

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

**List of Plants for GLUTAMIC-ACID**

Plant	Part	Low PPM	High PPM	StdDev	Reference
Ceratonia siliqua	Seed		131600.0	3.7924030897032144	Duke, J. A. Writeups or information summaries on approximately 2,000 economic plants, USDA, ARS, Beltsville, MD 20705.
Cucurbita pepo	Seed	43150.0	101820.0	2.535958532664187	--
Lupinus albus	Seed	21650.0	96985.0	2.3319656034068434	--
Glycine max	Seed	70680.0	77280.0	1.500594213331154	USDA's Ag Handbook 8 and sequelae)
Brassica chinensis	Leaf	3600.0	76932.0	2.1091668817278633	--
Brassica rapa	Leaf	3600.0	76932.0	2.1091668817278633	USDA's Ag Handbook 8 and sequelae)
Cucurbita foetidissima	Seed	52800.0	73530.0	1.3423783943621699	--
Allium schoenoprasum	Leaf	5790.0	72400.0	1.864122232129579	USDA's Ag Handbook 8 and sequelae)
Arachis hypogaea	Seed	54650.0	65281.0	0.994345783515463	--
Asparagus officinalis	Shoot	5010.0	64645.0	0.9806017011914672	--
Triticum aestivum	Seed	39000.0	63000.0	0.8981083746972622	--
Juglans cinerea	Seed	60840.0	62942.0	0.8956613033638753	--
Prunus dulcis	Seed	59340.0	62070.0	0.8588708515929542	USDA's Ag Handbook 8 and sequelae)
Pinus pinea	Seed	40840.0	59800.0	0.7630975425103956	--
Cnidioscolus chayamansa	Leaf	11780.0	58900.0	1.1341789908284232	--
Cajanus cajan	Seed	40790.0	56270.0	0.6141637182542585	--
Phaseolus vulgaris	Sprout Seedling	5120.0	55054.0	1.0799400548183595	USDA's Ag Handbook 8 and sequelae)
Juglans nigra	Seed	52130.0	54505.0	0.53969680612619	USDA's Ag Handbook 8 and sequelae)
Acacia farnesiana	Leaf	10080.0	54070.0	0.8730215200517875	CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses
Lycopersicon esculentum	Fruit	90.0	54053.0	3.1763013494537677	--
Sinapis alba	Seed	49790.0	53275.0	0.48780201750436314	--
Citrullus lanatus	Seed		53000.0	0.4761995241133043	Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
Rehmannia glutinosa	Root	2000.0	53000.0	3.202606243067563	--

Plant	Part	Low PPM	High PPM	StdDev	Reference
Sesamum indicum	Seed	24670.0	51927.0	0.43092870444456456	--
Pistacia vera	Seed	49160.0	51139.0	0.3976822870196297	--
Lens culinaris	Seed	43500.0	49000.0	0.30743598387972115	USDA's Ag Handbook 8 and sequelae)
Papaver somniferum	Seed	45410.0	48713.0	0.2953271998679615	--
Moringa oleifera	Shoot	10350.0	48500.0	0.39220423591385656	USDA's Ag Handbook 8 and sequelae)
Vigna radiata	Seed	42640.0	46883.0	0.21811788021109724	USDA's Ag Handbook 8 and sequelae)
Vicia faba	Seed	8550.0	45000.0	0.13867244364613796	USDA's Ag Handbook 8 and sequelae)
Pisum sativum	Fruit	4480.0	44313.0	2.4183217884660655	--
Trigonella foenum-graecum	Seed	39880.0	43870.0	0.0909967435301507	--
Psophocarpus tetragonolobus	Seed	40100.0	43749.0	0.08589164643808482	--
Aloe vera	Leaf		43256.0	0.28830994883469857	--
Papaver bracteatum	Seed	37600.0	43200.0	0.06272885054102553	--
Vigna unguiculata	Seed		43190.0	0.06230694169044158	--
Vigna unguiculata	Seed		43190.0	0.06230694169044158	--
Lablab purpureus	Seed	1720.0	42815.0	0.04648535979354315	--
Lens culinaris	Sprout Seedling	12580.0	41935.0	0.25078727322053307	USDA's Ag Handbook 8 and sequelae)
Secale cereale	Seed	36610.0	41110.0	-0.025450099231021674	USDA's Ag Handbook 8 and sequelae)
Basella alba	Leaf	2830.0	41015.0	0.1671393707787067	--
Spinacia oleracea	Plant	3430.0	40735.0	1.5707193839545637	USDA's Ag Handbook 8 and sequelae)
Mucuna pruriens	Seed	19075.0	40440.0	-0.05371799222014686	--
Brassica oleracea var. botrytis l.	Leaf	3750.0	40275.0	0.12712766718145815	--
Brassica oleracea var. italica	Leaf	3750.0	40275.0	0.12712766718145815	USDA's Ag Handbook 8 and sequelae)
Corchorus olitorius	Leaf	4930.0	40130.0	0.11928753607118647	--
Cucumis sativus	Fruit	1540.0	38987.0	2.0038454905378824	--
Cicer arietinum	Seed	33600.0	38150.0	-0.15033511900387322	--
Hordeum vulgare	Seed	32000.0	38000.0	-0.15666375176263259	Jim Duke's personal files.*

Plant	Part	Low PPM	High PPM	StdDev	Reference
Nasturtium officinale	Herb	1900.0	38000.0	1.0	USDA's Ag Handbook 8 and sequelae)
Opuntia ficus-indica	Seed		37500.0	-0.17775919429183049	Laferriere, J.E., 1988, Nutricomp Program, Nutricomp Database; reviewed in J. Ethnobiology 9(1):27-29.
Phaseolus vulgaris	Seed	32940.0	37019.0	-0.19805301000491887	USDA's Ag Handbook 8 and sequelae)
Anacardium occidentale	Seed	36240.0	36867.0	-0.20446602453379503	--
Brassica oleracea var. capitata l.	Leaf	2700.0	36099.0	-0.09866810879436606	USDA's Ag Handbook 8 and sequelae)
Nigella sativa	Seed	28085.0	35900.0	-0.24526461038526376	--
Vigna angularis	Seed	30990.0	35802.0	-0.24939931712098654	--
Carum carvi	Seed	31690.0	35175.0	-0.2758530020526007	Revised USDA data received 1993.
Amaranthus sp.	Leaf	2920.0	35128.0	-0.15116995229832328	--
Pisum sativum	Seed	7400.0	35005.0	-0.283025452512528	--
Cucurbita pepo	Fruit	1840.0	35000.0	1.6935719269179679	--
Brassica oleracea var. botrytis l.	Flower	2650.0	34240.0		--
Phaseolus lunatus	Seed	8810.0	33820.0	-0.333021651306727	USDA's Ag Handbook 8 and sequelae)
Portulaca oleracea	Herb	1500.0	33792.0	-1.0	--
Ipomoea aquatica	Leaf	2520.0	33465.0	-0.24108814565268047	--
Chenopodium album	Leaf	5210.0	33188.0	-0.25606549956678565	--
Bertholletia excelsa	Seed	31510.0	32600.0	-0.3844945310779699	--
Foeniculum vulgare	Fruit	29560.0	32427.0	1.4933376958685471	--
Foeniculum vulgare	Seed	29560.0	32427.0	-0.3917935541930723	USDA's Ag Handbook 8 and sequelae)
Avena sativa	Seed	29000.0	31000.0	-0.4519999471714031	Jim Duke's personal files.*
Beta vulgaris	Root	3930.0	30994.0	1.3370135300475792	USDA's Ag Handbook 8 and sequelae)
Lactuca sativa	Leaf	1820.0	30333.0	-0.4104349776345486	--
Juglans regia	Seed	28090.0	29155.0	-0.5298421301041434	USDA's Ag Handbook 8 and sequelae)
Nelumbo nucifera	Seed	9570.0	29000.0	-0.5363817172881947	--
Valerianella locusta	Plant	2030.0	28195.0	0.5626421499717483	--

Plant	Part	Low PPM	High PPM	StdDev	Reference
Oenothera biennis	Seed	26300.0	28068.0	-0.5757036221626196	--
Abelmoschus esculentus	Fruit	2710.0	27100.0	1.0787835766302012	USDA's Ag Handbook 8 and sequelae)
Cichorium endivia	Leaf	1660.0	26731.0	-0.6051946483876423	--
Helianthus tuberosus	Tuber		26493.0	0.992368582660606	Izadoost, M. & Robinson, T., Synergism & antagonism in the pharmacology of alkaloidal plants, pp 137-58 in Craker, L. & Simon, J., eds., Herbs, Spices & Medicinal Plants: Recent Advances in Botany, Horticulture & Pharmacology, v. 2, 1987, 255pp.
Zea mays	Seed	6360.0	26457.0	-0.6436731379916952	USDA's Ag Handbook 8 and sequelae)
Raphanus sativus	Root	1320.0	25580.0	0.8780332997335651	--
Solanum melongena	Fruit	2010.0	24907.0	0.9081214434427236	--
Mentha spicata	Leaf	3580.0	24775.0	-0.7109553135717208	USDA's Ag Handbook 8 and sequelae)
Solanum tuberosum	Tuber	3470.0	24150.0	0.6715518059550106	--
Brassica oleracea var. sabellica l.	Leaf	3740.0	24065.0	-0.749344921077189	--
Artocarpus altilis	Seed	10360.0	23690.0	-0.7604153169482764	USDA's Ag Handbook 8 and sequelae)
Fagopyrum esculentum	Seed		23300.0	-0.7768697621210507	Laferriere, J.E., 1988, Nutricomp Program, Nutricomp Database; reviewed in J. Ethnobiology 9(1):27-29.
Ginkgo biloba	Seed	8360.0	22840.0	-0.7962775692479128	USDA's Ag Handbook 8 and sequelae)
Capsicum frutescens	Fruit	2640.0	21542.0	0.6462527347442002	USDA's Ag Handbook 8 and sequelae)
Brassica oleracea var. viridis l.	Leaf	1310.0	21471.0	-0.8896021631464629	--
Pinus edulis	Seed	19690.0	20925.0	-0.8770731141347408	USDA's Ag Handbook 8 and sequelae)
Cucurbita spp	Fruit	1260.0	19935.0	0.5211938893122456	--
Sechium edule	Fruit	1370.0	19570.0	0.4927891111027475	--
Allium sativum var. sativum	Bulb	5.0	19320.0		--
Phaseolus vulgaris	Fruit	1870.0	19219.0	0.46547383123553154	USDA's Ag Handbook 8 and sequelae)
Mentha x piperita	Leaf	4090.0	19155.0	-1.0148279814319057	USDA's Ag Handbook 8 and sequelae)

Plant	Part	Low PPM	High PPM	StdDev	Reference
Avena sativa	Plant		19000.0	-0.17653409934818678	Jim Duke's personal files.*
Psophocarpus tetragonolobus	Tuber	8000.0	18779.0	-0.06387581149516006	--
Macadamia spp	Seed	17820.0	18330.0	-0.9865584608612779	USDA's Ag Handbook 8 and sequelae)
Apium graveolens	Pt	860.0	18285.0		USDA's Ag Handbook 8 and sequelae)
Vigna radiata	Sprout Seedling	1610.0	16912.0	-1.3307273280388923	USDA's Ag Handbook 8 and sequelae)
Psophocarpus tetragonolobus	Leaf	3890.0	16803.0	-1.142000315027485	--
Daucus carota	Root	2020.0	16545.0	0.11207718948474456	--
Opuntia ficus-indica	Bud		16000.0		Laferriere, J.E., 1988, Nutricomp Program, Nutricomp Database; reviewed in J. Ethnobiology 9(1):27-29.
Brassica rapa	Root	1300.0	15990.0	0.06502620540194483	--
Lepidium meyenii	Root		15650.0	0.036202179116986435	Taylor, Leslie. 2005. The Healing Power of Rainforest Herbs. SquareOne Publisher, Garden City Park, NY. 519 pp.
Ocimum basilicum	Leaf		15650.0	-1.204342874821576	USDA's Ag Handbook 8 and sequelae)
Capsicum annuum	Fruit	1120.0	15277.0	0.15870222657295222	USDA's Ag Handbook 8 and sequelae)
Manihot esculenta	Root	4700.0	14925.0	-0.025260818108292494	--
Cocos nucifera	Seed	7610.0	14355.0	-1.154267228968401	USDA's Ag Handbook 8 and sequelae)
Brassica napus var. napobrassica	Root	1420.0	13730.0	-0.12656879284513156	USDA's Ag Handbook 8 and sequelae)
Larrea tridentata	Plant		13600.0	-0.6106343436470067	--
Psoralea esculenta	Root	4093.0	12319.0	-0.24618850192770889	Izadoost, M. & Robinson, T., Synergism & antagonism in the pharmacology of alkaloidal plants, pp 137-58 in Craker, L. & Simon, J., eds., Herbs, Spices & Medicinal Plants: Recent Advances in Botany, Horticulture & Pharmacology, v. 2, 1987, 255pp.
Perideridia gairdneri	Root		12319.0	-0.24618850192770889	Izadoost, M. & Robinson, T., Synergism & antagonism in the pharmacology of alkaloidal plants, pp 137-58 in Craker, L. & Simon, J., eds., Herbs, Spices & Medicinal Plants: Recent Advances in Botany, Horticulture & Pharmacology, v. 2, 1987, 255pp.

Plant	Part	Low PPM	High PPM	StdDev	Reference
<i>Prunus armeniaca</i>	Fruit	1570.0	11500.0	-0.13522886191273067	USDA's Ag Handbook 8 and sequelae)
<i>Rosmarinus officinalis</i>	Leaf	3610.0	11200.0	-1.4449537951023277	USDA's Ag Handbook 8 and sequelae)
<i>Castanea dentata</i>	Seed	6204.0	11043.0	-1.294003440281808	--
<i>Fragaria</i> spp	Fruit	900.0	10676.0	-0.19935362148704966	USDA's Ag Handbook 8 and sequelae)
<i>Theobroma cacao</i>	Seed		10200.0	-1.3295703563860357	ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.
<i>Calathea allouia</i>	Root	8825.0	9710.0	-0.4673705153908161	--
<i>Castanea mollissima</i>	Seed	5393.0	9600.0	-1.354884887421073	--
<i>Zingiber officinale</i>	Rhizome	1620.0	9328.0	1.0	--
<i>Zingiber officinale</i>	Root	1620.0	9328.0	-0.49975515668744586	USDA's Ag Handbook 8 and sequelae)
<i>Prunus persica</i>	Fruit	1060.0	8586.0	-0.3620001597277373	--
<i>Dioscorea pentaphylla</i>	Root	1590.0	8565.0	-0.5644396627328083	--
<i>Averrhoa carambola</i>	Fruit	770.0	8480.0	-0.3702492186050162	USDA's Ag Handbook 8 and sequelae)
<i>Persea americana</i>	Fruit	1660.0	8045.0	-0.40410148852592487	--
<i>Arctium lappa</i>	Root	1570.0	7850.0	-0.6250548944791179	USDA's Ag Handbook 8 and sequelae)
<i>Psidium guajava</i>	Fruit	1070.0	7704.0	-0.43063855529151074	USDA's Ag Handbook 8 and sequelae)
<i>Pachyrhizus erosus</i>	Tuber	820.0	7560.0	-1.6000445771204561	--
<i>Citrullus lanatus</i>	Fruit		7420.0	-0.45273980737780517	Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
<i>Asimina triloba</i>	Fruit	622.0	7332.0	-0.4595880826721499	--
<i>Vitis vinifera</i>	Fruit	1380.0	7099.0	-0.47772044794013085	USDA's Ag Handbook 8 and sequelae)
<i>Citrus sinensis</i>	Fruit	60.0	7097.0	-0.4778760905604569	--
<i>Mangifera indica</i>	Fruit	600.0	6800.0	-0.5009890196788704	--
<i>Nelumbo nucifera</i>	Rhizome	1390.0	6650.0	-1.0	--
<i>Phyllanthus emblica</i>	Fruit	1320.0	6535.0	-0.5216116668720676	--
<i>Ipomoea batatas</i>	Root	1590.0	6360.0	-0.7513719508455532	--

Plant	Part	Low PPM	High PPM	StdDev	Reference
Lycium barbarum	Fruit		6300.0	-0.5398996747603746	Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
Phoenix dactylifera	Fruit	400.0	6160.0	-0.5507946581831958	--
Colocasia esculenta	Root	1740.0	5925.0	-0.7882497491807205	--
Castanea sativa	Seed	2558.0	5628.0	-1.5224670828730211	--
Vaccinium corymbosum	Fruit	830.0	5393.0	-0.6104836030782232	--
Citrus reticulata	Fruit	160.0	5158.0	-0.6287716109665302	Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.
Sambucus canadensis	Fruit	960.0	4752.0	-0.6603670628927117	USDA's Ag Handbook 8 and sequelae)
Panax quinquefolius	Plant	396.0	4450.0	-1.3461930909311184	--
Psidium cattleianum	Fruit	760.0	3930.0	-0.7243361798467046	--
Ficus carica	Fruit	720.0	3447.0	-0.7619238726554377	USDA's Ag Handbook 8 and sequelae)
Murraya sp	Fruit	1160.0	3341.0	-0.7701729315327166	--
Musa x paradisiaca	Fruit	1160.0	3341.0	-0.7701729315327166	USDA's Ag Handbook 8 and sequelae)
Ananas comosus	Fruit	90.0	3333.0	-0.7707955020140207	--
Citrus paradisi	Fruit	220.0	2800.0	-0.8122742603309042	--
Prunus domestica	Fruit	370.0	2500.0	-0.8356206533798067	USDA's Ag Handbook 8 and sequelae)
Pyrus communis	Fruit	280.0	1729.0	-0.8956208835154862	--
Malus domestica	Fruit	156.0	1244.0	-0.9333642189445454	--
Momordica charantia	Seed		212.0	-1.7509729163492929	Jim Duke's personal files.
Ribes nigrum	Fruit Juice		210.0		--
Pisum sativum	Shoot		70.0	-1.3728059371053247	--
Linum usitatissimum	Seed		1.153	-1.7598687378912001	--
Elaeagnus angustifolia	Root		0.48	-1.2905101027270787	Wheller, C. T., Bond, G. 1970. The Amino Acids of Non-Legume Root Nodules. Phytochemistry 9: 705-708. Dept. Botany Univ. Glasgow Glasgow, Scotland.
Allium sativum var. sativum	Leaf				--

Plant	Part	Low PPM	High PPM	StdDev	Reference
Myrica cerifera	Root				--
Glycine max	Shoot				--
Silybum marianum	Seed				--
Huperzia spp	Plant				--
Cryptotaenia japonica	Shoot				--
Melia azedarach	Plant				--
Stachys officinalis	Shoot				--
Lentinus edodes	Fruit				--
Angelica sinensis	Root				Jim Duke's personal files.
Oryza sativa	Hay				--
Coriandrum sativum	Fruit				--
Chondrus crispus	Thallus				Jim Duke's personal files.
Coffea arabica	Seed				Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
Taraxacum officinale	Leaf				Hansel, R., Keller, K., Rimpler, H., and Schneider, G. eds. 1992. Hager's Handbuch der Pharmazeutischen Praxis, Drogen (A-D), 1209 pp., 1993 (E-O), 970 pp., 1994 (P-Z), 1196 pp. Springer-Verlag, Berlin.
Cocos nucifera	Endosperm				Jim Duke's personal files.
Plantago ovata	Seed				--
Allium cepa	Bulb				Thomas, D. J., Parkin, K. L. 1994. Quantification of Alk(en)yl-L-Cysteine Sulfoxides and Related Amino Acids in Alliums by High-Performance Liquid Chromatography. J. Agr. Food Chem., 42(8): 1632-1638.
Cocos nucifera	Leaf				Jim Duke's personal files.
Alpinia galanga	Leaf				--
Prunus cerasus	Fruit				--
Crocus sativus	Bulb				--



Plant	Part	Low PPM	High PPM	StdDev	Reference
Astragalus membranaceus	Root				Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.
Capsella bursa-pastoris	Plant				--
Pinellia ternata	Tuber				--
Artemisia dracuncululus	Root				--
Momordica charantia	Fruit				Jim Duke's personal files.
Bacopa monnieri	Plant				Wealth of India.
Citrus limon	Plant				--
Artemisia dracuncululus	Shoot				--
Coccinia grandis	Flower				List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
Glechoma hederacea	Plant				Oriental Materia Medica (three volumes by Dr. Hsu and collaborators)
Apium graveolens	Shoot				--
Scutellaria baicalensis	Root				--
Centella asiatica	Plant				=ICMR(Indian Council of Medical Research).1976.Medicinal Plants of India.Vol.1.Indian Council of Med. Res.Cambridge Printing Works, New Delhi.487 pp;ICMR.1987.Medicinal Plants of India.Vol.2.Indian Council of Med. Res.Cambr. Printing Works,New Delhi.600pp
Anabasis aphylla	Plant				--
Achillea millefolium	Plant				Tunon, H., Thorsell, W., and Bohlin, L. 1993. Mosquito Repelling Activity of Compounds Occurring in Achillea millefolium L. (Asteraceae). Economic Botany 48(2): 111-120, 1994.
Tribulus terrestris	Fruit				--
Allium ampeloprasum	Plant				--
Urtica dioica	Leaf				Jim Duke's personal files.

Plant	Part	Low PPM	High PPM	StdDev	Reference
Panax ginseng	Root				--
Dryopteris marginalis	Plant				List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
Panax ginseng	Leaf				--
Artemisia dracunculus	Leaf				--
Ricinus communis	Seed				List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.
Harpagophytum procumbens	Root				--
Carica papaya	Fruit				USDA's Ag Handbook 8 and sequelae)
Morus alba	Leaf				--
Valeriana officinalis	Root				--
Trifolium pratense	Plant				--
Tilia sp.	Fruit				--