

Dr. Duke's Phytochemical and Ethnobotanical Databases

Chemicals found in Theobroma cacao

| Activities Count | Chemical         | Plant Part      | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|------------------|-----------------|---------|----------|--------|--|
| 0                | PROTEINASE       | Seed            |         |          |        | --   |
| 7                | CYANIDIN         | Plant           |         |          |        | --   |
| 0                | ARACHIDIC-ACID   | Plant           |         |          |        | --   |
| 77               | CHLOROGENIC-ACID | Seed            |         |          |        | Jeffery B. Harborne and H. Baxter, eds. 1983. Phytochemical Dictionary. A Handbook of Bioactive Compounds from Plants. Taylor & Frost, London. 791 pp. |
| 78               | LUTEOLIN         | Plant           |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 0                | FURFUROL         | Seed            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.                             |
| 4                | ISOVITEXIN       | Plant           |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 3                | XYLOSE           | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.                             |
| 1                | STACHYOSE        | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.                             |
| 11               | TYRAMINE         | Plant           |         |          |        | --   |
| 1                | RAFFINOSE        | Plant           |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.                             |
| 2                | DIACETYL         | Plant           |         |          |        | --   |
| 4                | BIOTIN           | Sprout Seedling |         |          |        | --   |
| 0                | METHYL-HEPTENONE | Seed            |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. l'ORSTROM, Paris. 569 pp.                                    |
| 0                | HAEMATIN         | Plant           |         |          |        | --   |

| Activities Count | Chemical                         | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|----------------------------------|------------|---------|----------|--------|--|
| 57               | COUMARIN                         | Seed       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. l'ORSTROM, Paris. 569 pp.            |
| 0                | ARABINOSE                        | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 0                | CATECHIN-TANNINS                 | Seed       |         |          |        | --   |
| 0                | PALMITODIOLIN                    | Seed       |         |          |        | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980. |
| 0                | LIPASE                           | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 8                | FRUCTOSE                         | Plant      |         |          |        | --   |
| 26               | SEROTONIN                        | Plant      |         |          |        | --   |
| 0                | OCTOIC-ACID                      | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 4                | ISOPROPYL-ACETATE                | Plant      |         |          |        | --   |
| 9                | SINAPIC-ACID                     | Plant      |         |          |        | --   |
| 13               | FORMIC-ACID                      | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.     |
| 1                | CATALASE                         | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 0                | 4-HYDROXY-3-METHOXY-BENZOIC-ACID | Seed       |         |          |        | Jim Duke's personal files.   |
| 15               | TRIGONELLINE                     | Seed       |         |          |        | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980. |

| Activities Count | Chemical                   | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|----------------------------|------------|---------|----------|--------|--|
| 0                | RAFFINASE                  | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | DEXTRINASE                 | Plant      |         |          |        | --   |
| 0                | BETA-THEOSTEROL            | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 12               | STIGMASTEROL               | Seed       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. l'ORSTROM, Paris. 569 pp.        |
| 0                | MESO-INOSITOL              | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | GLYCOSIDASE                | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 2                | APIGENIN-7-O-GLUCOSIDE     | Plant      |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 0                | 1-BUTYRIC-ACID             | Plant      |         |          |        | --   |
| 6                | TARTARIC-ACID              | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | O-HYDROXYPHENYLACETIC-ACID | Seed       |         |          |        | Jim Duke's personal files.   |
| 0                | PHOSPHATIDYL-INOSITOL      | Plant      |         |          |        | --   |
| 44               | QUERCITRIN                 | Leaf       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | DECARBOXYLASE              | Plant      |         |          |        | --   |

| Activities Count | Chemical                       | Plant Part      | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|--------------------------------|-----------------|---------|----------|--------|--|
| 47               | BETA-SITOSTEROL                | Sprout Seedling |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | MELIBIOSE                      | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 4                | GLYCOLIC-ACID                  | Leaf            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 1                | AMYLASE                        | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 38               | (-)-EPICATECHIN                | Leaf            |         |          |        | --   |
| 0                | P-HYDROXYPHENYLACETIC-ACID     | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | PROPYL-ACETATE                 | Plant           |         |          |        | --   |
| 2                | NONANOIC-ACID                  | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 3                | ISOBUTYL-ACETATE               | Seed            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 18               | VITEXIN                        | Plant           |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 3                | SALSOLINOL                     | Seed            |         |          |        | --   |
| 0                | PHOSPHATIDYL-ETHANOLAMINE      | Plant           |         |          |        | --   |
| 0                | 3-BETA-D-GALACTOSIDYL-CYANIDIN | Leaf            |         |          |        | --   |
| 0                | QUERCETIN-3-O-GLUCOSIDE        | Plant           |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |

| Activities Count | Chemical                  | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|---------------------------|------------|---------|----------|--------|--|
| 0                | D-GALACTOSE               | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 53               | BETA-CAROTENE             | Plant      |         |          |        | --   |
| 3                | MANNOSE                   | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 3                | AMYL-BUTYRATE             | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | GALLOCATECHIN             | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 13               | P-HYDROXY-BENZOIC-ACID    | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 6                | SYRINGIC-ACID             | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 6                | PROPIONIC-ACID            | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 1                | CHRYSOERIOL-7-O-GLUCOSIDE | Plant      |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 0                | VERBASCOTETROSE           | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | SACCHAROSE                | Plant      |         |          |        | --   |
| 61               | FERULIC-ACID              | Seed       |         |          |        | --   |

| Activities Count | Chemical                       | Plant Part      | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|--------------------------------|-----------------|---------|----------|--------|--|
| 2                | CAMPESTEROL                    | Sprout Seedling |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | 3-BETA-D-GALACTOSIDYL-CYANIDIN | Flower          |         |          |        | --   |
| 2                | QUERCETIN-3-O-GALACTOSIDE      | Plant           |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 0                | CYCLOARTANOL                   | Sprout Seedling |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | ASPARIGINASE                   | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 4                | PHENYLETHYLAMINE               | Seed            |         |          |        | --   |
| 0                | PHLOBAPHENE                    | Plant           |         |          |        | --   |
| 0                | PHLOBAPHENE                    | Seed            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | MANNINOTRIOSE                  | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | GLYCEROPHOSPHATASE             | Plant           |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 1                | AMYL-ALCOHOL                   | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | P-COUMARYL-QUINIC-ACID         | Leaf            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 14               | SUCROSE                        | Plant           |         |          |        | --   |
| 1                | CHOLESTEROL                    | Plant           |         |          |        | --   |

| Activities Count | Chemical         | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|------------------|------------|---------|----------|--------|--|
| 11               | NICOTINIC-ACID   | Plant      |         |          |        | --   |
| 1                | VERBASCOSIDE     | Seed       |         |          |        | --   |
| 4                | RUTOSIDE         | Leaf       |         |          |        | --   |
| 176              | QUERCETIN        | Leaf       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | MANNAN           | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 1                | GLYCERIN         | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | AMYL-ACETATE     | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 11               | TYRAMINE         | Seed       |         |          |        | --   |
| 25               | P-COUMARIC-ACID  | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 8                | LACTIC-ACID      | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 12               | STIGMASTEROL     | Plant      |         |          |        | --   |
| 77               | CHLOROGENIC-ACID | Leaf       |         |          |        | --   |
| 0                | INVERTASE        | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 24               | VANILLIC-ACID    | Seed       |         |          |        | --   |
| 87               | RUTIN            | Leaf       |         |          |        | --   |
| 4                | TRYPTAMINE       | Seed       |         |          |        | --   |

| Activities Count | Chemical                        | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|---------------------------------|------------|---------|----------|--------|--|
| 0                | 3-ALPHA-L-ARABINOSIDYL-CYANIDIN | Leaf       |         |          |        | --   |
| 0                | LINOLENIC-ACID                  | Plant      |         |          |        | 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. |
| 0                | CYANIDIN-3-GALACTOSIDE          | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | ASCORBIC-ACID-OXIDASE           | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | OXALURIC-ACID                   | Plant      |         |          |        | Gruenwald, J. et al. 1998. PDR for Herbal Medicine. 1st ed. Medical Economics Co., Montvale, NJ. 1244 pp. (abbreviated as PHR or Physicians Herbal Reference in my mind)                                   |
| 2                | PHENYLACETIC-ACID               | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | HAEMATIN                        | Seed       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. l'ORSTROM, Paris. 569 pp.  |
| 0                | MALEIC-ACID                     | Plant      |         |          |        | --   |
| 0                | ALPHA-THEOSTEROL                | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | PROPYL-ACETATE                  | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | P-ANISIC-ACID                   | Seed       |         |          |        | Jim Duke's personal files.   |



| Activities Count | Chemical                        | Plant Part      | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|---------------------------------|-----------------|---------|----------|--------|--|
| 0                | L-EPICATECHIN                   | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 0                | STEARODIOLEIN                   | Seed            |         |          |        | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980. |
| 0                | POLYPHENOL-OXIDASE              | Plant           |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 0                | IDAEIN                          | Flower          |         |          |        | Chemical Constituents of Oriental Herbs (3 diff. books)  |
| 30               | ESCULETIN                       | Seed            |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. L'ORSTROM, Paris. 569 pp.            |
| 26               | SEROTONIN                       | Seed            |         |          |        | --   |
| 0                | 3-ALPHA-L-ARABINOSIDYL-CYANIDIN | Flower          |         |          |        | --   |
| 0                | CYANIDIN-3-GALACTOSIDE          | Leaf            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.     |
| 0                | METHYL-STEROLS                  | Seed            |         |          |        | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.      |
| 0                | PEROXIDASE                      | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 0                | LYSOPHOSPHATIDYLCHOLINE         | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.     |
| 36               | THEOPHYLLINE                    | Plant           |         |          |        | --   |
| 0                | ALPHA-SITOSTEROL                | Sprout Seedling |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.     |

| Activities Count | Chemical                      | Plant Part      | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|-------------------------------|-----------------|---------|----------|--------|--|
| 0                | GALLOCATECHIN                 | Plant           |         |          |        | --   |
| 8                | STEARIC-ACID                  | Plant           |         |          |        | --   |
| 0                | POLYGALACTURONATE             | Plant           |         |          |        | --   |
| 1                | CELLULOSE                     | Plant           |         |          |        | --   |
| 0                | I-BUTYRIC-ACID                | Plant           |         |          |        | --   |
| 9                | VALERIC-ACID                  | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 5                | ERGOSTEROL                    | Seed            |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. I'ORSTROM, Paris. 569 pp.  |
| 5                | 24-METHYLENE-CYCLOARTANOL     | Sprout Seedling |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 1                | BEHENIC-ACID                  | Plant           |         |          |        | 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. |
| 0                | CYANIDIN-3-BETA-L-ARABINOSIDE | Seed            |         |          |        | --   |
| 20               | LECITHIN                      | Seed            |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | PENTOSE                       | Seed            |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 8                | GENTISIC-ACID                 | Leaf            |         |          |        | --   |
| 0                | OLEOPALMITOSTEARIN            | Seed            |         |          |        | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980.   |

| Activities Count | Chemical                      | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|-------------------------------|------------|---------|----------|--------|--|
| 6                | EPIGALLOCATECHIN              | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | PLANTEOSE                     | Plant      |         |          |        | --   |
| 0                | CELLULASE                     | Plant      |         |          |        | --   |
| 1                | VALERIANIC-ACID               | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 0                | RHAMNOSE                      | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 1                | N-NONACOSANE                  | Seed       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. l'ORSTROM, Paris. 569 pp.        |
| 43               | PROTOCATECHUIC-ACID           | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | CYANIDIN-3-BETA-L-ARABINOSIDE | Leaf       |         |          |        | --   |
| 0                | HYDROLASE                     | Seed       |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 24               | PECTIN                        | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 2                | LUTEOLIN-7-O-GLUCOSIDE        | Plant      |         |          |        | J.S. Glasby Dict.Pls Containing 2ndary Metabolite. 1991.   |
| 0                | GALACTURONIC-ACID             | Plant      |         |          |        | --   |

| Activities Count | Chemical          | Plant Part | Low PPM | High PPM | StdDev | Reference Citation   |
|------------------|-------------------|------------|---------|----------|--------|--|
| 1                | THEOSTEROL        | Testa      |         |          |        | 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. |
| 75               | KAEMPFEROL        | Leaf       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. I'ORSTROM, Paris. 569 pp.  |
| 40               | EPICATECHIN       | Leaf       |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. I'ORSTROM, Paris. 569 pp.  |
| 0                | PHYTASE           | Plant      |         |          |        | --   |
| 22               | CATECHOL          | Plant      |         |          |        | Grenand, P., Moretti, C., and Jacquemin, H. 1987. Pharmacopees Traditionnelles en Guyane. I'ORSTROM, Paris. 569 pp.  |
| 0                | HAEMIN            | Plant      |         |          |        | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | REDUCTASE         | Plant      |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 20               | DOPAMINE          | Seed       |         |          |        | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980.   |
| 102              | CAFFEIC-ACID      | Seed       |         |          |        | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 34               | PROANTHOCYANIDINS | Plant      |         |          |        | Gruenwald, J. et al. 1998. PDR for Herbal Medicine. 1st ed. Medical Economics Co., Montvale, NJ. 1244 pp. (abbreviated as PHR or Physicians Herbal Reference in my mind)                                   |

| Activities Count | Chemical              | Plant Part | Low PPM | High PPM | StdDev               | Reference Citation   |
|------------------|-----------------------|------------|---------|----------|----------------------|--|
| 1                | N-BUTYLACETATE        | Seed       |         |          |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| 7                | SALICYLATES           | Seed       |         | 0.0      | -0.3401776874861938  | --   |
| 5                | PHYLLOQUINONE         | Seed       |         | 0.02     | -1.1351915229662497  | --   |
| 43               | PYRIDOXINE            | Seed       |         | 1.0      | -1.1536599429026273  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 31               | THIAMIN               | Seed       | 1.0     | 3.0      | -0.8551170555321612  | --   |
| 15               | RIBOFLAVIN            | Fruit      | 1.6     | 3.8      | -0.25899158592219057 | J Cell Biochem VOL. 22=1995  |
| 15               | RIBOFLAVIN            | Seed       | 1.0     | 4.0      | 0.18234587940570884  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 31               | THIAMIN               | Fruit      | 1.8     | 4.2      | -0.14499283258341247 | J Cell Biochem VOL. 22=1995  |
| 0                | LINALOL               | Seed       |         | 5.0      | -0.6999883964509279  | --   |
| 53               | LINALOOL              | Seed       |         | 5.0      | -0.5895891599202989  | --   |
| 0                | EO                    | Plant      |         | 10.0     | -0.7393686069051985  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 11               | PANTOTHENIC-ACID      | Seed       | 13.0    | 20.0     | 0.34109708334068634  | --   |
| 2                | NICOTINAMIDE          | Seed       |         | 21.0     | -1.0                 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 0                | BETA-PHENYLETHYLAMINE | Seed       | 0.0     | 22.0     |                      | --   |
| 12               | COPPER                | Seed       |         | 24.0     | 0.8331720560940928   | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 112              | ASCORBIC-ACID         | Seed       |         | 31.0     | -0.3198458318942361  | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |

| Activities Count | Chemical       | Plant Part | Low PPM | High PPM | StdDev               | Reference Citation   |
|------------------|----------------|------------|---------|----------|----------------------|--|
| 6                | IRON           | Seed       | 36.0    | 37.0     | -0.5287176209786577  | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |
| 0                | IRON-OXIDE     | Seed       |         | 40.0     | -1.0                 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 1                | (-)-SALSOLINOL | Seed       | 0.007   | 40.0     |                      | --   |
| 39               | NIACIN         | Fruit      | 19.0    | 45.0     | -0.20985653043855088 | J Cell Biochem VOL. 22=1995  |
| 39               | NIACIN         | Seed       | 17.0    | 50.0     | 0.21294979342958875  | --   |
| 112              | ASCORBIC-ACID  | Fruit      | 30.0    | 70.0     | -0.2801366159826427  | J Cell Biochem VOL. 22=1995  |
| 0                | CHLORIDE       | Seed       |         | 120.0    | -0.6613721823540172  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 36               | THEOPHYLLINE   | Petiole    | 58.0    | 188.0    | 0.1867718419094071   | --   |
| 21               | THEOBROMINE    | Petiole    | 174.0   | 223.0    | 1.2182825031280367   | --   |
| 62               | CAFFEINE       | Petiole    | 51.0    | 252.0    | 1.3383130789607725   | --   |
| 36               | THEOPHYLLINE   | Testa      | 130.0   | 257.0    | 1.0617119603565899   | --   |
| 0                | PHYTATE        | Seed       | 10.0    | 530.0    | -1.5112480559438948  | Phytate in Food. Harland & Oberleas. Wld. Rev. Nutr. Diet, 52: 235-259.  |
| 62               | CAFFEINE       | Testa      | 130.0   | 723.0    | 1.364120501373702    | --   |
| 4                | LYSINE         | Seed       |         | 800.0    | -1.5304571248204542  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 7                | HISTIDINE      | Seed       |         | 800.0    | -1.4153953454644674  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 14               | ARGININE       | Seed       |         | 800.0    | -1.009489821300081   | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |

| Activities Count | Chemical                        | Plant Part | Low PPM | High PPM | StdDev              | Reference Citation   |
|------------------|---------------------------------|------------|---------|----------|---------------------|--|
| 12               | GLYCINE                         | Seed       |         | 900.0    | -1.4533713326030981 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | 3-BETA-D-GALACTOSIDYL-CYANIDIN  | Seed       |         | 1000.0   |                     | --   |
| 0                | 3-ALPHA-L-ARABINOSIDYL-CYANIDIN | Seed       |         | 1000.0   |                     | --   |
| 28               | CALCIUM                         | Seed       | 800.0   | 1100.0   | -0.5594989895943375 | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |
| 2                | PHOSPHATIDYL-CHOLINE            | Seed       | 92.0    | 1328.0   | -1.0                | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 4                | THREONINE                       | Seed       |         | 1400.0   | -1.5071309379745554 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 8                | FRUCTOSE                        | Seed       |         | 2000.0   | -0.5987994606248948 | --   |
| 1                | CHOLESTEROL                     | Oil        | 0.0     | 2800.0   | 1.0                 | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.  |
| 7                | GLUCOSE                         | Seed       | 1000.0  | 3000.0   | -0.5077819441641488 | --   |
| 28               | CALCIUM                         | Fruit      | 1300.0  | 3095.0   | -0.1756747356051228 | J Cell Biochem VOL. 22=1995  |
| 0                | PHOSPHOLIPIDS                   | Plant      | 255.0   | 3319.0   | -1.7600853913673296 | --   |
| 0                | PHOSPHOLIPIDS                   | Seed       | 255.0   | 3319.0   | -0.6578549027249627 | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.  |
| 30               | ANTHOCYANINS                    | Seed       |         | 4000.0   | 1.0                 | 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. |
| 2                | LEUCINE                         | Plant      |         | 4500.0   | -0.9511481830727361 | --   |
| 36               | THEOPHYLLINE                    | Seed       | 0.0     | 4739.0   | 1.7330040388042545  | --   |

| Activities Count | Chemical           | Plant Part | Low PPM | High PPM | StdDev               | Reference Citation   |
|------------------|--------------------|------------|---------|----------|----------------------|--|
| 4                | PHOSPHORUS         | Fruit      | 500.0   | 5000.0   | 0.5418734067690828   | J Cell Biochem VOL. 22=1995  |
| 0                | CYANIDIN-GLYCOSIDE | Seed       | 4000.0  | 5000.0   |                      | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 9                | OXALIC-ACID        | Seed       | 1520.0  | 5000.0   | 0.3447985152060364   | --   |
| 0                | KILOCALORIES       | Fruit      | 531.0   | 5310.0   | 2.5052266068859748   | J Cell Biochem VOL. 22=1995  |
| 4                | PHOSPHORUS         | Seed       | 3600.0  | 5571.0   | 0.05751506388486866  | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |
| 3                | ISOLEUCINE         | Seed       |         | 5600.0   | -0.624169861411402   | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 7                | PHENYLALANINE      | Seed       |         | 5600.0   | -0.7093928366416996  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 3                | VALINE             | Seed       |         | 5700.0   | -0.7773276247624422  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 8                | TYROSINE           | Seed       |         | 5700.0   | -0.4728461096051886  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 16               | ACETIC-ACID        | Seed       | 1520.0  | 7100.0   | 1.3864579714312821   | --   |
| 0                | PROLINE            | Seed       |         | 7200.0   | -0.8125279763894483  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 23               | CITRIC-ACID        | Seed       | 4500.0  | 7500.0   | 0.007355725552878182 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |
| 1                | SERINE             | Seed       |         | 8800.0   | -0.3400469562928065  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes. |



| Activities Count | Chemical      | Plant Part | Low PPM | High PPM | StdDev               | Reference Citation   |
|------------------|---------------|------------|---------|----------|----------------------|--|
| 0                | OXALATES      | Seed       | 6000.0  | 10000.0  |                      | --   |
| 0                | ALKALOIDS     | Leaf       |         | 10000.0  | 0.062309440096893175 | 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. |
| 8                | GLUTAMIC-ACID | Seed       |         | 10200.0  | -1.3295703563860357  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 3                | ALANINE       | Seed       |         | 10400.0  | 0.051822040311835675 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 27               | LINOLEIC-ACID | Plant      | 10700.0 | 12230.0  | -0.39147043061187325 | --   |
| 62               | CAFFEINE      | Seed       | 500.0   | 12900.0  | -0.4658272368460845  | --   |
| 21               | THEOBROMINE   | Testa      | 936.0   | 13000.0  | 1.0376929371594854   | --   |
| 0                | PURINE        | Root       |         | 14000.0  |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | PENTOSANS     | Seed       |         | 15000.0  | -1.3271673489237144  | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | NITROGEN      | Seed       |         | 22800.0  | -0.10548081217201899 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | L-EPICATECHIN | Flower     |         | 27000.0  |                      | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 0                | PROTEIN       | Fruit      | 12000.0 | 28570.0  | -1.0848822697889617  | J Cell Biochem VOL. 22=1995  |
| 27               | LINOLEIC-ACID | Seed       | 7420.0  | 29115.0  | -0.6683734051471023  | --   |
| 21               | THEOBROMINE   | Seed       | 10000.0 | 35000.0  | 2.234049191141325    | --   |

| Activities Count | Chemical           | Plant Part | Low PPM | High PPM | StdDev               | Reference Citation   |
|------------------|--------------------|------------|---------|----------|----------------------|--|
| 0                | LEUCOCYANIDINS     | Seed       | 14000.0 | 35000.0  |                      | --   |
| 0                | WATER              | Seed       |         | 36000.0  | -0.7352763653505671  | --   |
| 14               | SUCROSE            | Seed       | 18000.0 | 37000.0  | -0.17153022515909322 | --   |
| 0                | SUGARS             | Seed       | 20000.0 | 40000.0  | -0.4051939134225381  | 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. |
| 1                | CATECHINS          | Seed       | 30000.0 | 40000.0  | 1.0                  | --   |
| 0                | PURINE             | Seed       | 30000.0 | 40000.0  |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 0                | ALKALOIDS          | Seed       | 30000.0 | 40000.0  | 1.258570715061275    | --   |
| 0                | POLYHYDROXYPHENOLS | Seed       | 20000.0 | 60000.0  |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 5                | STARCH             | Hb         |         | 60000.0  |                      | --   |
| 0                | TANNINS            | Seed       |         | 75400.0  | 0.46682727652711586  | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 25               | OPCS               | Seed       |         | 80000.0  |                      | --   |
| 15               | FIBER              | Seed       | 59000.0 | 89000.0  | -0.36147740264683753 | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |
| 6                | FURFURAL           | Exocarp    |         | 90000.0  |                      | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 1                | CELLULOSE          | Seed       |         | 90000.0  | -0.23884916161035874 | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.   |
| 5                | STARCH             | Seed       | 50000.0 | 90000.0  | -0.891522967457591   | --   |

| Activities Count | Chemical        | Plant Part | Low PPM  | High PPM | StdDev              | Reference Citation   |
|------------------|-----------------|------------|----------|----------|---------------------|--|
| 0                | ASH             | Fruit      | 38000.0  | 90475.0  | 0.8755538014219674  | J Cell Biochem VOL. 22=1995  |
| 0                | OLEO-DIPALMATIN | Seed       | 76500.0  | 92800.0  |                     | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 30               | POLYPHENOLS     | Seed       | 78000.0  | 100000.0 | 1.0                 | ANON. 1948-1976. The Wealth of India raw materials. Publications and Information Directorate, CSIR, New Delhi. 11 volumes.   |
| 15               | FIBER           | Fruit      | 43000.0  | 102380.0 | -0.3708195428012696 | J Cell Biochem VOL. 22=1995  |
| 0                | FAT             | Fruit      | 44000.0  | 104760.0 | 0.15889636363871001 | J Cell Biochem VOL. 22=1995  |
| 0                | PHENOLICS       | Seed       |          | 130000.0 | 1.0                 | 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. |
| 0                | PROTEIN         | Seed       | 100000.0 | 180000.0 | -0.4785438804290316 | --   |
| 13               | PALMITIC-ACID   | Seed       | 89040.0  | 180500.0 | 3.024699622330506   | --   |
| 8                | STEARIC-ACID    | Seed       | 111300.0 | 215450.0 | 4.109143355899089   | --   |
| 18               | OLEIC-ACID      | Seed       | 122430.0 | 227100.0 | 0.8877951296368191  | --   |
| 0                | CARBOHYDRATES   | Seed       | 347000.0 | 445000.0 | -0.3115865270747604 | CRC Handbook of Medicinal Herbs and/or CRC Handbook of Proximate Analyses  |
| 0                | WATER           | Fruit      |          | 580000.0 | -0.8286411411444385 | J Cell Biochem VOL. 22=1995  |
| 0                | FAT             | Seed       | 371000.0 | 582300.0 | 1.6692910162467098  | --   |
| 0                | CARBOHYDRATES   | Fruit      | 343000.0 | 816665.0 | 0.18065678536256444 | J Cell Biochem VOL. 22=1995  |