



# CHEMICAL ANALYSIS

## GRAMINEX Flower Pollen Extract

Graminex Flower Pollen Extracts™ are natural and organic cellular food supplements. They are uniquely obtained from pollen through a non-solvent extraction process. Graminex™ extracts contain a group of pollen extracts from specific plant species, chosen after careful tests to ensure consistency and standardization. Two fractions are isolated in the extraction:

- G60™ = hydrophilic, water-soluble fraction
- GFX™ = lipophilic, fat-soluble fraction, containing natural inhibitors which prevent rancidity.

Graminex Flower Pollen Extract™ is concentrated to ensure optimum potency and clinical strength of the nutritional constituents. The amount of concentration of flower pollen in each product is to Graminex's exact specifications.

Flower pollen is the male seed of flowers which enables flowering plants to reproduce. It is produced in the upper part, or anthers, of the flower. Pollen grains contain all the substances that are necessary to create new life within the world of plants. Like a spark of energy, creating new life is still a secret to us.

Graminex Flower Pollen Extracts™ are concentrates of these life-giving substances in a form which makes them easily accessible for humans. A large number of these ingredients have been discovered, and in the research work regarding the Graminex Flower Pollen Extracts™, precise analysis has been possible. Despite this fact, our knowledge on the chemical composition of flower pollen cannot be regarded as complete in every detail.

Some of the substances which can be found in flower pollen can be found in the following analysis.

### Vitamins, Carotenoids, and Minerals:

#### Vitamins:

Provitamin A (carotenoids)  
B1 Thiamine  
B2 Riboflavin  
Niacin  
B6 Pyridoxine  
Pantothenic Acid  
Biotin  
B 12 (Cyanocobalamir)  
Folic Acid  
Choline  
Inositol  
Vitamin C  
Vitamin D  
Vitamin E  
Vitamin K  
Ratin

#### Carotenoids:

Alpha-carotene  
Beta-carotene  
Xanthophyll  
Zeaxanthin  
Lycopene  
Crocerin  
Cryptoxanthin

#### Minerals:

Calcium  
Phosphorus  
Potassium  
Sulphur  
Sodium  
Clorine  
Magnesium  
Iron  
Manganese  
Copper  
Iodine  
Zinc  
Silicon  
Chromium  
Molybdenum  
Boron  
Titanium

### Dietary Essential Amino Acids and Physiological Essential Amino Acids:

#### Dietary Essential:

Histidine

#### Physiologically Essential:

Alanine

Glutamine

|               |                          |                |
|---------------|--------------------------|----------------|
| Isoleucine    | Alpha-amino butyric acid | Glycine        |
| Leucine       | Arginine                 | Hydroxyproline |
| Lysine        | Asparagine               | Proline        |
| Methionine    | Aspartic Acid            | Serine         |
| Phenylalanine | Cysteine                 | Taurine        |
| Threonine     | Cystine                  | Tyrosine       |
| Tryptophan    | Glutamic Acid            |                |
| Valine        |                          |                |

## Enzymes:

| Tivial name                                 | EC number* |
|---|------------|
| <b>Class: Oxidoreductases</b>               |            |
| Alcohol dehydrogenase                       | 1.1.1.1    |
| D-Arabinitol dehydrogenase                  | 1.1.1.11   |
| Inositol 2-dehydrogenase                    | 1.1.1.18   |
| UDP-Glucose dehydrogenase                   | 1.1.1.22   |
| Lactate dehydrogenase                       | 1.1.1.27   |
| Malate dehydrogenase                        | 1.1.1.37   |
| Isocitrate dehydrogenase (NADP)             | 1.1.1.42   |
| Phosphogluconate dehydrogenase              | 1.1.1.44   |
| Glucose dehydrogenase                       | 1.1.1.47   |
| Glucose-6-phosphate dehydrogenase           | 1.1.1.49   |
| Triose phosphate dehydrogenase              | 1.2.1.9    |
| Malonate semialdehyde dehydrogenase         | 1.2.1.15   |
| Succinate dehydrogenase                     | 1.3.99.1   |
| Glutamate dehydrogenase (NADP)              | 1.4.1.3    |
| L-Amino-acid oxidase                        | 1.4.3.2    |
| Monoamine oxidase                           | 1.4.3.4    |
| Lipoamide dehydrogenase                     | 1.6.4.3    |
| Cytochrome oxidase                          | 1.9.3.1    |
| o-Diphenol oxidase, tyrosinase              | 1.10.3.1   |
| Ascorbate Oxidase                           | 1.10.3.3   |
| Fatty acid peroxidase                       | 1.11.1.3   |
| Catalase                                    | 1.11.1.6   |
| Peroxidase                                  | 1.11.1.7   |
| Meso-inositol oxygenase                     | 1.13.99.1  |
| <b>Class: Transferases</b>                  |            |
| Aspartate carbamoyltransferase              | 2.1.3.2    |
| Phosphorylase                               | 2.4.1.25   |
| 4-alpha-glucanotransferase                  | 2.4.1.3    |
| UDP-Glucose-beta-glucan glucosyltransferase | 2.4.1.12   |
| Trehalosephosphate-UDP glucosyltransferase  | 2.4.1.15   |
| alpha-Glucan branching glycosyltransferase  | 2.4.1.18   |
| UDP-Galactose-glucose galactosyltransferase | 2.4.1.22   |
| Aspartate aminotransferase                  | 2.6.1.1    |
| Alanine aminotransferase                    | 2.6.1.2    |
| Glycine aminotransferase                    | 2.6.1.4    |
| Hexokinase                                  | 2.7.1.1    |
| Glucokinase                                 | 2.7.1.2    |
| Xylulokinase                                | 2.7.1.17   |
| Phosphoribulokinase                         | 2.7.1.19   |
| Glucuronokinase                             | 2.7.1.43   |

|                                    |           |
|------------------------------------|-----------|
| Nucleosidediphosphate kinase       | 2.7.4.6   |
| Phosphoglucomutase                 | 2.7.5.1   |
| DNA Nucleotidyltransferase         | 2.7.7.7   |
| UDP-Glucose pyrophosphorylase      | 2.7.7.9   |
| ADP-Glucose pyrophosphorylase      | 2.7.7.27  |
| Ribonuclease (R Nase)              | 2.7.7.16  |
| <b>Class: Hydrolases</b>           |           |
| Carboxylesterase (B-esterase)      | 3.1.1.1   |
| Arylesterase (A-esterase)          | 3.1.1.2   |
| Lipase                             | 3.1.1.3   |
| Cutinase                           | 3.1.1.74  |
| Pectinesterase                     | 3.1.1.11  |
| Alkaline phosphatase               | 3.1.3.1   |
| Acid phosphatase                   | 3.1.3.2   |
| Phytase                            | 3.1.3.8   |
| Trehalosephosphatase               | 3.1.3.12  |
| Phosphodiesterase                  | 3.1.4.1   |
| Deoxyribonuclease (D Nase)         | 3.1.21.1  |
| Arysulphatase                      | 3.1.6.1   |
| alpha-Amylase                      | 3.2.1.1   |
| beta-Amylase                       | 3.2.1.2   |
| Cellulase                          | 3.2.1.4   |
| Laminaranase (Callase)             | 3.2.1.6   |
| Polygalacturonase (Pectinase)      | 3.2.1.15  |
| alpha-Glucosidase                  | 3.2.1.20  |
| beta-Glucosidase                   | 3.2.1.21  |
| beta-galactosidase                 | 3.2.1.23  |
| alpha-Mannosidase                  | 3.2.1.24  |
| beta-Fructofuranosidase, Invertase | 3.2.1.26  |
| Trenalase                          | 3.2.1.28  |
| beta-N-Acetylglucosaminidase       | 3.2.1.52  |
| Laminarase                         | 3.2.1.39  |
| Leucine aminopeptidase             | 3.4.11.1  |
| Aminopeptidase                     | 3.4.11.2  |
| Pepsin, Protease                   | 3.4.23.15 |
| Trypsin                            | 3.4.21.4  |
| Aminoacylase                       | 3.5.1.14  |
| Inorganic diphosphatase            | 3.6.1.1   |
| ATPase                             | 3.6.1.3   |
| ATPase                             | 3.6.1.8   |
| <b>Class: Lyases</b>               |           |
| Pyruvic decarboxylase              | 4.1.1.1   |
| Oxaloacetat decarboxylase          | 4.1.1.3   |
| Mesoxalic decarboxylase            |           |
| Glutamic decarboxylase             | 4.1.1.15  |
| Phosphopyruvate carbonxylase       | 4.1.1.31  |
| Phosphoenolpyruvate carboxykinase  | 4.1.1.38  |
| Ribulose-biohosphate carboxylase   | 4.1.1.39  |
| Fructosediphosphate aldolase       | 4.1.2.13  |
| Citrate synthase (synthetase)      | 2.3.3.1   |
| <b>Class: Isomerases</b>           |           |
| UDP-Glucose epimerase              | 5.1.3.2   |
| Arabinose isomerase                | 5.3.1.3   |
| Xylose isomerase                   | 5.3.1.5   |

|  |             |
|--|-------------|
| Ribosephosphate isomerase                        | 5.3.1.6     |
| Glucosephosphate isomerase                       | 5.3.1.9     |
| <b>Class: Ligases and Others</b>                 |             |
| Carboxylases                                     | 6.4.1.(1.2) |
| Folic acid conjugase                             |             |
| D-glucose-6-P- cycloaldolase (NAD <sup>+</sup> ) | 4.1.2.x     |

\* EC (Enzyme Classification) Number given by the IUBMB (International Union of Biochemistry and Molecular Biology), classes of enzymes und subclasses defined according to the reaction catalyzed.

## Different Lipid Classes:

### Polar lipids:

The major fractions of the polar lipids in flower pollen are lecithin, lysolecithin, phosphoinositol and phosphatidylcholine.

### Neutral lipids:

|                |                  |
|----------------|------------------|
| Monoglycerides | Free fatty acids |
| Diglycerides   | Sterols          |
| Triglycerides  | Hydrocarbons     |

## Fatty Acid Profile:

### Number of C-atoms and double bonds:

|  |  |
|--|--|
| Caprylic acid (C-8)                      |  |
| Capric (C-10)                            |  |
| Lauric (C-12)                            |  |
| Myristic (C-14)                          |  |
| Myristoleic (C-14) one double bond       |  |
| Pentadecanoic (C-15)                     |  |
| Pentadecenoic (C-15) one double bond     |  |
| Palmitic (C-16)                          |  |
| Palmitoleic (C-16) one double bond       |  |
| Heptadecanoic (C-17)                     |  |
| Heptadecanoic (C-17) one double bond     |  |
| Stearic (C-18)                           |  |
| Oleic (C-18) one double bond             |  |
| Linoleic (C-18) two double bonds         |  |
| Linolenic (C-18) three double bonds      |  |
| Arachidic (C-20)                         |  |
| Eicosenoic (C-20) one double bond        |  |
| Eicosadienoic (C-20) two double bonds    |  |
| Eicosatrienoic (C-20) three double bonds |  |
| Arachidonic (C-20) four double bonds     |  |

## Prostaglandins:

A group of hormone-like compounds derived from linoleic and arachidonic acids that influence innumerable body processes.

## Phytosterols:

|                 |             |
|-----------------|-------------|
| Fucoesterol     | Cholesterol |
| Beta-sitosterol | Campesterol |
| Stigmasterol    | Estrone     |

## Long Chain Hydrocarbons:

|                     |              |
|---------------------|--------------|
| n-tricosane (C23)   | myo-inositol |
| n-pentacosane (C25) | Pinitol      |
| n-heptacosane (C27) | Sequitol     |
| n-nonacosane (C29)  |              |

### Streptolysin Inhibitory Factor:

From Graminex™ extract it was possible to isolate a streptolysin-inhibiting factor. The basic principle is a heat resistant factor (SIF) with a molecular weight of 850. In vitro, it causes irreversible inhibition of the streptococcus toxins.

### Low Molecular Weight Sugars and Related Compounds:

|                |                  |
|----------------|------------------|
| Fructose       | Maltotriose      |
| Mannose        | Glucose          |
| Galactose      | Xylose           |
| Arabinose      | Xyitole          |
| Ribose         | Xylogaracturonan |
| Fucose         | Glucoronolactone |
| Hexasamine     | Raffinose        |
| Rhamnose       | Stachyose        |
| Maltotetratose | Sucrose          |
| Maltrose       | Callose          |
| Myo-inositol   | Pinitol          |
| Sequoyitol     |                  |

### Flavanoids:

|                  |              |                   |
|------------------|--------------|-------------------|
| Quercetin        | Apigenin     | Kaempferol        |
| Dihydroquercetin | Sorhamnetin  | Dihydrokaempferol |
| Naringenin       | Myricetin    | Luteolin          |
| P-coumaric Acid  | Isorhemnetin |                   |

### Growth Regulators:

|          |             |
|----------|-------------|
| Auxins   | Gibberelins |
| Brassins | Kinins      |

### Others:

|   |                            |                              |
|---|----------------------------|------------------------------|
| Chlorophyll                                   | Xanthine                   | Nucleic Acids                |
| Hypoxanthine                                  | Phenolic Acids             | Nuclein                      |
| Terpenes                                      | Amines                     | Nucleosides                  |
| Hexodecanal                                   | Vernine                    | Pentosans                    |
| Guanine                                       | Gluthothlone               | Ferulic Acid                 |
| Indoles                                       | Superoxide Eismutase (SOD) | Adenosine Triphosphate (ATP) |
| Polyphenols                                   | Pentosane                  | Ellagic Acid                 |
| Phenolic Acids (Catechin, Epicetohln, Gallio) |                            |                              |

### Unknown:

Some of the greatest values of Graminex™ Flower Pollen Extract and Flower Pollen may stem from elements which are for the moment still unknown to science, and from the synergistic action of all the elements working together. IMPORTANT: There are established Recommended Daily Allowances for many vitamins and minerals and Graminex™ Flower Pollen contains trace amounts of these ingredients.

