	Komati Fruits cultivar information for Samba	
San Hong	Zeng Wei L.G. 2016. Biological characteristics and cultivation techniques of Sa	Wang, Y., He, W., Fu, X., Chen, Q. and Wang, X., 2019, October. Effect o	Wang, Y., Fu, X., He, W., Chen, Q. and Wang, X. 2019, December. Effect o
Sando	IVIA cultivar information for Sando	Sando Clementine SL	FreshPlaza, 2019-12-13: Sando expands development to South Africa
Sangdojosaeng	Park, Young Chul; Oh, Hyun Woo; Kan, Jong Hoon; Lee, Joong Seok; Chin, Se	KR PVP grant: Sangdojosaeng	
Sanzo	Caruso, Marco; Perri, Francesco; Russo, Giuseppe. 2016. Sanzo, nuova selezio	Eleuteri, Marco. 2017. Sanzo, variedad tardía 'Made in Italy' que garantiza	Sanzo, the latest clementine variety, makes its official debut. FreshPlaza, 202
Sarahyang	Rural Development Administratio cultivar information for Sarahyang	KR PVP application: Sarahyang	Woo, J.K., Yun, S.H., Yi, K.U., Park, Y.C., Lee, H.Y., Kim, M., Lee, Y., Song,

Kurita, Yukinobu; Susaki, Shizuo; Banno, Mituru; Kato, Minoru; Esaki. Ikuo; Kobe, Hiroo. 2014. Breeding of a new citrus cultivar, 'Yuyakehime' = カンキツ新品種「夕焼け姫」の育成. Research bulletin of the Aichi-ken Agricultural Research Center = 愛知県農業総合試験場研究報告 46:59-66.



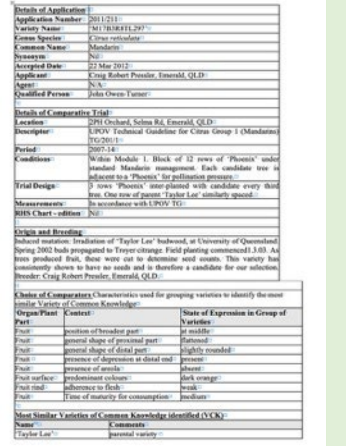
Breeding of a New Citrus Cultivar, 'Yuyakehime'

KURITA Yukinobu, SUSAKI Shizuo, BANNO Mituru,
KATO Minoru, ESAKI Ikuo and KOBE Hiroo

Abstract: 'Yuyakehime' is an early-maturing citrus, cultivar that was developed at the Aichi Agricultural Research Center. This cultivar originated from the crossing between 'Miyagawawase' bud variation and 'page' in 1988. 'Yuyakehime' was registered on March 25,2013.

1. The attitude is spreading. The tree vigor is weak.
2. 'Yuyakehime' sprouts at the beginning of April, and is in full blossom during mid-May.
3. The rind color is vivid red orange. The coloring occurs earlier than in 'Miyagawawase' and 'Yamashitabeniwase', and is complete by the beginning of November.
4. The fruit weighs 120 g and is oblate in shape. The sugar content is 11%. The citric acid content reaches approximately 0.8% during mid-November, and shipment is possible.

Information sources



Details of Application	
Application Number	2011/211
Variety Name	'M17B3R8TL297'
Genus Species	*Citrus reticulata*
Common Name	Mandarin
Synonym	Nil
Accepted Date	22 Mar 2012
Applicant	Craig Robert Pressler, Emerald, QLD
Agent	N/A
Qualified Person	John Owen-Turner
Details of Comparative Trial	
Location	2PH Orchard, Selma Rd, Emerald, QLD
Descriptor	UPOV Technical Guideline for Citrus Group 1 (Mandarins) TG/201/1
Period	2007-14
Conditions	Within Module 1. Block of 12 rows of 'Phoenix' under standard Mandarin management. Each candidate tree is adjacent to a 'Phoenix' for pollination pressure.
Trial Design	3 rows 'Phoenix' inter-planted with candidate every third tree. One row of parent 'Taylor Lee' similarly spaced.
Measurements	In accordance with UPOV TG
RHS Chart - edition	Nil

Origin and Breeding

Induced mutation: Irradiation of 'Taylor Lee' budwood, at University of Queensland. Spring 2002 buds propagated to Treyer citrange. Field planting commenced 1.3.03. As trees produced fruit, these were cut to determine seed counts. This variety has consistently shown to have no seeds and is therefore a candidate for our selection. Breeder: Craig Robert Pressler, Emerald, QLD.

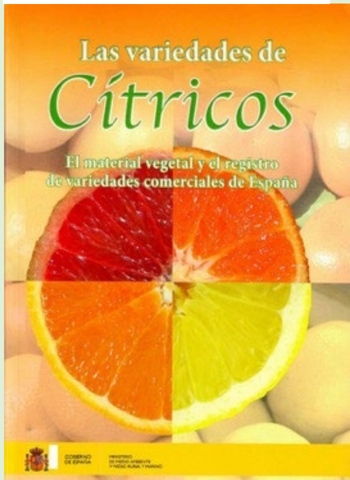
Choice of Comparators Characteristics used for grouping varieties to identify the most similar Variety of Common Knowledge

Organ/Plant Part	Context	State of Expression in Group of Varieties
Fruit	position of broadest part	at middle
Fruit	general shape of proximal part	flattened
Fruit	general shape of distal part	slightly rounded
Fruit	presence of depression at distal end	present
Fruit	presence of areola	absent
Fruit surface	predominant colours	dark orange
Fruit rind	adherence to flesh	weak
Fruit	Time of maturity for consumption	medium

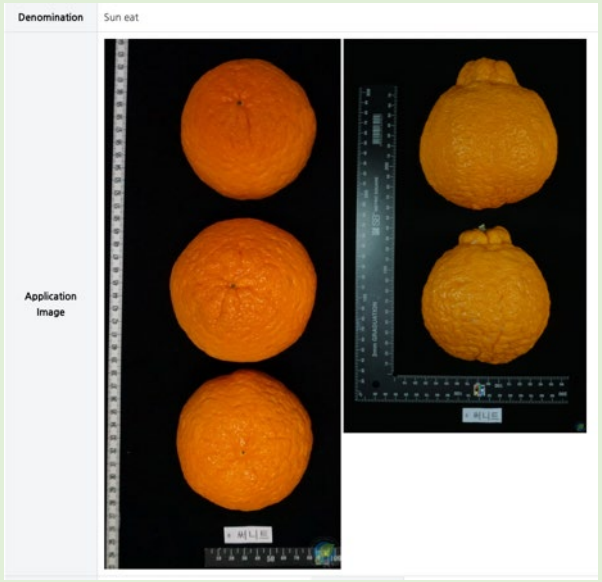
Most Similar Varieties of Common Knowledge identified (VCK)

Name	Comments
'Taylor Lee'	parental variety

- US plant patents
- CPVO, Japanese, Australian, South Korean PBR, which when granted include detailed descriptions
- Scientific literature, esp. *HortScience* cultivar articles
- Release notes
- Register of New Fruit and Nut Cultivars descriptions
- International Society of Citriculture Proceedings
- Google translations of foreign material
- Descriptions from citrus books (~275 in my library)
- Notes from 20+ years of citrus research
- Brochures from Citrogold, IVIA, NSW DPI, etc.
- Information sent by breeders



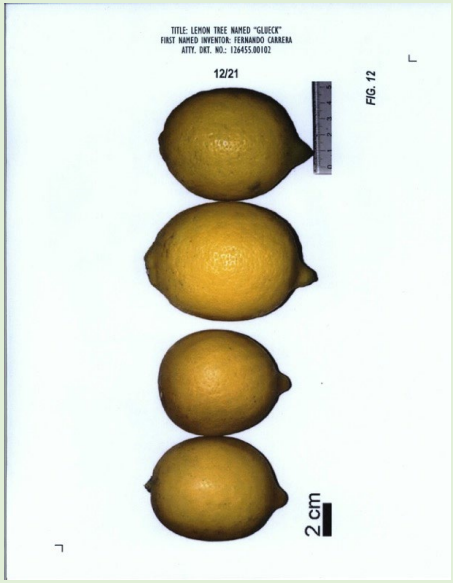
Cultivars of potential interest



‘Suneat’: red-skinned ‘Shiranui’
South Korea, 2013

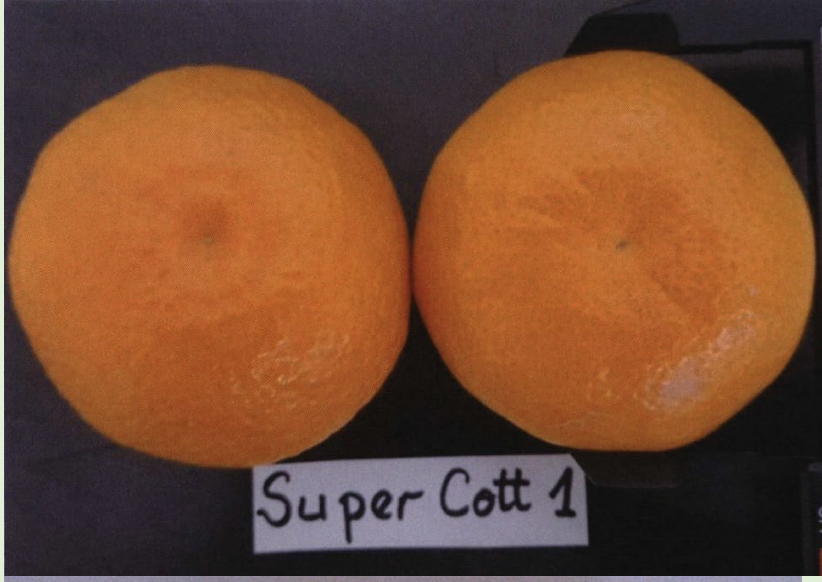
‘BRS Rubra Cara’: variegated Cara Cara
Brazil, 2017

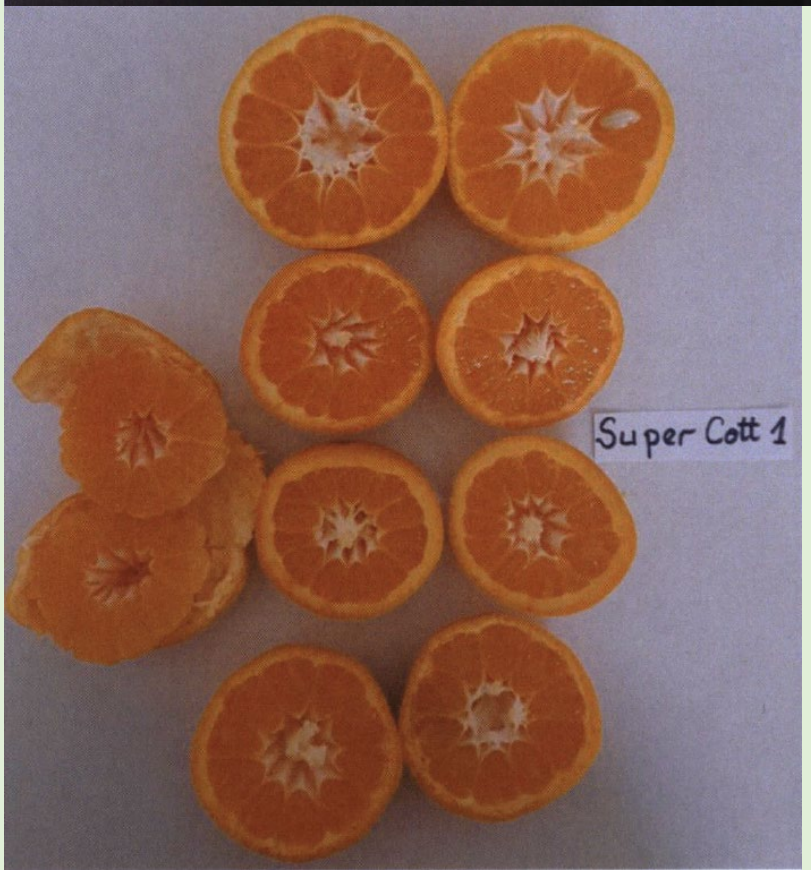
‘Glueck’ >
acidless lemon
Argentina, 2020



< ‘Zhong Gan Suo 5 Hao’
Golden Autumn mandarin
China, 2013

‘Star Cott 1’ (Super Cott 1; Starcott 1). Low-seeded mutation of Nadorcott mandarin hybrid, ripening 6-7 weeks earlier. **Origin:** Qualioagro, Casablanca, Morocco, by M. Zemzami. Gamma irradiation–induced bud mutation of Nadorcott, obtained 2013; grafted in Kénitra, Morocco; tested in Beni Mellal, Morocco. Moroccan PBR applied for. USPP 33,563; 19 Oct. 2021. **Fruit:** oblate, height 63 mm, diameter 65 mm; rind smooth, reddish orange, thickness 2.95 mm, peels easily, with medium albedo strands present; segments 9-11, membrane thin; flesh strong reddish orange, soft, juice content >50%, 10-13 ºBrix, TA 1.2% to 0.75%; seeds 1 under heavy open field cross-pollination, polyembryonic; ripens 6-7 weeks before Nadorcott, December in Beni Mellal; similar to parent in tolerance to spring heat and winter frost. **Tree:** ellipsoid, growth habit upright, vegetation dense; branches thornless, trunk bark smooth; leaves lanceolate, long, narrow; pollen viability low, 6.5% vs. 60% for parent.





‘Noah’ Valencia orange

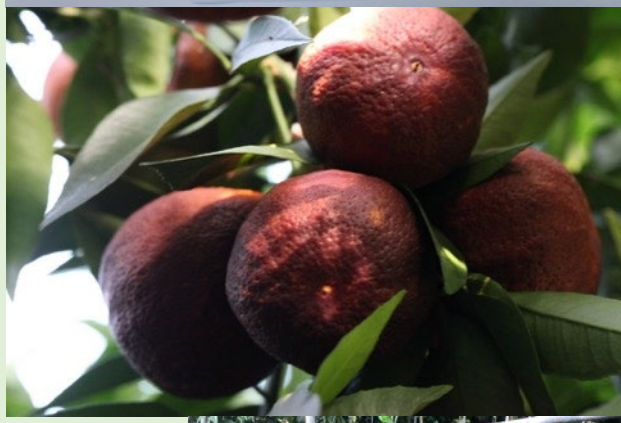
Valencia orange sport, disc. in a citrus grove in Lake Wales, FL. Tree diploid; vigor very high, growth habit weeping, domelike; canopy very dense, apical dominance weak, branches abnormally long, often double back and grow in a disorderly manner; juvenile trees thornless; leaves larger than on standard orange trees, with a distinct waviness on edges; tree healthier than standard Valencia, resistant or tolerant to huanglongbing. Fruit of higher quality and larger size than normally produced on HLB-infected orange trees; fruit very rounded, large, height 82 mm, width 78 mm; navel present on 60% of fruit; rind yellow orange (Rhs 23A), thickness slightly greater than standard Valencia, 6 mm, texture medium rough, similar to Valencia; segments 11; flesh orange (RHS N253); flavor sweet-tart, 10.5 º Brix, TA 0.84%, TSS/TA ratio 12.5 on 13 Feb. 2020, from HLB-infected trees; seeds 0-2; ripens with standard Valencia, mid- to late February in central Florida, but harvest window longer, through mid-June.

‘Hanba R6’ (‘한바알6’) tangor

Origin: Kim, Sihyun; Hannong Bio Industry, South Korea

KR PBR application: 2021-332; 2021-07-19

‘Shiranui’ mandarin hybrid × ‘Sanguinelli’ blood orange (?); tested as BKM 1678; tree growth habit open; flower medium yellow; tends to fruit in clusters; fruit oblong/pyriform, height 90 mm, diameter 70 mm; neck present, length and thickness intermediate; rind red, rough, thick, adherence to flesh medium; flesh red, pigmented with anthocyanins; virtually seedless; ripens in February in Jeju, South Korea.



- South Korean Plant Variety Gazette 277 [=품종보호공보 제 277호], 2021-08-15 [in Korean, in HWP format]
- KR PVP application, with photos of Hanba R6
- Kim, Misun, Si Hyun Kim, Ho Bang Kim, Young Chul Park, and Kwan Jeong Song. 2020. Some factors affecting the efficiency of hybrid embryo rescue in the ‘Shiranuhi’ mandarin. Horticultural Science and Technology 38(2):271-281.

‘Huamei No. 2’ mandarin hybrid

(‘华美2号’) = “Gorgeous 2”

Origin: Jiang, Dong; Chongqing Lvkang Fruit Industry Co. China PBR application 20201005980; 2020-10-28

Nanxiang mandarin hybrid [南香 = Nankou, q.v.; Miho Wase satsuma × clementine mandarin hybrid] × Shatangju mandarin hybrid [砂糖橘]; tree vigor medium, upright when young, crown round; juvenile thorns long; anthers aborted, style higher than stamens; fruit oblate, small to midsize 98 g; rind orange-red, smooth, thin, thickness 2 mm, strong, easy to peel, aromatic, oil glands conspicuous, large, convex; apex colors before base; segments 9-11; flesh deep orange, firm, tender, flavor excellent and rich, 12.5 ºBrix; seedless; ripens early, late Sept. - early Oct. in Chongqing; stores and ships well.

- China MARA Announcement of variety rights application 130, official date 2021-03-01, published 2021-07-19
- Chongqing Lvkang Fruit Industry Co. description of Huamei 2
- “Small size, big market” why Huamei No. 2 will occupy a place = “小个头，大市场”为何说华美2号将占一席之地. New Citrus Varieties = 柑橘新品网 2020-08-29. [in Chinese]

Potential users and uses

- Citrus scientists
- Germplasm curators
- Geneticists
- Breeders
- Nurseries
- Farmers
- Citrus IP purveyors
- Marketers
- Consumers

Moving forward

- Add more modern non-IP cultivars
  —Australasian native citrus, citrons
- Add cultivars from non-UPOV nations
  —India, Pakistan, Malaysia, Vietnam, Egypt, Iran…
- Country contributors from citrus nations; will be credited
- Add photographs?
- Currently in Excel spreadsheet searchable but unwieldy
- Transition to searchble database on UCR website?
- Advisory board?
- Modern Citrus Cultivars book?

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