

**Dr. Duke's Phytochemical and Ethnobotanical Database**

**Chemicals Found in Helianthus annuus**

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	(-)-ENT-KAUR-16-EN-19-OIC-ACID	Stem	--	--		
0	(-)-ENT-KAUR-16-EN-19-OIC-ACID-THUJANOL-ESTER	Flower	--	--		
0	(-)-ENT-KAURAN-16-BETA-19-DIOL	Flower	--	--		
0	(-)-ENT-KAURAN-16-BETA-OL	Flower	--	--		
3	(-)-KAUR-16-EN-19-OIC-ACID	Flower	--	--		
0	(-)-TRACHYLOBAN-19-OIC-ACID-THUJANOL-ESTER	Flower	--	--		
0	1,2-ANHYDRIDO-4,5-DIHYDO-NIVEUSIN-A	Leaf	161	161		
0	1,2-ANHYDRIDO-NIVEUSIN-A	Leaf	228	228		
67	1,8-CINEOLE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	1-METHOXY-4,5-DIHYDO-NIVEUSIN-A	Leaf	207	207		
0	1-O-METHYL-4,5-DIHYDO-NIVEUSIN-A	Leaf	207	207		
0	1-O-METHYL-HEMI-KETAL-4,5-DIHYDO-NIVEUSIN-A	Leaf	207	207		
0	12N-TRICOSANE	Seed	--	--		
0	15-BETA-HYDROXY-TRACHYLOBAN-19-OIC-ACID-METHYL-ESTER	Flower	--	--		
0	15-HYDROXY-3-DEHYDRO-DEOXY-FRUTICIN	Leaf	78	78		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	15-HYDROXY-DEOXY-3-DEHYDRO-FRUTICIN	Leaf	--	--		
0	17-HYDROXY-ENT-ISOKAUR-15(16)-EN-19-OIC-ACID	Leaf	--	--		
0	2,4-METHYLENE-CHOLESTEROL	Pollen Or Spore	--	--		
0	2-METHYL-PROPAN-1-OL	Flower	--	--		
0	23-DEHYDRO-BETA-SITOSTEROL	Pollen Or Spore	--	--		
0	23-DEHYDRO-CAMPESTANOL	Pollen Or Spore	--	--		
0	23-DEHYDRO-CHOLESTEROL	Pollen Or Spore	--	--		
0	24-ETHYL-24(25)-DEHYDROLATHOSTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-ETHYL-CHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	24-ETHYL-TRANS-22-DEHYDROCHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-ETHYLLATHOSTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-METHYL-CHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-METHYL-LATHOSTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-METHYL-TRANS-22-DEHYDROCHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	24-METHYLENE-25-METHYLCHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24-METHYLENE-CHOLESTANOL	Pollen Or Spore	--	--		
0	24-METHYLENE-CYCLOARTENOL	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
0	24Z-ETHYLIDENECHOLESTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	24Z-ETHYLIDENELATHOSTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	25-DEHYDRO-SITOSTANOL	Pollen Or Spore	--	--		
0	28-ISOAVENASTEROL	Seed	--	--		
0	3-ETHOXY-NIVEUSIN-B	Leaf	--	11		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	3-ETHOXYNIVEUSIN-A	Leaf	11	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	3-HYDROXY-3,4-SECO-DAMMARA-4,24-DIENE	Pollen Or Spore	79	79		
0	3-HYDROXY-DEOXY-3-DEHYDRO-FRUTICIN	Leaf	--	--		
0	3-KETO-15-HYDROXY-DEOXY-FRUTICIN	Shoot	45	45		
0	4,5-DIHYDRO-8,9-DEHYDRO-THEASPIRONE	Flower	--	--		
0	4,5-DIHYDRO-NIVEUSIN-A	Leaf	--	--		
0	5-DEHYDRO-AVENASTEROL	Seed	--	--		
0	6-ALPHA,7-ALPHA-17-TETRAHYDROXY	Plant	--	--		
0	7,24-STIGMASTADIEN-3BETA-OL	Plant	--	--		J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.
0	7-ALPHA,16-BETA-17-TRIHIDROXY	Plant	--	--		
0	7-DEHYDRO-AVENASTEROL	Seed	--	--		
0	ABSCISIC-ACID	Seed	--	--		
0	ACETIC-ACID-ETHYL-ESTER	Flower	--	--		
0	ACETOIN	Flower	--	--		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	ACONITIC-ACID	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	AGROPHYLLIN-A	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	AGROPHYLLIN-B	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
3	ALANINE	Seed	11170	11800	0.3494340343120688	USDA's Ag Handbook 8 and sequelae)
0	ALL-TRANS-LUTEIN-EPOXIDE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
10	ALPHA-AMYRIN	Seed	--	--		
28	ALPHA-PINENE	Plant	--	--		Stitt, Paul. Why George should eat broccoli.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
13	ALPHA-TERPINENE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
23	ALPHA-TERPINEOL	Flower	--	--		
32	ALPHA-TOCOPHEROL	Oil	622	622	0.2186734260494272	
2	ANNUITHRIN	Leaf	--	--		Chemical Constituents of Oriental Herbs (3 diff. books)
2	ANNUITHRIN	Shoot	40	40		
0	ARABINOSE	Seed	--	--		
14	ARGININE	Seed	24030	82000	2.428816543007727	USDA's Ag Handbook 8 and sequelae)
2	ARGOPHYLLIN-A	Leaf	--	--		
2	ARGOPHYLLIN-B	Leaf	176	176		
1	ARNIDIOL	Flower	--	--		
0	ARTEMISIA-KETONE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	ASH	Seed	26000	49300	0.04270681663676372	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	ASPARTIC-ACID	Seed	24460	25800	0.2850604453864925	USDA's Ag Handbook 8 and sequelae)
0	AYAPIN	Root	--	--		
1	BEHENIC-ACID	Fruit	--	--		
1	BEHENIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	BENZOIC-ACID-PENTYL	Plant	--	--		
0	BENZOIC-ACID-PENTYL-ESTER	Flower	--	--		
9	BETA-AMYRIN	Seed	--	--		
53	BETA-CAROTENE	Seed	--	0.3	-0.41055580088060895	USDA's Ag Handbook 8 and sequelae)
13	BETA-PINENE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
47	BETA-SITOSTEROL	Seed	3490	3510	0.7159177552484736	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
35	BORNEOL	Flower	--	--		



Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	BORNEOL-ACETATE	Flower	--	--		
0	BRASSICASTEROL	Pollen Or Spore	--	--		
3	BRASSINOLIDE	Pollen Or Spore	--	--		
0	BREIN	Shoot	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
102	CAFFEIC-ACID	Pollen Or Spore	4	4		
102	CAFFEIC-ACID	Seed	1600	1800	0.9502356432760076	
28	CALCIUM	Seed	917	1225	-0.5365417460978219	USDA's Ag Handbook 8 and sequelae)
0	CALENDULADIOL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	CAMPEST-7-EN-BETA-OL	Seed	--	--		
2	CAMPESTEROL	Seed	750	770	0.9683913917867137	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
9	CAMPHENE	Essential Oil	--	--		
0	CAMPHOLENAL	Flower	--	--		
41	CAMPHOR	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
3	CAPRIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	CAPROIC-ACID-METHYL-ESTER	Flower	--	--		
0	CARBOHYDRATES	Seed	133000	213000	-1.233601396943731	
0	CASTASTERONE	Pollen Or Spore	--	--		
1	CELLULOSE	Fruit	--	--		
1	CELLULOSE	Seed	--	--		
1	CEPHALIN	Seed	615	1230	-0.7370340011227791	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
77	CHLOROGENIC-ACID	Seed	1900	28000	0.33366434629149755	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	CHOLESTEROL	Seed	1500	1500	1	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
20	CHOLINE	Seed	1200	1200	-0.4445983553028156	
0	CILIARIC-ACID	Leaf	--	--		
18	CINNAMIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	CIS-13'-LUTEIN-EPOXIDE	Flower	--	--		
0	CIS-13-VIOLAXANTHIN	Flower	--	--		
0	CIS-5,6-LUTEIN-EPOXIDE	Flower	--	--		
0	CIS-9'-LUTEIN	Flower	--	--		
0	CIS-XANTHOXIN	Flower	--	--		
53	CITRAL	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
23	CITRIC-ACID	Seed	1900	1900	-1.228406167330634	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
12	COPPER	Seed	15	19	0.3796476594234794	USDA's Ag Handbook 8 and sequelae)
2	CRYPTOXANTHIN	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
1	CUMIN-ALCOHOL	Flower	--	--		
0	CUTIN	Flower	--	--		
7	CYCLOARTENOL	Seed	--	--		
13	CYSTEINE	Seed	4510	16000	2.5164597908165307	
0	DAUCIC-ACID	Plant	--	--		Chemical Constituents of Oriental Herbs (3 diff. books)
5	DAUCOSTEROL	Seed	--	--		
0	DECA-2,5-DIEN-1-AL	Flower	--	--		
1	DELTA-7-AVENASTEROL	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	DELTA-CADINOL	Flower	--	--		
4	DELTA-TOCOPHEROL	Oil	--	--		
0	DEMETHOXY-ENCECALIN	Root	10	10		
0	DEMETHOXY-ENCECALOL	Root	19	19		
0	DIHYDRO-PHASEIC-ACID	Seed	--	--		
0	DIOXINDOLE-3-ACETIC-ACID	Seed	--	--		
0	ECHINOCYSTIC-ACID	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	ENT-15-BEYERAN-19-OIC-ACID	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	ENT-ATISAN-16-ALPHA-OL	Flower	--	--		
0	ENT-ATISAN-16-BETA-OL	Flower	--	--		
0	ENT-ISO-KAUR-15(16)-EN-19-OIC-ACID	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	ENT-KAUR-16-EN-19-AL	Leaf	--	--		
0	ENT-KAUR-16-EN-19-OIC-ACID	Stem	--	--		
0	ENT-KAUR-16-EN-19-OIC-ACID-THUJANOL-ESTER	Flower	--	--		
0	ENT-KAURAN-16-BETA-19-DIOL	Flower	--	--		
0	ENT-KAURAN-16-BETA-OL	Flower	--	--		
0	ENT-TRACHYLOBAN-19-AL	Flower	--	--		
0	EO	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	ERYTHRODIOL	Shoot	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
76	EUGENOL	Flower	--	--		
2	FARADIOL	Flower	7800	7800		
0	FAT	Seed	222000	523800	1.3611505908440047	
61	FERULIC-ACID	Pollen Or Spore	2	3		
15	FIBER	Seed	37550	323000	1.486226562630823	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
8	FRUCTOSE	Flower	--	--		
7	FUMARIC-ACID	Leaf	--	--		
0	GADOLEIC-ACID	Seed	480	505	-0.657058506074547	USDA's Ag Handbook 8 and sequelae)
1	GALACTOSE	Flower	--	--		
0	GALACTURONIC-ACID	Flower	--	--		
14	GAMMA-TOCOPHEROL	Oil	27	27	-1.241582556791874	
0	GERANIOL-ACETONE	Flower	--	--		
0	GIBBERELLINS	Seed	--	--		
7	GLUCOSE	Seed	--	--		
0	GLUTAMINIC-ACID	Seed	55790	58900		USDA's Ag Handbook 8 and sequelae)
0	GLYCEROL-ALPHA-MONOPALMITATE	Pollen Or Spore	102	102		
12	GLYCINE	Seed	14610	15400	0.6430760701183263	USDA's Ag Handbook 8 and sequelae)
0	GLYCOLATE-OXIDASE	Cotyledon	--	--		
54	GOSSYPOL	Seed	10	10	-0.5512186425263101	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
6	GRANDIFLORIC-ACID	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
1	HELIANGIN	Plant	--	--		Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
1	HELIANTHOSIDE-A	Flower	--	--		
0	HELIANTHOSIDES	Flower	--	--		
0	HELIANTRIOL-B	Flower	700	700		
0	HELIANTRIOL-C	Flower	100	100		
0	HELIANTRIOL-F	Flower	5	5		
0	HELIANTRIOLS	Plant	--	--		J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.
0	HEMICELLULOSE	Flower	--	--		
0	HEX-TRANS-2-EN-1-AL	Flower	--	--		



Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	HEXAHYDRO-2H-AZEPIN-2-ONE	Sprout Seedling	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	HEXAN-1-AL	Seed	--	--		
7	HISPIDULIN	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
18	HISTAMINE	Tissue Culture	--	--		
7	HISTIDINE	Seed	6320	20000	3.688881333268414	
3	HYMENOXIN	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
12	IODINE	Seed	0.042	0.042	-0.2745141613777973	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
6	IRON	Seed	60	70	-0.37538951089484696	
4	ISOCHLOROGENIC-ACID	Plant	--	--		
4	ISOFERULIC-ACID	Seed	1400	1700	1.4142093214695879	Jim Duke's personal files.
0	ISOFUCOSTEROL	Pollen Or Spore	--	--		
3	ISOLEUCINE	Seed	11390	46500	4.594732547635374	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
28	ISOLIQUIRITIGENIN	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
1	ISOMENTHOL	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	JASMONIC-ACID	Seed	--	--		
3	KAUR-16-EN-19-OIC-ACID	Flower	--	--		
0	KILOCALORIES	Plant	6022	6022	2.506936719352974	
8	LACTIC-ACID	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
20	LECITHIN	Seed	385	2300	-0.6765969690609044	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
0	LEUCENOPINE	Tissue Culture	--	--		
0	LEUCENOPINE-LACTAM	Tissue Culture	--	--		
2	LEUCINE	Seed	16590	35500	1.7630018192536456	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
13	LIGNIN	Pericarp	250000	300000		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
1	LIGNOCERIC-ACID	Fruit	--	--		
1	LIGNOCERIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
60	LIMONENE	Flower	--	--		
0	LINALOL	Flower	--	--		
53	LINALOOL	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
7	LINALYL-ACETATE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
27	LINOLEIC-ACID	Seed	89000	350000	2.0810011317954165	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	LINOLENIC-ACID	Seed	690	730	-0.5671181629291847	USDA's Ag Handbook 8 and sequelae)
2	LOLIOLIDE	Flower	--	--		
21	LUPEOL	Shoot	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
15	LUTEIN	Flower	--	--		
0	LUTEIN-EPOXIDE	Flower	--	--		
4	LYSINE	Seed	9370	9900	-0.29781359908921706	
65	MAGNESIUM	Seed	3540	5176	0.8810173298853301	
15	MALIC-ACID	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
1	MALONIC-ACID	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
2	MALTOSE	Flower	--	--		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
14	MANGANESE	Seed	20	21	-0.40511016640256897	USDA's Ag Handbook 8 and sequelae)
0	MELOBIOSE	Flower	--	--		
63	MENTHOL	Flower Essent. Oil	235000	310000		
15	METHIONINE	Seed	4940	20500	4.1793275654576725	
3	METHYL-ACETATE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
13	MUFA	Seed	94620	100000	-0.06817898704459366	
6	MYRISTIC-ACID	Seed	500	900	-0.2842214392424068	
5	MYRTENAL	Flower	--	--		
0	N-DOCOSANE	Seed	--	--		
0	N-EICOSANE	Seed	--	--		
0	N-HENEICOSANE	Seed	--	--		
3	N-HENTRIACONTANE	Seed	--	--		
0	N-HEPTACOSANE	Seed	--	--		
0	N-HEPTADECANE	Seed	--	--		
2	N-HEXACOSANE	Seed	--	--		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	N-HEXADECANE	Seed	--	--		
1	N-NONACOSANE	Seed	--	--		
0	N-NONADECANE	Seed	--	--		
0	N-OCTADECANE	Seed	--	--		
0	N-PENTACOSANE	Seed	--	--		
0	N-TETRACOSANE	Seed	--	--		
0	N-TRIDEC-2-ONE	Flower	--	--		
2	NEO-CHLOROGENIC-ACID	Seed	--	--		
39	NIACIN	Seed	45	48	0.1530815697418368	
0	NIVEUSIN-B	Leaf	--	--		
2	NIVEUSIN-C	Leaf	114	114		Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
0	NUCLEIN	Seed	5100	5100		ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	O-HYDROXYBENZOIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
64	OLEANOLIC-ACID	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
18	OLEIC-ACID	Seed	36000	178000	0.48416430072452843	
25	P-COUMARIC-ACID	Pollen Or Spore	11	11		
25	P-COUMARIC-ACID	Seed	900	1100	2.709983056618278	Jim Duke's personal files.
16	P-CYMENE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
13	P-HYDROXY-BENZOIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
13	PALMITIC-ACID	Seed	14250	32000	-0.039337218532970196	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	PALMITOLEIC-ACID	Seed	490	515	-0.28610525841718454	USDA's Ag Handbook 8 and sequelae)
24	PECTIN	Plant	110000	110000	1.4120278901082428	Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
2	PECTOLINARIGENIN	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
0	PENTAN-2-ONE	Seed	--	--		
0	PENTOSANS	Pericarp	240000	290000		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	PERILLYL-ACETATE	Flower	--	--		
2	PHENYL-ACETALDEHYDE	Flower	--	--		
7	PHENYLALANINE	Seed	11690	48000	4.353920008819304	
2	PHOSPHATIDYL-CHOLINE	Seed	--	--		
0	PHOSPHATIDYL-ETHANOLAMINE	Seed	--	--		
0	PHOSPHATIDYL-SERINE	Seed	--	--		
4	PHOSPHORUS	Seed	6930	7450	0.5540577574564426	
5	PHYLLUQUINONE	Seed Oil	--	0.06	-1.0587137637796051	



Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	PHYTATE	Seed	16000	17030	0.5838864845748781	
9	PHYTIC-ACID	Seed	--	--		
0	PHYTIN	Seed	--	--		ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
2	PHYTOSTEROLS	Seed	5340	5642	0.8999907123518872	
14	POTASSIUM	Seed	6890	7280	-0.46522595774426684	
0	PROLINE	Seed	11820	12500	0.2287059383143203	
0	PROPIOVANILLONE	Flower	--	--		
0	PROTEIN	Seed	135000	240700	0.13182207877269972	
4	PUFA	Seed	327350	345900	1.828849417347788	
176	QUERCETIN	Flower	100	400	-0.4773236748162204	
176	QUERCETIN	Leaf	60	210	-0.34863362562221356	
2	QUERCETIN-3'-GLUCOSIDE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	QUERCETIN-7-O-BETA-D-GLUCOSIDE	Pollen Or Spore	22	22		
1	QUINIC-ACID	Seed	--	--		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
1	RAFFINOSE	Pericarp	--	--		
0	RHAMNOSE	Seed	--	--		
15	RIBOFLAVIN	Seed	2	3	-0.20090831129253928	Laferriere, J.E., 1988, Nutricomp Program, Nutricomp Database; reviewed in J. Ethnobiology 9(1):27-29.
0	RUBBER	Leaf	5500	5500		
0	RUBBER	Shoot	2600	2600		
1	RUBIXANTHIN	Flower	--	--		Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp.
5	SABINENE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
5	SABINOL	Flower	--	--		
7	SALICYLATES	Seed	--	1	-0.33481239090631587	
44	SCOPOLETIN	Plant	--	--		Stitt, Paul. Why George should eat broccoli.
1	SERINE	Seed	10750	11400	0.15824437140006012	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	SFA	Seed	51950	54900	-0.03900725043781273	
14	SHIKIMIC-ACID	Seed	--	--		
9	SINAPIC-ACID	Seed	4800	5700	1.7320468327716805	Jim Duke's personal files.
1	SODIUM	Seed	30	32	-0.6649190286723775	
10	SQUALENE	Seed	--	--		ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
1	STACHYOSE	Seed	--	--		
8	STEARIC-ACID	Seed	9000	28000	0.04211488009527745	
0	STIGMAST-7-EN-3-BETA-OL	Seed	--	--		
12	STIGMASTEROL	Seed	610	650	0.2956718243575674	Spiller, G. A. 1996 (Spiller, G. A. Ed. 1996. CRC Handbook of Lipids in Human Nutrition. CRC Press. Boca Raton, FL. 233 pp.)
7	SUCCINIC-ACID	Leaf	--	--		
14	SUCROSE	Flower	--	--		
14	SULFUR	Seed	2574	4880	1.3264976870978602	

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
6	SYRINGIC-ACID	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
0	TARAXANTHIN	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
2	TARAXASTEROL	Shoot	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
6	TARTARIC-ACID	Seed	1900	1900		ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
0	TERPINEN-1-EN-4-OL	Flower	--	--		
5	TERPINYL-ACETATE	Flower	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
31	THIAMIN	Seed	22	24	4.155129863917932	
4	THREONINE	Seed	9280	9805	0.37302144205015586	
0	TIGITANIN-A	Leaf	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
93	TOCOPHEROL	Seed	--	34000	2.641805493100346	Laferriere, J.E., 1988, Nutricomp Program, Nutricomp Database; reviewed in J. Ethnobiology 9(1):27-29.
3	TRACHYLOBAN-19-OIC-ACID	Flower	--	--		
0	TRACHYLOBAN-19-OIC-ACID-THUJANOL-ESTER	Flower	--	--		
0	TRANS-5,6-LUTEIN-EPOXIDE	Flower	--	--		
0	TRANS-ABSCISIC-ACID	Seed	--	--		
0	TRANS-CINNAMIC-ACID	Seed	500	700		Jim Duke's personal files.
29	TRYPTOPHAN	Seed	3480	15900	4.288467497944186	
8	TYROSINE	Seed	6660	7035	-0.16359025398761914	
0	URONIC-ACID	Pericarp	65000	77600		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	VALINE	Seed	13150	50000	4.678652580685171	
28	VANILLIN	Fruit	--	--		
28	VANILLIN	Root	0.9	0.9		
28	VANILLIN	Seed	--	--		Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
5	VERBENONE	Flower	--	--		
2	VIOLAXANTHIN	Flower	--	--		
0	WATER	Seed	53600	72900	-0.5936756731552985	
0	WAX	Pericarp	4200	4600	-1	Rizk, A.F.M. and Al-Nowaihi, A.S., The Phytochemistry of the Horticultural Plants of Qatar, Scientific and Applied Research Centre, University of Qatar.
77	ZINC	Seed	46	54	0.2517628230210634	