

Diamine Oxidase from Pea Seedlings

Many legumes (peas, beans, lentils) produce diamine oxidase (DAO) as the seed germinates to form a seedling. The enzyme regulates the levels of chemicals involved in the development of the seedling; is involved in the initial nutrition of the seedling; and regulates the level of hydrogen peroxide in the cell wall so that the cell develops structurally in a proper fashion. Among the different types of legumes, pea seedlings seem to produce one of the higher levels of DAO.

Research point #1:

Grow pea seedlings in the dark for the optimum time for DAO to develop: about 10-12 days

- If the seedling is growing in less than optimal conditions, more DAO is produced in order to protect the fledgling plant. Researchers have discovered that seedlings grown in darkness produce a lot more DAO than seedlings grown in light (2.32 compared to 0.43 active units per weight). This is probably because an important energy source (light) is lacking, so the seedlings are under “stress” during this crucial stage in the development of the plant and require more DAO in order to produce the structures needed to survive and grow.

Research point #2:

Consume seedlings with all their structural components complete but accessible, including their DAO. The best way to do this is to consume the seedlings as soon after harvesting as possible. The fresh product will contain and maintain the maximum activity of the enzyme.

- All enzymes are proteins. So, diamine oxidase, being an enzyme, is a protein. When proteins enter the digestive tract they are digested by protease enzymes. Therefore, diamine oxidase will be subject to the same degradation (digestion) as any other protein. To some extent proteins are “protected” by other parts of the plant or animal material in the food as it passes through the digestive tract. Diamine oxidase needs to be active in the small intestine, which is where the maximum absorption of nutrients and food material is absorbed into circulation. So, when diamine oxidase is an integral part of the seedling structure, it will retain enzymatic activity long enough to be effective while it is surrounded by other structures of the seedling.

Research point #3

“Liberate” the DAO physically by breaking up in a blender to form a “smoothie”.

- The DAO is loosely attached to the cell walls of the seedlings, but fairly readily removed into the extracellular fluid.

Research point #4

Consume the pea seedling “smoothie” as close to the meal with potentially high levels of histamine as you possibly can. If you wish to reduce the level of histamine in your body throughout the day, space your consumption of your seedling smoothie judiciously for maximum effect. Start with the smoothie at breakfast and before each meal thereafter.

- The “half-life” (time taken for the active ingredient to lose half its activity) is very short for DAO. Once it enters the blood stream, DAO loses activity quite quickly.

Research point #5

In addition to their DAO content and activity, pea seedlings are a wonderful source of fibre and other important nutrients and make a marvellous contribution to a healthy diet.

Food Analysis: (Analyzed by Norwest Labs for Nankai Sprouts
(<http://www.nankaisprouts.com/>)

Calories	0.36kcal/g
Carbohydrates	2.65%
Total fat	0.24%
Crude protein	5.80%

Calcium	0.14%	Iron	154 ppm
Boron	9.1 ppm	Ash	0.50%
Nitrogen	0.92%	Sodium	0.02%
Phosphorus	0.01%	Molybdenum	3.4 ppm
Manganese	22.5 ppm	Total sulphur	0.61%
Potassium	2.26%	Vitamin C	8.9 mcg/g
Copper	16.9 ppm	Zinc	140 ppm
Magnesium	0.26%		

Research point #6

Consume pea seedlings fresh. Do not cook, blanch, or heat above room temperature in order to preserve the activity of DAO and all the heat-labile nutrients pea seedlings provide.

- DAO is a protein. If heated (e.g. in cooking, blanching, or in a stir-fry), the protein will be denatured and the DAO will be inactive.
- Grow seedlings in a sprouter using only water. Do not grow in soil because residual soil bacteria may pose a health hazard as the seedlings cannot be sterilized.

Principal References:

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Federico R, Angelini R. Distribution of polyamines and their related catabolic enzyme in etiolated and light-grown leguminosae seedlings. Planta 1988;173:317-321

Method for Preparing and Consuming Pea Seedlings for Maximum Benefit

Use a sprouter for production of your seedlings from peas. Sprouters are readily available as a simple 3-tiered device, or more complicated appliances with automatic watering.

Harvest the whole seedling, including the roots, after 10-12 days from initial sprouting.

Wash and place in a blender with sufficient water to make into a “smoothie”. Blend until it forms a smooth slurry.

Consume as soon after processing as possible. The enzyme will remain active in the refrigerator for a few hours, so if you make a batch in the morning, you may consume the smoothie throughout the day. It is unlikely that the enzyme will retain its activity if left overnight.

At this stage of our knowledge it is not possible to say how much DAO is present per volume of smoothie. Nor is it possible to estimate how much of the smoothie is effective as a DAO supplement for each individual. You will need to discover the degree of benefit to you personally.