

# C BETA-PHELLANDRENE

## Chemid

BETAPHELLANDRENE

\*Unless otherwise noted all references are to Duke, James A. 1992. Handbook of phytochemical constituents of GRAS herbs and other economic plants. Boca Raton, FL. CRC Press.

| Plant                       | Part              | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                        |
|-----------------------------|-------------------|---------|----------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Abies alba                  | Plant             | 32      | 46       | -0.387752999228035   | --                                                                                                                                                                                               |
| Abies balsamea              | Gum               | --      | --       |                      | --                                                                                                                                                                                               |
| Agathosma betulina          | Leaf Essent. Oil  | --      | --       |                      | --                                                                                                                                                                                               |
| Allium sativum var. sativum | Bulb              | --      | --       |                      | 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. |
| Anethum graveolens          | Fruit             | 168     | 1925     | -0.1401637043460988  | --                                                                                                                                                                                               |
| Anethum graveolens          | Root              | 168     | 1925     |                      | --                                                                                                                                                                                               |
| Anethum graveolens          | Leaf              | 120     | 2100     | 4.5514578733129      | --                                                                                                                                                                                               |
| Anethum graveolens          | Seed              | 25      | 1925     | -0.06920272549899337 | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                                                         |
| Anethum graveolens          | Essential Oil     | --      | 31600    | 1.724225349934716    | --                                                                                                                                                                                               |
| Anethum graveolens          | Shoot Essent. Oil | 82100   | 169300   | 1                    | --                                                                                                                                                                                               |

| Plant                 | Part             | Low PPM | High PPM | StdDev              | Reference                                                                                                                 |
|-----------------------|------------------|---------|----------|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| Anethum graveolens    | Root Essent. Oil | --      | --       |                     | --                                                                                                                        |
| Anethum graveolens    | Seed Essent. Oil | --      | --       |                     | --                                                                                                                        |
| Angelica archangelica | Root             | 50      | 1000     | 1                   | --                                                                                                                        |
| Angelica archangelica | Fruit            | --      | --       |                     | --                                                                                                                        |
| Angelica archangelica | Root Essent. Oil | --      | --       |                     | --                                                                                                                        |
| Apium graveolens      | Fruit            | --      | 2000     | -0.1272127645580522 | --                                                                                                                        |
| Apium graveolens      | Seed Essent. Oil | 200     | 2000     | -1.027685692005648  | --                                                                                                                        |
| Artemisia dracunculus | Shoot            | 100     | 1070     | 4.04416490771926    | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp. |
| Boswellia sacra       | Essential Oil    | --      | --       |                     | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                  |
| Boswellia serrata     | Essential Oil    | --      | --       |                     | --                                                                                                                        |
| Canarium indicum      | Essential Oil    | 800     | 2000     | -1.0729833292578388 | --                                                                                                                        |
| Carica papaya         | Fruit            | --      | --       |                     | --                                                                                                                        |
| Carum carvi           | Seed             | --      | --       |                     | Wealth of India.                                                                                                          |
| Cinnamomum verum      | Leaf             | --      | --       |                     | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                  |
| Cistus ladaniferus    | Plant            | 2       | 140      | 0.5096601921671527  | --                                                                                                                        |

| Plant                | Part                 | Low PPM | High PPM | StdDev               | Reference                                                                                                                  |
|----------------------|----------------------|---------|----------|----------------------|----------------------------------------------------------------------------------------------------------------------------|
| Citrus aurantiifolia | Fruit                | 90      | 90       | -0.45703003116030555 | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                   |
| Citrus limon         | Essential Oil        | 80      | 80       | -1.254423892232491   | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                   |
| Citrus limon         | Pericarp Essent. Oil | --      | 65900    |                      | Jim Duke's personal files.                                                                                                 |
| Citrus limon         | Leaf Essent. Oil     | --      | 3300     | -0.6449387865926303  | Jim Duke's personal files.                                                                                                 |
| Citrus limon         | Petiole              | --      | 8        |                      | --                                                                                                                         |
| Citrus paradisi      | Pericarp             | --      | --       |                      | --                                                                                                                         |
| Coleus barbatus      | Root Essent. Oil     | --      | 10000    | 1                    | Jim Duke's personal files.                                                                                                 |
| Coriandrum sativum   | Fruit                | 1       | 13       | -0.4703263293427     | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| Coriandrum sativum   | Essential Oil        | --      | --       |                      | --                                                                                                                         |
| Coriandrum sativum   | Seed Essent. Oil     | 400     | 18600    | -0.3304275521980012  | --                                                                                                                         |
| Cuminum cyminum      | Fruit                | 90      | 279      | -0.4243936628944281  | --                                                                                                                         |
| Cuminum cyminum      | Seed                 | 90      | 279      | -0.9915321681819333  | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                   |
| Cuminum cyminum      | Seed Essent. Oil     | --      | 700      | -1.0822902451231144  | --                                                                                                                         |
| Daucus carota        | Shoot                | 177     | 177      | 0.14375394815958314  | --                                                                                                                         |

| Plant                     | Part             | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                                                       |
|---------------------------|------------------|---------|----------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elettaria cardamomum      | Seed Essent. Oil | --      | 32500    | 0.2534211311349079   | --                                                                                                                                                                                                                                                              |
| Eucalyptus angulosa       | Leaf             | --      | 1.5      | -0.4607470278878015  | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |
| Eucalyptus behriana       | Leaf             | 2.7     | 2.7      | -0.45788086354115354 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus ceratocorys    | Leaf             | --      | 80       | -0.2732521102112444  | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |
| Eucalyptus citriodora     | Leaf Essent. Oil | --      | 12000    | 0.07288220829298371  | --                                                                                                                                                                                                                                                              |
| Eucalyptus cuprea         | Leaf             | 6.4     | 6.4      | -0.4490435234723222  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus desquamata     | Leaf             | 0       | 15       | -0.4285026789880114  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus dolichorhyncha | Leaf             | --      | 6        | -0.4499989115878715  | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |

| Plant                   | Part              | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                                                       |
|-------------------------|-------------------|---------|----------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eucalyptus erythrandra  | Leaf              | --      | 7        | -0.44761044129899813 | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |
| Eucalyptus fasciculosa  | Leaf              | 0       | 1.3      | -0.4612247219455761  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus forrestiana  | Leaf              | --      | 95       | -0.2374250558781443  | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |
| Eucalyptus globulus     | Fruit Essent. Oil | --      | 34300    | -0.6379877744813619  | --                                                                                                                                                                                                                                                              |
| Eucalyptus globulus     | Essential Oil     | --      | --       | --                   | --                                                                                                                                                                                                                                                              |
| Eucalyptus globulus     | Leaf Essent. Oil  | --      | 36000    | 2.0530780562532986   | --                                                                                                                                                                                                                                                              |
| Eucalyptus incrassata   | Leaf              | --      | 14       | -0.43089114927688477 | Bignell,C.M.,Dunlop,P.J.,Brophy,J.J.,and Jackson, J.F.1994.Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus.Part I.Subgenus Symphyomyrtus,Section Dumaria,Series Incrassatae.Flavour and Fragrance J.9(3):113-7 |
| Eucalyptus intertexta   | Leaf              | 5.5     | 5.5      | -0.45119314673230815 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus lansdowneana | Leaf              | 430     | 430      | 0.5627124908944243   | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |

| Plant                   | Part | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                                                       |
|-------------------------|------|---------|----------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eucalyptus largisparsa  | Leaf | 4.6     | 4.6      | -0.4533427699922941  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus leucoxydon   | Leaf | 10      | 10       | -0.4404450304323781  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus melanophloia | Leaf | 0       | 0.8      | -0.4624189570900128  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus ochrophloia  | Leaf | 0.5     | 0.5      | -0.4631354981766748  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus odorata      | Leaf | 4.4     | 4.4      | -0.4538204640500689  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus populnea     | Leaf | 1.8     | 1.8      | -0.46003048680113945 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |
| Eucalyptus porosa       | Leaf | 10      | 10       | -0.4404450304323781  | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364 |

| Plant                 | Part   | Low PPM | High PPM | StdDev              | Reference                                                                                                                                                                                                                                                                     |
|-----------------------|--------|---------|----------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eucalyptus sparsa     | Leaf   | 100     | 100      | -0.2254827044337776 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364               |
| Eucalyptus stoatei    | Leaf   | --      | 13       | -0.4332796195657581 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1994. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part I. Subgenus Symphyomyrtus, Section Dumaria, Series Incrassatae. Flavour and Fragrance J. 9(3):113-7 |
| Eucalyptus tetraptera | Leaf   | --      | 100      | -0.2254827044337776 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1994. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part I. Subgenus Symphyomyrtus, Section Dumaria, Series Incrassatae. Flavour and Fragrance J. 9(3):113-7 |
| Eucalyptus viridis    | Leaf   | 0       | 0.5      | -0.4631354981766748 | Bignell, C.M., Dunlop, P.J., Brophy, J.J., and Jackson, J.F. 1995. Volatile Leaf Oils of Some South-western and Southern Australian Species of the Genus Eucalyptus. Part VI. Subgenus Symphyomyrtus, Section Adnataria. Flavour and Fragrance J. 10(6):359-364               |
| Foeniculum vulgare    | Fruit  | 170     | 1020     | -0.2964383777885277 | --                                                                                                                                                                                                                                                                            |
| Foeniculum vulgare    | Seed   | 170     | 1020     | -0.5763158151879731 | --                                                                                                                                                                                                                                                                            |
| Gossypium sp          | Plant  | --      | --       |                     | --                                                                                                                                                                                                                                                                            |
| Hedeoma drummondii    | Plant  | 9       | 31       | -0.5309572318974799 | --                                                                                                                                                                                                                                                                            |
| Hyssopus officinalis  | Flower | 34      | 348      |                     | Flavour and Fragrance Journal, 6: 69.                                                                                                                                                                                                                                         |
| Hyssopus officinalis  | Leaf   | 1       | 800      | 1.4464464977775597  | --                                                                                                                                                                                                                                                                            |
| Hyssopus officinalis  | Shoot  | 330     | 330      | 0.8120214473898526  | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781.                                                                                               |

| Plant                | Part  | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                       |
|----------------------|-------|---------|----------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hyssopus officinalis | Shoot | --      | 190      | 0.20053484678699166  | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 280      | 0.5936333757459736   | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 380      | 1.0304095190337315   | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 330      | 0.8120214473898526   | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 290      | 0.6373109900747495   | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 50       | -0.41095175381586924 | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 60       | -0.3672741394870935  | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | --      | 50       | -0.41095175381586924 | Kerrola, K., Galambosi, B. and Kallio, H. 1994. Volatile Components and Odor Intensity of Four Phenotypes of Hyssop (Hyssopus officinalis L.) J. Agric. Food Chem. 42: 776-781. |
| Hyssopus officinalis | Shoot | 0.1     | 0.1      | -0.6289030493164603  | Tsankova, E.T., Konatchiev, A.N. and Genova, E.M. 1993. Chemical Composition of the Essential Oils of Two Hyssopus officinalis cultivars. J. Ess. Oil Res. 5: 609-611.          |



| Plant                  | Part              | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                              |
|------------------------|-------------------|---------|----------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hyssopus officinalis   | Shoot             | --      | --       |                      | Tsankova, E.T., Konatchiev, A.N. and Genova, E.M. 1993. Chemical Composition of the Essential Oils of Two Hyssopus officinalis cultivars. J. Ess. Oil Res. 5: 609-611. |
| Hyssopus officinalis   | Essential Oil     | --      | --       |                      | --                                                                                                                                                                     |
| Illicium verum         | Fruit             | 220     | 835      | -0.32838402926570937 | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.                                              |
| Juniperus communis     | Fruit             | 66      | 660      | -0.3586028887711514  | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                               |
| Juniperus communis     | Leaf Essent. Oil  | --      | --       |                      | --                                                                                                                                                                     |
| Juniperus communis     | Essential Oil     | --      | --       |                      | --                                                                                                                                                                     |
| Juniperus communis     | Fruit Essent. Oil | --      | --       |                      | --                                                                                                                                                                     |
| Laurus nobilis         | Leaf              | --      | --       |                      | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                               |
| Lavandula angustifolia | Flower            | --      | --       |                      | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                               |
| Levisticum officinale  | Root              | 24      | 240      | -1                   | --                                                                                                                                                                     |
| Lindera benzoin        | Fruit             | 400     | 545      | -0.37846099644615616 | --                                                                                                                                                                     |
| Lycopus uniflorus      | Plant             | 107     | 154      | 0.643317475991968    | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                               |
| Melaleuca alternifolia | Leaf              | 75      | 75       | -0.2851944616556111  | --                                                                                                                                                                     |
| Melaleuca alternifolia | Root Essent. Oil  | --      | 6300     | -1                   | --                                                                                                                                                                     |

| Plant                            | Part             | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                   |
|----------------------------------|------------------|---------|----------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Melaleuca alternifolia           | Essential Oil    | --      | 5800     | -0.713882215037173   | --                                                                                                                                                                                                                          |
| Mentha arvensis var. piperascens | Plant            | --      | --       |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.                                                                                                  |
| Mentha pulegium                  | Plant            | 3       | 400      | 2.9918668917708637   | Duke, J. A. Writeups or information summaries on approximately 2,000 economic plants, USDA, ARS, Beltsville, MD 20705.                                                                                                      |
| Mentha pulegium                  | Essential Oil    | 800     | 20000    | 0.6280219486295257   | --                                                                                                                                                                                                                          |
| Micromeria teneriffae            | Leaf             | 20      | 20       | -0.41656032754364475 | Kirimer, N., Ozek, T., and Baser, K.H.C. 1991. Composition of the Essential Oil of Micromeria congesta. J. Ess. Oil Res., 3: 387-393.                                                                                       |
| Micromeria varia                 | Shoot            | 15      | 15       | -0.5638234039665844  | Pedro, L.G., et al. 1995. Composition of the Essential oil of Micromeria varia Benth. ssp. thymoides (Sol. ex Lowe) Perez var. thymoides, and endemic species of the Madeira Archipelago. flav. & Fragr. J. 10(3): 199-202. |
| Micromeria varia                 | Shoot            | --      | 15       | -0.5638234039665844  | --                                                                                                                                                                                                                          |
| Murraya koenigii                 | Leaf             | 140     | 560      | 0.8732136284479584   | --                                                                                                                                                                                                                          |
| Myrciaria dubia                  | Fruit            | --      | --       |                      | --                                                                                                                                                                                                                          |
| Myristica fragrans               | Essential Oil    | --      | 20000    | 0.6280219486295257   | --                                                                                                                                                                                                                          |
| Myristica fragrans               | Seed Essent. Oil | --      | 34000    | 0.31642638473198437  | --                                                                                                                                                                                                                          |
| Ocimum gratissimum               | Plant            | 5       | 30       | -0.5405041807421095  | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                                                                                    |
| Oenanthe aquatica                | Fruit            | 8000    | 20000    | 2.9810127845731307   | --                                                                                                                                                                                                                          |
| Origanum majorana                | Plant            | 27      | 155      | 0.6528644248365976   | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                                                                                    |
| Origanum majorana                | Essential Oil    | --      | 14000    | 0.06102018933373759  | --                                                                                                                                                                                                                          |

| Plant                | Part                 | Low PPM | High PPM | StdDev              | Reference                                                                                                                                                                                                            |
|----------------------|----------------------|---------|----------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Origanum onites      | Shoot                | 38      | 38       | -0.4633648910104002 | Biondi, D., Cianci, P., Geraci, C. and Ruberto, G. 1993. Antimicrobial Activity and Chemical Composition of Essential Oils from Sicilian Aromatic Plants. Flav. & Frag. J. 8: 331-7.                                 |
| Origanum syriacum    | Shoot                | 60      | 60       | -0.3672741394870935 | Fleisher, A. & Fleisher, Z. 1991. Chemical Composition of Origanum syriacum L. Essential Oil. J. Ess. Oil Res. 3: 121-123.                                                                                           |
| Origanum syriacum    | Shoot                | --      | 60       | -0.3672741394870935 | Fleisher, A. & Fleisher, Z. 1991. Chemical Composition of Origanum syriacum L. Essential Oil. J. Ess. Oil Res. 3: 121-123.                                                                                           |
| Origanum vulgare     | Plant                | 1       | 1        | -0.8173656972363698 | Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four Origanum vulgare Subspecies of Anatolian Origin. J. Ess. Oil Res., 5: 425-431.                                |
| Origanum vulgare     | Plant                | 60      | 60       | -0.2540957154032198 | Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four Origanum vulgare Subspecies of Anatolian Origin. J. Ess. Oil Res., 5: 425-431.                                |
| Origanum vulgare     | Plant                | 4       | 4        | -0.7887248507024808 | Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four Origanum vulgare Subspecies of Anatolian Origin. J. Ess. Oil Res., 5: 425-431.                                |
| Origanum vulgare     | Plant                | 5       | 5        | -0.7791779018578511 | Sezik, E., Tumen, G., Kirimer, N., Ozek, T., and Baser, K.H.C. 1993. Essential Oil Composition of Four Origanum vulgare Subspecies of Anatolian Origin. J. Ess. Oil Res., 5: 425-431.                                |
| Origanum vulgare     | Plant                | 12      | 60       | -0.2540957154032198 | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                                                                             |
| Origanum vulgare     | Shoot<br>Essent. Oil | --      | 800      | -1                  | --                                                                                                                                                                                                                   |
| Pastinaca sativa     | Root                 | --      | --       |                     | --                                                                                                                                                                                                                   |
| Pelargonium citrosum | Shoot                | --      | 4        | -0.6118687797282377 | Matsuda, B. M., et al. 1996. Essential Oil Analysis and Field Evaluation of the Citrosa Plant 'Pelargonium citrosum' as a Repellent Against Populations of Aedes Mosquitoes. J. Am. Mosq. Contr. Assoc. 12(1):69-74. |

| Plant                  | Part                | Low PPM | High PPM | StdDev             | Reference                                                                                                                      |
|------------------------|---------------------|---------|----------|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Pelargonium graveolens | Essential Oil       | --      | --       |                    | --                                                                                                                             |
| Petroselinum crispum   | Leaf                | 60      | 530      | 0.8015595197817582 | --                                                                                                                             |
| Petroselinum crispum   | Seed                | 43      | 4970     | 1.6370507088688995 | --                                                                                                                             |
| Petroselinum crispum   | Fruit Essent. Oil   | --      | 35100    | -0.618205207830777 | --                                                                                                                             |
| Petroselinum crispum   | Seed Essent. Oil    | --      | 71000    | 1.8705559734598718 | --                                                                                                                             |
| Pimenta dioica         | Plant               | --      | --       |                    | --                                                                                                                             |
| Pimenta dioica         | Fruit               | --      | --       |                    | --                                                                                                                             |
| Pimenta racemosa       | Leaf                | 230     | 780      | 1.398677092000093  | --                                                                                                                             |
| Pinus mugo             | Leaf                | --      | --       |                    | Guenther, E., The Essential Oils, 6 volumes, D. van Nostrand, New York, 1948-1952.                                             |
| Pinus palustris        | Resin, Exudate, Sap | --      | --       |                    | Leung, A.Y., Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics, John Wiley & Sons, New York, 1980. |
| Pinus sylvestris       | Resin, Exudate, Sap | --      | --       |                    | --                                                                                                                             |
| Pinus sylvestris       | Leaf Essent. Oil    | --      | 13000    | 0.1553903686246635 | --                                                                                                                             |
| Pinus sylvestris       | Essential Oil       | --      | --       |                    | --                                                                                                                             |
| Pinus sylvestris       | Flower              | --      | --       |                    | --                                                                                                                             |
| Pinus sylvestris       | Twig                | --      | --       |                    | --                                                                                                                             |

| Plant                  | Part              | Low PPM | High PPM | StdDev               | Reference                                                                                                                  |
|------------------------|-------------------|---------|----------|----------------------|----------------------------------------------------------------------------------------------------------------------------|
| Piper auritum          | Leaf              | --      | --       |                      | Tramil                                                                                                                     |
| Piper cubeba           | Fruit Essent. Oil | 120000  | 130000   | 1.7285017610948525   | --                                                                                                                         |
| Piper cubeba           | Fruit             | --      | --       |                      | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.  |
| Piper nigrum           | Seed Essent. Oil  | --      | --       |                      | --                                                                                                                         |
| Piper nigrum           | Fruit Essent. Oil | --      | 41000    | -0.47230877878271366 | --                                                                                                                         |
| Ribes nigrum           | Fruit             | --      | --       |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| Ribes nigrum           | Leaf              | --      | --       |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979. |
| Ribes nigrum           | Bud               | --      | --       |                      | --                                                                                                                         |
| Rosmarinus officinalis | Plant             | --      | --       |                      | --                                                                                                                         |
| Rosmarinus officinalis | Leaf Essent. Oil  | --      | --       |                      | --                                                                                                                         |
| Salvia officinalis     | Leaf              | 5       | 28       | -0.39745256523265804 | Duke, J. A. Writeups or information summaries on approximately 2,000 economic plants, USDA, ARS, Beltsville, MD 20705.     |
| Salvia officinalis     | Leaf Essent. Oil  | --      | 1000     | -0.8347075553554938  | --                                                                                                                         |
| Sassafras albidum      | Root              | --      | --       |                      | Leung, A. Y. and Foster, S. 1995. Encyclopedia of Common Natural Ingredients 2nd Ed. John Wiley & Sons, New York. 649 pp.  |
| Sassafras albidum      | Leaf              | --      | 0        | -0.4643297333211115  | --                                                                                                                         |

| Plant               | Part              | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                                      |
|---------------------|-------------------|---------|----------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Satureja hortensis  | Plant             | --      | --       |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.                                                                                                                     |
| Satureja obovata    | Leaf              | 110     | 110      | -0.2015980015450442  | Arrebola, M.L., Navaro, M.C., Jimenez, J. and Ocana, F.A. 1994. Variations in Yield and Composition of the Essential Oil of Satureja obovata. Phytochemistry 35(1): 83.                                                                        |
| Satureja obovata    | Leaf              | --      | 360      | 0.3955195706732905   | Arrebola, M.L., Navaro, M.C., Jimenez, J. and Ocana, F.A. 1994. Variations in Yield and Composition of the Essential Oil of Satureja obovata. Phytochemistry 35(1): 83.                                                                        |
| Satureja obovata    | Leaf              | --      | 300      | 0.2522113533408902   | Arrebola, M.L., Navaro, M.C., Jimenez, J. and Ocana, F.A. 1994. Variations in Yield and Composition of the Essential Oil of Satureja obovata. Phytochemistry 35(1): 83.                                                                        |
| Satureja obovata    | Leaf              | --      | 110      | -0.2015980015450442  | Arrebola, M.L., Navaro, M.C., Jimenez, J. and Ocana, F.A. 1994. Variations in Yield and Composition of the Essential Oil of Satureja obovata. Phytochemistry 35(1): 83.                                                                        |
| Schinus molle       | Fruit             | --      | --       |                      | --                                                                                                                                                                                                                                             |
| Skimmia arborescens | Leaf              | 325     | 1560     | 3.2616839173212973   | --                                                                                                                                                                                                                                             |
| Tagetes minuta      | Plant             | --      | --       |                      | List, P.H. and Horhammer, L., Hager's Handbuch der Pharmazeutischen Praxis, Vols. 2-6, Springer-Verlag, Berlin, 1969-1979.                                                                                                                     |
| Tagetes minuta      | Shoot Essent. Oil | --      | --       |                      | --                                                                                                                                                                                                                                             |
| Tagetes minuta      | Leaf Essent. Oil  | --      | --       |                      | Zygodlo, J. S., Guzman, C. A., Grosso, N. R. 1994. Antifungal Properties of the Leaf Oils of Tagetes Minuta L. and T. filifolia Lag. J. Essent. Oil Res. 6 6: 617-621. Cat Quim Org Fac Cien Exact Univ Nacion Cordoba Cordoba 5000 Argentina. |
| Teucrium cyprium    | Leaf              | 50      | 50       | -0.34490621887744455 | Arnold, N., Bellomaria, B., Velentini G. and Rifaiani, S.M. 1991. Comparative Study on Essential Oil of Some Teucrium Species from Cyprus. J. Ethnopharm. 35: 105-113.                                                                         |

| Plant                   | Part  | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                        |
|-------------------------|-------|---------|----------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Teucrium divaricatum    | Leaf  | 12      | 12       | -0.43566808985463146 | Arnold, N., Bellomaria, B., Velentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some Teucrium Species from Cyprus. J. Ethnopharm. 35: 105-113.                           |
| Teucrium kotschyianum   | Leaf  | 18      | 18       | -0.4213372681213914  | Arnold, N., Bellomaria, B., Velentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some Teucrium Species from Cyprus. J. Ethnopharm. 35: 105-113.                           |
| Teucrium micropodioides | Leaf  | 0       | 0        | -0.4643297333211115  | Arnold, N., Bellomaria, B., Velentini G. and Rafaiani, S.M. 1991. Comparative Study on Essential Oil of Some Teucrium Species from Cyprus. J. Ethnopharm. 35: 105-113.                           |
| Thymus capitatus        | Plant | --      | --       |                      | Lawrence, B.M., Essential Oils 1976-1977, Essential Oils 1978, Essential Oils 1979-1980.                                                                                                         |
| Thymus capitatus        | Shoot | 0       | 0        | -0.629339825459748   | Biondi, D., Cianci, P., Geraci, C. and Ruberto, G. 1993. Antimicrobial Activity and Chemical Composition of Essential Oils from Sicilian Aromatic Plants. Flav. & Frag. J. 8: 331-7.             |
| Thymus longicaulis      | Shoot | 3       | 3        | -0.6162365411611153  | Baser, K.H.C., Ozek, T., Kirimer, N. and Tumen, G. 1993. The Occurrence of Three Chemotypes of Thymus longicaulis C. Presl subsp. longicaulis in the same Population. J. Ess. Oil Res. 5: 291-5. |
| Thymus longicaulis      | Shoot | --      | 3        | -0.6162365411611153  | Baser, K.H.C., Ozek, T., Kirimer, N. and Tumen, G. 1993. The Occurrence of Three Chemotypes of Thymus longicaulis C. Presl subsp. longicaulis in the same Population. J. Ess. Oil Res. 5: 291-5. |
| Thymus longicaulis      | Shoot | --      | 0        | -0.629339825459748   | Baser, K.H.C., Ozek, T., Kirimer, N. and Tumen, G. 1993. The Occurrence of Three Chemotypes of Thymus longicaulis C. Presl subsp. longicaulis in the same Population. J. Ess. Oil Res. 5: 291-5. |
| Thymus riatarum         | Shoot | 35      | 35       | -0.4764681753090329  | Iglesias, J., Vila, R., Canigueral, S., Bellakdhar, and Il Idrissi, A. 1991. Analysis of the Essential Oil of Thymus riatarum. J. Ess. Oil Res. 3: 43-4.                                         |
| Thymus vulgaris         | Plant | --      | --       |                      | Duke, J. A. Writeups or information summaries on approximately 2,000 economic plants, USDA, ARS, Beltsville, MD 20705.                                                                           |

| Plant                    | Part                | Low PPM | High PPM | StdDev               | Reference                                                                                                                                                                                                                           |
|--------------------------|---------------------|---------|----------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thymus vulgaris          | Essential Oil       | --      | --       |                      | --                                                                                                                                                                                                                                  |
| Trachyspermum ammi       | Plant               | --      | --       |                      | --                                                                                                                                                                                                                                  |
| Trichostemma dichotomum  | Shoot               | 18      | 18       | -0.5507201196679516  | Tucker, A.O. and Maciarello, M.J. 1990. The Essential Oil of Trichostemma dichotomum. J. Ess. Oil Res. 2: 149-150.                                                                                                                  |
| Umbellularia californica | Plant               | 10      | 40       | -0.44503469229581294 | --                                                                                                                                                                                                                                  |
| Valeriana officinalis    | Root                | --      | --       |                      | --                                                                                                                                                                                                                                  |
| Valeriana officinalis    | Leaf Essent. Oil    | --      | 1400     | -0.8017042912228218  | --                                                                                                                                                                                                                                  |
| Valeriana officinalis    | Leaf                | --      | 35       | -0.3807332732105446  | Father Nature's Pharmacy: The aggregate of all these three-letter citations.                                                                                                                                                        |
| Vitex agnus-castus       | Leaf                | --      | 1.4      | -0.4609858749166889  | Ekundayo, O., Laakso, I., Holopainen, M., Hiltunen, R., Oguntimein, B., and Kauppinen, V. 1990. The Chemical Composition and Antimicrobial Activity of the Leaf Oil of Vitex agnus-castus L. J. Essential Oil Research, 2: 115-119. |
| Zingiber officinale      | Rhizome             | 32      | 2850     |                      | --                                                                                                                                                                                                                                  |
| Zingiber officinale      | Rhizome Essent. Oil | 57000   | 106700   |                      | --                                                                                                                                                                                                                                  |