

Dr. Duke's Phytochemical and Ethnobotanical Databases

Chemicals found in *Malus domestica*

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
30	(+)-CATECHIN	Fruit				--
30	(+)-CATECHIN	Leaf				--
30	(+)-CATECHIN	Bark				--
30	(+)-CATECHIN	Seed				--
30	(+)-CATECHIN	Pt				--
30	(+)-CATECHIN	Pericarp				--
38	(-)-EPICATECHIN	Pericarp				--
38	(-)-EPICATECHIN	Fruit				--
38	(-)-EPICATECHIN	Leaf	150.0	900.0	-0.6820874109972213	--
38	(-)-EPICATECHIN	Fruit Juice				--
6	ACETALDEHYDE	Fruit Juice				Miyake, T., Shibamoto, T. 1993. Quantitative Analysis of Acetaldehyde in Foods and Beverages. J. Agr. Food Chem, 41(11): 1968-1970.
6	ACETALDEHYDE	Plant				--
6	ACETALDEHYDE	Fruit				--
16	ACETIC-ACID	Plant				--
3	ACETONE	Plant				--
11	ADENINE	Root				--
3	ALANINE	Fruit	70.0	435.0	-1.2861845168681025	USDA's Ag Handbook 8 and sequela)
15	ALPHA-LINOLENIC-ACID	Fruit	180.0	1120.0	-0.6452626880371877	--
32	ALPHA-TOCOPHEROL	Fruit	2.0	37.0	-0.5521025162177928	--
5	ALUMINUM	Fruit	0.4	129.0	-0.18599251654737567	--
8	AMYGDALIN	Seed	6000.0	13800.0	-0.8422024808761887	--
3	AMYL-BUTYRATE	Fruit				--
3	AMYL-BUTYRATE	Plant				--
1	AMYL-FORMATE	Fruit				--
101	APIGENIN	Heart Wood				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
14	ARGININE	Fruit	60.0	373.0	-1.0500818434124615	USDA's Ag Handbook 8 and sequelae)
2	ARSENIC	Fruit	0.001	0.43	0.014133429185321438	--
112	ASCORBIC-ACID	Fruit	20.0	402.0	-0.2594938543964892	--
2	ASPARAGINE	Fruit		171.0	-0.825458790451801	--
3	ASPARTIC-ACID	Fruit	210.0	2115.0	-1.056731649443471	USDA's Ag Handbook 8 and sequelae)
7	AVICULARIN	Fruit				--
7	AVICULARIN	Pericarp				--
7	AVICULARIN	Leaf	0.0	1425.0		--
7	AVICULARIN	Fruit Juice				--
20	BENZOIC-ACID	Leaf	98.0	710.0	1.3479809099758226	--
20	BENZOIC-ACID	Plant				--
9	BENZYL-ACETATE	Plant				--
2	BETA-ALANINE	Fruit				--
53	BETA-CAROTENE	Fruit	0.0	76.0	-0.0038939984397263717	--
47	BETA-SITOSTEROL	Seed				Fathy, M. M., Abd El Megid, R. M. 1995. A Comparative Study of the Lipid Contents and the Antimicrobial Activity of Certain Rosaceous Seeds. Zagazig J Pharm Sci, 4(2): 121-127.
47	BETA-SITOSTEROL	Fruit	110.0	660.0	0.07292039240169416	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
47	BETA-SITOSTEROL	Heart Wood				--
4	BIOTIN	Plant				--
4	BORON	Fruit	1.0	110.0	1.410811087811246	--
3	CADMIUM	Fruit	0.002	0.026	-0.5672128851607269	--
102	CAFFEIC-ACID	Fruit Juice				--
102	CAFFEIC-ACID	Fruit	85.0	1270.0	-0.10378621224302456	--
28	CALCIUM	Fruit	43.0	570.0	-0.75834467805693	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
4	CALCIUM-OXALATE	Plant				--
2	CAMPESTEROL	Fruit	10.0	60.0	-0.14986892201478846	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
1	CATALASE	Plant				--
77	CHLOROGENIC-ACID	Seed				--
77	CHLOROGENIC-ACID	Fruit Juice				--
77	CHLOROGENIC-ACID	Pericarp	8.0	18.0		--
77	CHLOROGENIC-ACID	Fruit	5.0	15.0	-1.0935971883111022	--
77	CHLOROGENIC-ACID	Pt				--
77	CHLOROGENIC-ACID	Leaf	100.0	1200.0	-1.3240006985895736	--
21	CHLOROPHYLL	Fruit	0.0	1.0	-0.9710352631864654	--
24	CHROMIUM	Fruit	0.005	0.3	-0.4654957769727276	--
60	CINNAMALDEHYDE	Fruit				--
23	CITRIC-ACID	Plant				--
2	COBALT	Fruit	0.005	0.043	-0.5299096696083117	--
12	COPPER	Fruit	0.24	4.0	-0.6863742487163819	--
4	COSMOSIIN	Heart Wood				--
7	CYANIDIN	Leaf				--
2	CYSTINE	Plant	30.0	187.0	-1.078139109591067	--
4	D-CATECHIN	Fruit				--
2	DIETHYL-AMINE	Fruit		3.0		--
40	EPICATECHIN	Pericarp	20.0	80.0		--
40	EPICATECHIN	Fruit	4.0	11.0		--
1	EPSILON-CAROTENE	Plant				Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
12	ESTRAGOLE	Essential Oil				--
8	ESTRONE	Seed	0.1	0.13	-1.0000000000000002	--
24	ETHANOL	Plant				--
6	ETHYL-ACETATE	Plant				--
6	ETHYL-ACETATE	Fruit				--
1	ETHYL-BUTYRATE	Plant				--
1	ETHYL-FORMATE	Fruit				--
2	ETHYL-ISOBUTYRATE	Plant				--
2	ETHYL-ISOBUTYRATE	Fruit				--
1	ETHYL-NONANOATE	Plant				--
1	ETHYL-PROPIONATE	Plant				--
1	ETHYL-PROPIONATE	Fruit				--
1	ETHYL-VALERATE	Fruit				--
2	FARNESENE	Fruit Epidermis				--
2	FARNESENE	Pericarp				--
61	FERULIC-ACID	Fruit	4.0	95.0	1.7162326606420661	--
15	FIBER	Fruit	5200.0	49636.0	-0.8685372806832163	USDA's Ag Handbook 8 and sequelae)
15	FOLACIN	Fruit	0.02	0.2	-0.7547576455042277	USDA's Ag Handbook 8 and sequelae)
13	FORMIC-ACID	Plant				--
2	FRIEDELIN	Heart Wood				--
8	FRUCTOSE	Fruit	50100.0	60800.0	0.04916971831634761	--
7	FUMARIC-ACID	Plant				--
62	GALLIC-ACID	Pericarp				--
62	GALLIC-ACID	Fruit				--
35	GERANIOL	Plant				--
7	GLUCOSE	Fruit	17200.0	18200.0	-0.7019443383136035	--
8	GLUTAMIC-ACID	Fruit	156.0	1244.0	-0.9333642189445454	--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
5	GLUTAMINE	Plant		20.0		--
3	GLYCERIC-ACID	Plant				--
12	GLYCINE	Plant	80.0	497.0	-0.8208359653564842	--
4	GLYCOLIC-ACID	Plant				--
1	GLYOXYLIC-ACID	Plant				--
6	GUANIDINE	Stem				--
6	GUANIDINE	Shoot				--
5	HEXANAL	Fruit				--
3	HEXANOL	Plant				--
1	HEXYL-ACETATE	Fruit				--
1	HEXYL-ACETATE	Plant				--
1	HEXYL-BUTYRATE	Fruit				--
1	HEXYL-BUTYRATE	Plant				--
1	HEXYL-FORMATE	Plant				--
7	HISTIDINE	Fruit	30.0	187.0	-1.0696353953245137	--
14	HYPERIN	Plant				--
30	HYPEROSIDE	Fruit				--
30	HYPEROSIDE	Heart Wood				--
30	HYPEROSIDE	Pericarp				--
30	HYPEROSIDE	Fruit Juice				--
7	INDOLE-3-ACETIC-ACID	Plant				Stitt, Paul. Why George should eat broccoli.
7	INDOLE-3-ACETIC-ACID	Stem Bark				--
7	INDOLE-3-ACETIC-ACID	Leaf				--
8	INOSITOL	Plant				--
12	IODINE	Plant				--
6	IRON	Fruit	1.1	123.0	-0.039580333705947705	--
2	ISOAMYL-ACETATE	Fruit				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	ISOBUTYL-ACETATE	Plant				--
4	ISOCHLOROGENIC-ACID	Plant				Stitt, Paul. Why George should eat broccoli.
3	ISOLEUCINE	Fruit	50.0	497.0	-0.9433250929721118	--
4	ISOPROPYL-ACETATE	Fruit				--
3	ISOQUERCETIN	Fruit Juice				--
22	ISOQUERCITRIN	Fruit Juice				--
22	ISOQUERCITRIN	Fruit				--
22	ISOQUERCITRIN	Pericarp				--
1	ISOVALERALDEHYDE	Fruit				--
75	KAEMPFEROL	Fruit		2.0	-0.5794291374991353	--
1	L-ARGININE	Stem				--
1	L-ARGININE	Shoot				--
8	LACTIC-ACID	Plant				--
7	LAURIC-ACID	Fruit	10.0	63.0	-0.44474745342800637	--
20	LECITHIN	Plant				--
2	LEUCINE	Fruit	120.0	746.0	-0.9258535515942413	--
11	LITHIUM	Fruit	0.044	0.172	-0.8448748858580687	--
15	LUTEIN	Fruit	0.4	5.0	-0.4027761600563295	--
78	LUTEOLIN	Heart Wood				--
4	LYSINE	Fruit	20.0	746.0	-0.8724121045963826	--
65	MAGNESIUM	Fruit	48.0	478.0	-0.7648501234386748	--
14	MANGANESE	Fruit	0.0	29.0	-0.2123152729972876	--
3	MANNOSE	Plant				--
23	MELATONIN	Fruit				Hattori, A., et. al. 1995. Identification of Melatonin in Plants and its Effects on Plasma Melatonin Levels and Binding to Melatonin Receptors in Vertebrates. Biochem. Mol. Biol. Int., 35(3): 627-634.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
1	MERCURY	Fruit	0.0	0.02	0.10095423065636192	--
2	METHANOL	Plant				--
15	METHIONINE	Plant	20.0	124.0	-0.9578509469925256	--
2	METHYL-2-METHYL-BUTYRATE	Plant				--
3	METHYL-ACETATE	Plant				--
1	METHYL-AMINE	Pericarp		4.5		--
1	METHYL-AMINE	Fruit Epidermis		4.5		--
1	METHYL-AMINE	Fruit		5.6		--
4	METHYL-BENZOATE	Fruit				--
2	METHYL-BUTYRATE	Plant				--
2	METHYL-BUTYRATE	Fruit				--
2	METHYL-CAPROATE	Plant				--
2	MOLYBDENUM	Fruit	0.077	0.43	-0.3990584824882058	--
13	MUFA	Fruit	150.0	935.0	-0.24039423421132997	USDA's Ag Handbook 8 and sequelae)
34	MYRICETIN	Fruit		0.5	-0.7536633445071549	--
6	MYRISTIC-ACID	Fruit	20.0	124.0	-0.26329389964394695	--
1	N-BUTYL-FORMATE	Plant				--
1	N-BUTYL-PROPIONATE	Plant				--
1	N-BUTYL-PROPIONATE	Fruit				--
1	N-HEXYL-PROPIONATE	Plant				--
1	N-HEXYL-PROPIONATE	Fruit				--
2	NEO-CHLOROGENIC-ACID	Plant				--
2	NEOXANTHIN	Fruit Epidermis				--
39	NIACIN	Fruit	1.0	7.0	-0.7178505836876389	--
3	NICKEL	Fruit	0.004	0.645	-0.5833033975627046	--
2	NONACOSANE	Plant				--
6	OCTACOSANOL	Plant				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
18	OLEIC-ACID	Fruit	140.0	871.0	-0.4740320725940964	--
9	OXALIC-ACID	Plant				--
25	P-COUMARIC-ACID	Leaf				--
25	P-COUMARIC-ACID	Fruit	15.0	460.0	1.836295249622603	--
13	P-HYDROXY-BENZOIC-ACID	Fruit				--
13	PALMITIC-ACID	Seed				Fathy, M. M., Abd El Megid, R. M. 1995. A Comparative Study of the Lipid Contents and the Antimicrobial Activity of Certain Rosaceous Seeds. Zagazig J Pharm Sci, 4(2): 121-127.
13	PALMITIC-ACID	Fruit	480.0	2986.0	-0.31904990505316816	--
2	PALMITOLEIC-ACID	Fruit	10.0	62.0	-0.3340992517515945	--
11	PANTOTHENIC-ACID	Fruit	1.0	4.0	-0.8996713902808875	USDA's Ag Handbook 8 and sequelae)
24	PECTIN	Fruit	1400.0	66585.0	0.16029071562128944	--
7	PHENYLALANINE	Fruit	50.0	311.0	-1.0455516744717288	--
9	PHLORETIN	Leaf	300.0	11000.0		--
1	PHLORETIN-GLUCOSIDE	Pericarp	10.0	15.0		--
1	PHLORETIN-GLUCOSIDE	Fruit		1.0		--
8	PHLORIDZIN	Leaf	54000.0	140000.0	1.0	--
8	PHLORIDZIN	Fruit Juice				--
8	PHLORIZIN	Pericarp				--
8	PHLORIZIN	Leaf				--
8	PHLORIZIN	Plant				--
2	PHOSPHATIDYL-CHOLINE	Fruit	189.0	214.0		--
4	PHOSPHORUS	Fruit	68.0	925.0	-0.6958662309301713	--
5	PHYLLOQUINONE	Fruit		0.06	-0.22359887323159108	--
2	PHYTOSTEROLS	Fruit	120.0	745.0	-0.2581394518581099	USDA's Ag Handbook 8 and sequelae)



Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	POMOLIC-ACID	Plant				J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.
14	POTASSIUM	Fruit	1110.0	12140.0	-0.5110685274797335	--
17	PROCYANIDIN-A-2	Leaf				--
1	PROCYANIDIN-B-1	Leaf				--
1	PROCYANIDIN-B-1	Pericarp				--
1	PROCYANIDIN-B-1	Fruit Juice				--
1	PROCYANIDIN-B-1	Fruit				--
1	PROCYANIDIN-B-2	Fruit Juice				--
1	PROCYANIDIN-B-2	Fruit	2.0	10.0		--
1	PROCYANIDIN-B-2	Pericarp	15.0	100.0		--
1	PROCYANIDIN-B-2	Leaf	150.0	900.0	0.9999999999999998	--
4	PROCYANIDIN-B-4	Leaf				--
27	PROCYANIDINS	Leaf				--
2	PROPIONALDEHYDE	Fruit				--
43	PROTocatechuic-ACID	Fruit				--
4	PUFA	Fruit	1050.0	6535.0	-0.3716987814442892	USDA's Ag Handbook 8 and sequelae)
1	PYRROLIDINE	Pericarp		1.5		--
1	PYRROLIDINE	Fruit Epidermis		1.5		--
1	PYRUVIC-ACID	Plant				--
176	QUERCETIN	Heart Wood				--
176	QUERCETIN	Pericarp	58.0	263.0	1.0	Pizzorno, J.E. and Murray, M.T. 1985. A Textbook of Natural Medicine. John Bastyr College Publications, Seattle, Washington (Looseleaf).
176	QUERCETIN	Fruit	2.5	41.0	-0.582618968173555	--
2	QUERCETIN-3-O-BETA-D-GLUCOSIDE	Plant				J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	QUERCETIN-3-O-RHAMNOSIDE	Plant				J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.
4	QUERCETIN-3-RHAMNOGLUCOSIDE	Plant				--
44	QUERCITRIN	Fruit				--
44	QUERCITRIN	Leaf	600.0	9015.0	1.7298124819748746	--
44	QUERCITRIN	Fruit Juice				--
44	QUERCITRIN	Pericarp				--
2	REYNOUSTRIN	Fruit				--
2	REYNOUSTRIN	Fruit Juice				--
2	REYNOUSTRIN	Pericarp				--
15	RIBOFLAVIN	Fruit		1.3	-0.7944081953947483	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
87	RUTIN	Fruit Epidermis				--
87	RUTIN	Fruit				--
87	RUTIN	Leaf	0.0	8885.0	-0.45294433702030634	--
87	RUTIN	Fruit Juice				--
87	RUTIN	Pericarp				--
7	SALICYLATES	Fruit	0.8	60.0	-0.16469419114376535	--
60	SELENIUM	Fruit		0.0	-0.38618723699673646	--
1	SERINE	Fruit	80.0	497.0	-1.1107007920496865	USDA's Ag Handbook 8 and sequela)
14	SHIKIMIC-ACID	Plant				--
4	SILICON	Fruit	0.0	70.0	-0.3810148443665756	--
3	SILVER	Fruit	0.011	0.086	-0.4995614833070808	--
9	SINAPIC-ACID	Fruit				--
1	SODIUM	Fruit	0.0	133.0	-0.1713385458263085	--
11	SORBITOL	Leaf				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	SPERMIDINE	Bud				Wang, S. Y., Faust, M. 1994. Changes in Polyamine Content During Dormancy in Flower Buds of 'Anna' Apple. J. Amer. Soc. Hort. Sci., 119(1): 70-73.
1	SPERMINE	Bud				Wang, S. Y., Faust, M. 1994. Changes in Polyamine Content During Dormancy in Flower Buds of 'Anna' Apple. J. Amer. Soc. Hort. Sci., 119(1): 70-73.
8	STEARIC-ACID	Seed				Fathy, M. M., Abd El Megid, R. M. 1995. A Comparative Study of the Lipid Contents and the Antimicrobial Activity of Certain Rosaceous Seeds. Zagazig J Pharm Sci, 4(2): 121-127.
8	STEARIC-ACID	Fruit	70.0	435.0	-0.25037310927026857	--
7	SUCCINIC-ACID	Plant				--
14	SUCROSE	Fruit	24000.0	36200.0	-0.49014841841433165	--
14	SULFUR	Fruit	1.65	23.0	-0.9685087927350676	--
31	THIAMIN	Fruit	1.0	2.0	-0.4266044741562528	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
4	THREONINE	Fruit	30.0	435.0	-1.0736073129874002	--
4	TIN	Fruit		0.0	-0.3771396188984718	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
3	TRIACONTANOL	Plant				--
29	TRYPTOPHAN	Fruit	20.0	124.0	-1.0195295627538696	--
8	TYROSINE	Fruit	40.0	249.0	-0.8990776765345502	--
89	URSOLIC-ACID	Wax				--
89	URSOLIC-ACID	Fruit Epidermis				--
89	URSOLIC-ACID	Pericarp				--
3	VALINE	Fruit	40.0	560.0	-0.8032333881374735	--
3	XYLOSE	Plant				--

Activities Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Refernce Citation
77	ZINC	Fruit	0.0	35.0	0.1413570623516533	--