

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

**Chemicals Found in Echinacea spp**

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	(+)-TARTARIC-ACID	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
0	(E)-10-HYDROXY-4,10-DIMETHYL-4,11-DODECADIEN-2-ONE	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
0	13-HYDROXYOCTADECA-(9Z,11E,15Z)-TRIENOIC-ACID	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2,3-O-DIFERULOYLTARTARIC-ACID	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-METHYLTETRADECA-5,12-DIENE	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-METHYLTETRADECA-6,12-DIENE	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-O-CAFFELOYL-3-(5-(ALPHA-CARBOXY-BETA-(3,4,-DIHYDROXYPHENYL...	Plant	--	--		
0	2-O-CAFFELOYL-3-O-CUMAROYLTARTARIC-ACID	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-O-CAFFELOYL-3-O-FERULOYLTARTARIC-ACID	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-O-CAFFELOYLTARTARIC-ACID	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	2-O-FERULOYLTARTARIC-ACID	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
3	3,5-DICAFFELOYL-QUINIC-ACID	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	4,5-O-DICAFFEYOYLQUINIC-ACID	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
0	6-O-CAFFEOYLECHINACOSIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	ALKYLAMIDES	Root	40	1510		Economic & Medicinal Plant Research, 5: 253.
28	ALPHA-PINENE	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
5	ALUMINUM	Root	786	12900	6.609103108636193	Economic & Medicinal Plant Research, 5: 253.
101	APIGENIN	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
6	ARABINOGALACTAN	Root	--	--		Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
112	ASCORBIC-ACID	Leaf	2140	2140	-0.24535536616295778	Economic & Medicinal Plant Research, 5: 253.
112	ASCORBIC-ACID	Root	843	843	-0.16407727962118843	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	ASH	Root	80000	80000	0.35526479427075014	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	BEHENIC-ACID-ETHYL-ESTER	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
53	BETA-CAROTENE	Root	2.2	2.2	-0.4223548942066434	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	BETA-FARNESENE	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
13	BETA-PINENE	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
47	BETA-SITOSTEROL	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
14	BETAINE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
35	BORNEOL	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
12	BORNYL-ACETATE	Plant	--	--		Economic & Medicinal Plant Research, 5: 253.
102	CAFFEIC-ACID	Plant	--	--		
28	CALCIUM	Root	3290	7760	0.03911936916970287	Economic & Medicinal Plant Research, 5: 253.
0	CARBONATE	Root	7100	7100		Economic & Medicinal Plant Research, 5: 253.
31	CARYOPHYLLENE	Root	42	42	-0.6463900093826075	Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
6	CARYOPHYLLENE-EPOXIDE	Root	26	26		Economic & Medicinal Plant Research, 5: 253.
0	CHLORIDE	Root	760	760		Economic & Medicinal Plant Research, 5: 253.
77	CHLOROGENIC-ACID	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
24	CHROMIUM	Root	19	19	3.226984382736168	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
14	CICHORIC-ACID	Flower	12000	31000		Economic & Medicinal Plant Research, 5: 253.
14	CICHORIC-ACID	Root	6000	21000		
0	CICHORIC-ACID-METHYL-ESTER	Root	6000	21000		Economic & Medicinal Plant Research, 5: 253.
2	COBALT	Root	148	148	2.6671392852066766	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	CYANADIN-3-O-(6-O-MALONYL-BETA-D-GLYCOPYRANOSIDE)	Flower	--	--		Economic & Medicinal Plant Research, 5: 253.
0	CYANADIN-3-O-(BETA-D-GLYCOPYRANOSIDE)	Flower	--	--		Economic & Medicinal Plant Research, 5: 253.
23	CYNARIN	Root	--	--		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	DECA-(2E,4E,6E)-TRIENOIC-ACID-ISOBUTYLAMIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	DES-RHAMNOSYLVERBASCOSIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	DODECA-(2E,4E)-DIENOIC-ACID-ISOBUTYLAMIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	DODECA-(2E,6Z,8E,10E)-TETRAENOIC-ACID-ISOBUTYLAMIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	DODECA-2,4-DIEN-1-YL-ISOVALERATE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	DODECA-2E,4E,8Z,10E/Z-TETRAENOIC-ACID-ISOBUTYLAMIDES	Shoot	--	--		Bisset, N.G., ed. 1994. Herbal Drugs and Phytopharmaceuticals. CRC Press. Boca Raton, FL. 566 pp.
3	ECHINACEIN	Root	10	100	0.7071067811865475	Economic & Medicinal Plant Research, 5: 253.
2	ECHINACIN	Root	--	--		Williamson, E. M. and Evans, F. J., Potter's New Cyclopaedia of Botanical Drugs and Preparations, Revised Ed., Saffron Walden, the C. W. Daniel Co., Ltd., Essex UK, 362 pp, 1988, reprint 1989.
10	ECHINACOSIDE	Root	3000	17000	0.7071067811865469	
2	ECHINOLONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	EO	Flower	600	6000	-0.22356926401953045	Economic & Medicinal Plant Research, 5: 253.
0	EO	Leaf	100	6000	-0.4868602567711417	Economic & Medicinal Plant Research, 5: 253.
0	EO	Root	50	40000	1.2293123783517959	
0	EPISHIOBUNOL	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
0	FAT	Root	13000	13000	-0.3294780368795451	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
61	FERULIC-ACID	Plant	--	--		
15	FIBER	Root	111000	111000	0.5083064852727784	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	FLAVANOIDS	Leaf	3800	4800		Economic & Medicinal Plant Research, 5: 253.
0	GERMACRENE-ALCOHOL	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
2	GERMACRENE-D	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	HEPTADECA-(8Z,11Z)-DIEN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
1	HETEROXYLAN	Root	800	800		

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
2	HUMULENE	Root	8	12		Economic & Medicinal Plant Research, 5: 253.
19	INULIN	Root	59000	200000	-0.39833681982829794	
6	IRON	Root	700	4800	6.531741131693913	
4	ISOCHLOROGENIC-ACID	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
2	ISORHAMNETIN-3-RUTINOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	ISOTUSSILAGINE	Plant	15	15		
75	KAEMPFEROL	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	KAEMPFEROL-3-O-GLUCOSIDE	Leaf	--	--		
0	KAEMPFEROL-3-O-RUTINOSIDE	Leaf	--	--		
4	KAEMPFEROL-3-O-GLUCOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	KAEMPFEROL-3-O-RUTINOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	KILOCALORIES	Root	2800	2800	-1.2475625360231575	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	L-PENTADECENE	Root	400	400		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
60	LIMONENE	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
78	LUTEOLIN	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
7	LUTEOLIN-7-GLUCOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
65	MAGNESIUM	Root	1170	1860	-0.3732958440640499	
14	MANGANESE	Root	101	101	0.6601606462244966	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	METHYL-P-HYDROXYCINNAMATE	Essential Oil	--	--		Williamson, E. M. and Evans, F. J., Potter's New Cyclopaedia of Botanical Drugs and Preparations, Revised Ed., Saffron Walden, the C. W. Daniel Co., Ltd., Essex UK, 362 pp, 1988, reprint 1989.
22	MYRCENE	Fruit	--	--		Economic & Medicinal Plant Research, 5: 253.
0	N-TRIACONTANOL	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
39	NIACIN	Root	--	17	-0.9633392827635444	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.



Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
13	PALMITIC-ACID	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	PENTA-(1,8Z)-DIENE	Root	400	400		Economic & Medicinal Plant Research, 5: 253.
0	PENTADECA-(8Z)-EN-11,13-DIYN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	PENTADECA-(8Z)-EN-2-ONE	Root	4000	4000		Economic & Medicinal Plant Research, 5: 253.
0	PENTADECA-(8Z,11Z)-DIEN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	PENTADECA-(8Z,13Z)-DIEN-11-YN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
0	PENTADECA-8-EN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
4	PHOSPHORUS	Root	790	790	-0.47928982526561387	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	POLYACETYLENES	Root	20	20		Economic & Medicinal Plant Research, 5: 253.
0	POLYSACCHARIDES	Root	--	--		Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
3	PONTICAEPOXIDE	Root	--	--		List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
14	POTASSIUM	Root	3140	8090	-0.5629990790704673	
0	PROTEIN	Root	92000	92000	-0.2966070707869874	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	QUERCETAGETIN-7-GLUCOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
176	QUERCETIN	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
2	QUERCETIN-3'-GLUCOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	QUERCETIN-3-0-GALACTOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	QUERCETIN-3-0-XYLOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	QUERCETIN-3-ROBINOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
0	QUERCETIN-3-XYLOSYL GALACTOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	RHAMNOARABINOGALACTAN	Root	--	--		Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
15	RIBOFLAVIN	Bark	12	3	-0.04398526740271707	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
87	RUTIN	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
4	RUTOSIDE	Leaf	--	--		Economic & Medicinal Plant Research, 5: 253.
60	SELENIUM	Root	--	0.5	-0.3268846586034691	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	SILICATE	Root	15340	15340		Economic & Medicinal Plant Research, 5: 253.
4	SILICON	Root	301	8	-0.30615522402124107	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	SITOSTEROL-3-BETA-O-GLUCOSIDE	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
1	SODIUM	Root	90	90	-0.4708671369343761	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
12	STIGMASTEROL	Shoot	--	--		Economic & Medicinal Plant Research, 5: 253.
0	SULFATE	Root	2450	2450		Economic & Medicinal Plant Research, 5: 253.
0	TETRADECA-(8Z)-EN-11,13-DIYN-2-ONE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
31	THIAMIN	Root	2.6	2.6	-0.3624549785956239	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
4	TIN	Root	17	1.7	-1.5030133891091328	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
0	TRIDECA-1-EN-3,5,7,9,10-PENTAYNE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.
1	TUSSILAGINE	Root	15	60		
28	VANILLIN	Plant	--	--		Williamson, E. M. and Evans, F. J., Potter's New Cyclopaedia of Botanical Drugs and Preparations, Revised Ed., Saffron Walden, the C. W. Daniel Co., Ltd., Essex UK, 362 pp, 1988, reprint 1989.
20	VERBASCOSIDE	Root	--	--		Economic & Medicinal Plant Research, 5: 253.

Activity Count	Chemical	Plant Part	Low PPM	High PPM	StdDev	Reference Citation
0	WATER	Root	749000	749000	-0.13250827284057254	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.
77	ZINC	Root	51	5.1	-0.8355779101426338	Pedersen, M. 1987. Nutritional Herbology. Pederson Publishing. Bountiful, Utah. 377 pp.