

## Dr. Duke's Phytochemical and Ethnobotanical Databases

### Chemicals found in Citrus sinensis

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
56	NARINGENIN	Pericarp	35000.0	45800.0		Jim Duke's personal files.
60	LIMONENE	Fruit	8300.0	9700.0	0.6409395320453212	--
23	CITRIC-ACID	Fruit	5600.0	9800.0	-0.4912433942967182	--
15	FIBER	Fruit	3740.0	47000.0	-0.8934118438004772	--
16	P-CYMENE	Fruit	3590.0	4070.0	-0.04098189676522262	--
14	POTASSIUM	Fruit	1400.0	13772.0	-0.3666795712783593	--
24	PECTIN	Fruit	1300.0	5900.0	-0.5601993872457034	--
15	MALIC-ACID	Fruit	600.0	2000.0	-0.8215787018847368	--
112	ASCORBIC-ACID	Fruit	500.0	4071.0	-0.03136646807240172	--
4	LYSINE	Fruit	470.0	3548.0	-0.1467119613903352	USDA's Ag Handbook 8 and sequelae)
14	BETAINE	Fruit	390.0	630.0	-1.0398613033298902	--
7	PHENYLALANINE	Fruit	310.0	2340.0	-0.34187787905261324	USDA's Ag Handbook 8 and sequelae)
3	ISOLEUCINE	Fruit	250.0	1888.0	-0.5255451749979052	USDA's Ag Handbook 8 and sequelae)
14	ARGININE	Fruit	230.0	4908.0	0.15957250579145005	--
2	LEUCINE	Fruit	230.0	1136.0	-0.8429441489050677	USDA's Ag Handbook 8 and sequelae)
28	CALCIUM	Fruit	210.0	5615.0	0.4058414049804431	--
15	METHIONINE	Fruit	200.0	1510.0	0.6791094324753408	USDA's Ag Handbook 8 and sequelae)
2	ASPARAGINE	Fruit	200.0	1800.0	0.3373215168393527	--
7	HISTIDINE	Fruit	180.0	1359.0	-0.24792284510655177	USDA's Ag Handbook 8 and sequelae)
27	LINOLEIC-ACID	Fruit	180.0	1359.0	-0.33622644162700344	USDA's Ag Handbook 8 and sequelae)
8	TYROSINE	Fruit	160.0	1208.0	-0.501692988706999	USDA's Ag Handbook 8 and sequelae)
4	THREONINE	Fruit	150.0	1132.0	-0.7838698402029908	USDA's Ag Handbook 8 and sequelae)
4	PHOSPHORUS	Fruit	136.0	1980.0	-0.3754207541761312	--
13	PALMITIC-ACID	Fruit	130.0	982.0	-0.35024794688904615	USDA's Ag Handbook 8 and sequelae)
22	MYRCENE	Fruit	130.0	140.0	-0.36272097374914564	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	CYSTINE	Fruit	100.0	755.0	-0.2882040289158333	USDA's Ag Handbook 8 and sequelae)
3	VALINE	Fruit	100.0	3020.0	-0.29566746601618277	--
65	MAGNESIUM	Fruit	98.0	1075.0	-0.4884044378711737	--
29	TRYPTOPHAN	Fruit	90.0	680.0	-0.23921305471754814	USDA's Ag Handbook 8 and sequelae)
3	ASPARTIC-ACID	Fruit	70.0	8607.0	-0.2038383572771155	--
20	CHOLINE	Fruit	70.0	160.0	-0.5734302834278399	--
15	ALPHA-LINOLENIC-ACID	Fruit	70.0	528.0	-0.913356590105175	USDA's Ag Handbook 8 and sequelae)
24	ETHANOL	Fruit Juice	64.0	900.0	1.0	--
8	GLUTAMIC-ACID	Fruit	60.0	7097.0	-0.4778760905604569	--
12	GLYCINE	Fruit	50.0	7097.0	1.3509995174874219	--
14	SULFUR	Fruit	46.0	1000.0	-0.28853428975640755	--
9	SINAPIC-ACID	Pericarp	45.0	100.0	1.0	--
1	SERINE	Fruit	40.0	2410.0	-0.43531280247846904	--
22	GAMMA-AMINOBUTYRIC-ACID	Fruit	40.0	730.0	-0.27868808492512787	--
28	ALPHA-PINENE	Fruit	35.0	40.0	-0.7083402631126611	--
3	ALANINE	Fruit	30.0	3775.0	0.02652939797970876	--
5	GLUTAMINE	Fruit	30.0	630.0	0.1767951575504613	--
53	LINALOOL	Fruit	30.0	530.0	-0.43753461385311765	--
2	PALMITOLEIC-ACID	Fruit	30.0	226.0	-0.30412481168854	USDA's Ag Handbook 8 and sequelae)
18	OLEIC-ACID	Fruit	20.0	1510.0	-0.4691070855395464	USDA's Ag Handbook 8 and sequelae)
61	FERULIC-ACID	Pericarp	20.0	180.0	1.0	--
5	SYNEPHRINE	Fruit	15.0	43.0		--
7	CHLORINE	Fruit	12.0	32.0	-0.6800304631000254	--
11	ALPHA-PHELLANDRENE	Fruit	12.0	14.0	-0.5695870460921888	--
13	BETA-PINENE	Fruit	11.0	13.0	-0.29742687330503664	--
5	SABINENE	Fruit	11.0	13.0	-0.5315196015036519	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
61	FERULIC-ACID	Fruit	10.0	30.0	-0.7627700713964738	--
8	DELTA-3-CARENE	Fruit	7.0	9.0	-0.5981394247478974	--
9	SINAPIC-ACID	Fruit	7.0	19.0	0.784062560233975	--
13	GERANIAL	Fruit	6.0	7.0	-0.9983227361677096	--
25	P-COUMARIC-ACID	Pericarp	5.0	75.0	1.0	--
25	P-COUMARIC-ACID	Fruit	5.0	17.0	-0.6943231755501756	--
2	DODECANAL	Fruit	5.0	20.0	0.9948320067476139	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
32	ALPHA-TOCOPHEROL	Fruit	4.0	29.0	-0.6752411923996696	--
4	NERAL	Fruit	4.0	5.0	-0.8791176720401793	--
20	CITRONELLAL	Fruit	4.0	5.0	-0.9952774234291415	--
6	ACETALDEHYDE	Fruit Juice	3.0	15.0	1.0	--
39	NIACIN	Fruit	2.0	31.0	-0.39701223426716226	--
23	ALPHA-TERPINEOL	Fruit	2.0	3.0	-0.40604181620664676	--
19	CARVONE	Fruit	2.0	10.0	-0.49999993853473	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
11	PANTOTHENIC-ACID	Fruit	2.0	19.0	0.05712424299404392	USDA's Ag Handbook 8 and sequelae)
102	CAFFEIC-ACID	Fruit	2.0	50.0	-0.3296566072538586	--
4	BORON	Fruit	1.89	27.5	-0.25022637010687165	--
13	ALPHA-TERPINENE	Fruit	1.0	2.0	-0.44934612100297294	--
60	LIMONENE	Fruit Juice	1.0	278.0		--
5	ALUMINUM	Fruit	1.0	165.0	-0.17551933701223474	--
53	BETA-CAROTENE	Fruit	1.0	28.0	-0.0966771336129336	--
11	GAMMA-TERPINENE	Fruit	1.0	2.0	-0.6509562680883627	--
31	THIAMIN	Fruit	1.0	7.0	0.21342198396383905	--
5	HEXANAL	Fruit	1.0	2.0		Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
9	TERPINOLENE	Fruit	1.0	2.0	-0.7498060467737104	--
6	IRON	Fruit	1.0	8.0	-0.49575433892938076	--
77	ZINC	Fruit	0.9	13.0	-0.5205322406758267	--
2	METHANOL	Fruit Juice	0.8	80.0	1.0	--
5	NERYL-ACETATE	Fruit	0.7	1.0	-0.724098948454428	--
35	GERANIOL	Fruit	0.7	1.0	-0.6057972802749785	--
5	BETA-ELEMENE	Fruit	0.7	1.0	-0.565275335737646	--
10	NEROL	Fruit	0.7	1.0	-0.5477997473775594	--
15	CITRONELLOL	Fruit	0.7	1.0	-0.5060981097957616	--
2	UNDECANAL	Fruit	0.7	1.0	-0.5758305509285185	--
12	COPPER	Fruit	0.44	5.5	-0.569630082366932	--
7	ALPHA-CAROTENE	Fruit	0.19	1.9	-0.26808750426637384	--
53	LINALOOL	Fruit Juice	0.15	4.69	1.0000000000000004	--
11	LITHIUM	Fruit	0.108	1.54	0.890343380696948	--
2	MOLYBDENUM	Fruit	0.1	0.385	-0.4080774738511709	--
23	ALPHA-TERPINEOL	Fruit Juice	0.09	1.1	-0.6501250791550391	--
1	ETHYL-BUTYRATE	Fruit Juice	0.08	1.02		--
11	GAMMA-TERPINENE	Fruit Juice	0.04	0.46	-1.0	--
3	SILVER	Fruit	0.027	0.055	-0.5875909007853288	--
3	HEXANOL	Fruit Juice	0.02	0.22		--
5	HEXANAL	Fruit Juice	0.02	0.65		--
3	NICKEL	Fruit	0.01	0.55	-0.6121948588601274	--
2	METHYL-BUTYRATE	Fruit Juice	0.01	0.1		--
6	ETHYL-ACETATE	Fruit Juice	0.01	0.58		--
24	CHROMIUM	Fruit	0.005	0.385	-0.45355683651553846	--
2	COBALT	Fruit	0.001	0.055	-0.5284569584957359	--
3	CADMIUM	Fruit	0.001	0.138	-0.23805307615553817	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	ARSENIC	Fruit	0.001	0.154	-0.33956845146287234	--
15	FOLACIN	Fruit	0.0	2.0	-0.019192793995839758	USDA's Ag Handbook 8 and sequelae)
71	THYMOL	Fruit	0.0	0.1	-0.7071067811865474	--
7	SALICYLATES	Fruit	0.0	200.0	0.236750790358027	--
15	RIBOFLAVIN	Fruit	0.0	3.0	-0.4303249009534089	--
1	N-METHYL-TYRAMINE	Fruit	0.0	2.0	-1.0	--
2	FARNESENE	Fruit	0.0	0.1	-1.0	--
15	LUTEIN	Fruit	0.0	3.0	-0.575590894746515	--
11	TYRAMINE	Fruit	0.0	1.0	0.7071067811865478	--
60	SELENIUM	Fruit	0.0	0.002	-0.38569128420884563	--
1	TRANS-2-HEXENOL	Fruit Juice	0.0	0.1		--
2	ALPHA-HUMULENE	Fruit	0.0	0.1	-0.5986253681056065	--
5	GERANYL-ACETATE	Fruit	0.0	0.1	-0.9446827484165164	--
1	MERCURY	Fruit	0.0	0.001	-0.7865389313824043	--
2	CITRONELLYL-ACETATE	Fruit	0.0	0.1	-0.9999999999999998	--
1	SODIUM	Fruit	0.0	29.0	-0.1812007490262155	--
5	SABINENE	Fruit Juice	0.0	0.15		--
14	MANGANESE	Fruit	0.0	8.0	-0.3507865335531638	--
176	QUERCETIN	Fruit		3.4	-0.7856446697799095	Jim Duke's personal files.
2	BETA-CRYPTOXANTHIN	Pericarp				Jim Duke's personal files.
15	TANGERETIN	Fruit				--
87	RUTIN	Leaf		9000.0	-0.44580487824979076	Jim Duke's personal files.
1	XANTHOXYLETIN	Root				Jim Duke's personal files.
6	BUTYRIC-ACID	Fruit				--
12	NARINGIN	Fruit Juice				Jim Duke's personal files.
8	HORDENINE	Fruit		0.0		--
19	D-LIMONENE	Fruit Juice				Jim Duke's personal files.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	VIOLAXANTHIN	Fruit				--
8	QUERCETAGETIN	Fruit Juice				Jim Duke's personal files.
25	P-COUMARIC-ACID	Fruit Juice				Jim Duke's personal files.
5	CAPRYLIC-ACID	Fruit				--
16	ACETIC-ACID	Plant				--
2	VIOLAXANTHIN	Pericarp				Jim Duke's personal files.
34	MYRICETIN	Fruit		0.5	-0.7536633445071549	Jim Duke's personal files.
4	SILICON	Fruit		2.0	-0.6019449725946585	ACTA AGRIC SCAND SUPPL 22: 1980
2	CRYPTOXANTHIN	Fruit				--
1	ANTHERAXANTHIN	Fruit				--
6	NEOHESPERIDIN	Fruit Juice				Jim Duke's personal files.
24	PECTIN	Pericarp				Jim Duke's personal files.
53	BETA-CAROTENE	Pericarp				Jim Duke's personal files.
2	PHYTOSTEROLS	Fruit		240.0	-0.9087217260357541	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
1	QUINIC-ACID	Fruit				--
1	CAPROIC-ACID	Fruit				--
2	VIOLAXANTHIN	Tissue Culture				Jim Duke's personal files.
2	BETA-MYRCENE	Fruit				Jim Duke's personal files.
2	NERYL-FORMATE	Fruit		10.0	-1.0	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
31	HESPERIDIN	Flower				Jim Duke's personal files.
3	SESELIN	Root				Jim Duke's personal files.
15	OSTHOL	Root				Jim Duke's personal files.
7	ALPHA-CAROTENE	Pericarp				Jim Duke's personal files.
14	SUCROSE	Fruit		47000.0	-0.41357367622327157	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
7	GLUCOSE	Fruit		23600.0	-0.644631124988246	--
5	PHYLLOQUINONE	Fruit		0.001	-0.23285139490462353	--
6	PROPIONIC-ACID	Plant				--
3	CAPRIC-ACID	Fruit				--
1	6,7-DIMETHOXYCOUMARIN	Bark		162.0		Jim Duke's personal files.
1	N-METHYL-TYRAMINE	Pericarp				Jim Duke's personal files.
9	OXALIC-ACID	Fruit		87.0	-0.3015516499208378	Watt, J.M. and Breyer-Brandwijk, M.G. 1962. The Medicinal and Poisonous Plants of Southern and Eastern Africa. E. & S. Livingstone, Ltd. Edinburg & London. 1457 pp.
47	BETA-SITOSTEROL	Fruit		170.0	-0.570881270243894	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
16	LYCOPENE	Pericarp				Jim Duke's personal files.
2	ELEMOL	Root Bark		28200.0		Jim Duke's personal files.
31	HESPERIDIN	Fruit				Jim Duke's personal files.
2	CONIFERIN	Pericarp				Jim Duke's personal files.
102	CAFFEIC-ACID	Fruit Juice				Jim Duke's personal files.
7	SUCCINIC-ACID	Fruit				--
8	NOBILETIN	Fruit				--
2	CAMPESTEROL	Fruit		40.0	-0.31972036696488193	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
3	NOOTKATONE	Pericarp Essent. Oil				Jim Duke's personal files.
15	TANGERETIN	Pericarp				Jim Duke's personal files.
4	OSTHOLE	Root				--
15	LUTEIN	Pericarp				Jim Duke's personal files.
31	CARYOPHYLLENE	Pericarp				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
11	NEROLIDOL	Flower				Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
31	HESPERIDIN	Fruit Juice		110.0		Jim Duke's personal files.
9	DELTA-CADINENE	Pericarp Essent. Oil				Jim Duke's personal files.
3	SUBAPHYLLIN	Leaf				Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
4	TRANS-2-HEXENAL	Pericarp				Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
2	NOMILIN	Fruit Juice				Jim Duke's personal files.
3	SUBAPHYLLIN	Fruit				Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
15	TANGERETIN	Fruit Juice				Jim Duke's personal files.
5	LIMONIN	Seed				Jim Duke's personal files.
4	4-VINYL-GUAIACOL	Fruit Juice				Jim Duke's personal files.
7	SCUTELLAREIN	Fruit				--
3	BRASSINOLIDE	Pollen Or Spore				Jim Duke's personal files.
62	CAFFEINE	Leaf		6.0	-0.9423311788449318	Jim Duke's personal files.
8	NOBILETIN	Pericarp				Jim Duke's personal files.
12	STIGMASTEROL	Fruit		20.0	-0.8951703667819086	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
5	SYNEPHRINE	Pericarp				Jim Duke's personal files.



Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	OBACUNONE	Seed				Jim Duke's personal files.
8	AURAPTENE	Fruit				--
5	LIMONIN	Fruit				--
5	LIMONIN	Fruit Juice				Jim Duke's personal files.
1	NEOHESPERIDIN-DIHYDROCHALCONE	Pericarp				Jim Duke's personal files.
28	ALPHA-PINENE	Plant				--
61	FERULIC-ACID	Fruit Juice				Jim Duke's personal files.
22	SCOPARONE	Bark		162.5		Jim Duke's personal files.
1	ANTHERAXANTHIN	Tissue Culture				Jim Duke's personal files.
26	BERGAPTEN	Pericarp				Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
11	PERILLALDEHYDE	Fruit		2.0	-0.7326583054413682	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
62	CAFFEINE	Flower		62.0	1.0998533626601497	Jim Duke's personal files.
8	NOBILETIN	Fruit Juice				Jim Duke's personal files.
6	STACHYDRINE	Fruit				--
2	SINENSETIN	Pericarp				Jim Duke's personal files.
1	NORDENTATIN	Root Bark		300.0		Jim Duke's personal files.
5	LIMONIN	Twig				Jim Duke's personal files.
5	ZEAXANTHIN	Fruit		2.0	-1.0	--
5	BETA-ELEMENE	Pericarp Essent. Oil				Jim Duke's personal files.
6	NEOHESPERIDIN	Pericarp		28000.0		Jim Duke's personal files.
2	SINENSETIN	Plant				Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
5	ZEAXANTHIN	Pericarp				Jim Duke's personal files.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
62	CAFFEINE	Bud		0.3		Jim Duke's personal files.
3	MANNOSE	Fruit				--
1	NARIRUTIN	Fruit Juice				Jim Duke's personal files.
31	CARYOPHYLLENE	Pericarp Essent. Oil				Jim Duke's personal files.
34	DIOSMIN	Pericarp				--
2	SINENSETIN	Fruit Juice				Jim Duke's personal files.
3	NOOTKATONE	Fruit		1.0		Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
5	LIMONIN	Branches				Jim Duke's personal files.
3	XYLOSE	Fruit				--
9	SINAPIC-ACID	Fruit Juice				Jim Duke's personal files.
34	DIOSMIN	Flower				Jim Duke's personal files.
1	NARIRUTIN	Pericarp				Jim Duke's personal files.
1	GALACTOSE	Fruit				--
5	ZEAXANTHIN	Tissue Culture				Jim Duke's personal files.
12	NARINGIN	Flower				Jim Duke's personal files.
28	ALPHA-PINENE	Fruit Juice		0.22	-0.9999999999999999	--
9	CAMPHENE	Fruit		0.1	-0.35176349319281713	--
2	SINENSETIN	Fruit				--
9	DELTA-CADINENE	Pericarp				--
2	NOOTKATOL	Fruit				Jim Duke's personal files.
5	LIMONIN	Bark				Jim Duke's personal files.
1	XANTHYLETIN	Root Bark		45000.0		Jim Duke's personal files.
7	SCUTELLAREIN	Fruit Juice				Jim Duke's personal files.
2	BETA-CRYPTOXANTHIN	Fruit				--
23	TERPINEN-4-OL	Fruit		0.1	-0.358333842321623	--
31	HESPERIDIN	Pericarp		63500.0	0.38878029269733505	Jim Duke's personal files.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
87	RUTIN	Pericarp		6100.0		Jim Duke's personal files.
1	CHOLESTEROL	Fruit				--
12	NARINGIN	Fruit				--
8	FRUCTOSE	Fruit		23800.0	-0.555436040816387	--
1	XANTHYLETIN	Root				Jim Duke's personal files.
1	MALONIC-ACID	Plant				--
12	NARINGIN	Pericarp				Jim Duke's personal files.
1	MALONIC-ACID	Fruit				--
1	DELPHINIDIN-3-GLUCOSIDE	Fruit				--
2	NOMILIN	Seed				Jim Duke's personal files.
1	HYDROXYPROLINE	Leaf				Jim Duke's personal files.
5	LIMONIN	Root				Jim Duke's personal files.
1	XANTHOXYLETIN	Root Bark		24000.0		Jim Duke's personal files.