

Immunodetection and quantification of insulin-like antigens in sprouts: development of an efficient functional food

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Running title: Sprouts can be a good source of insulin

Abstract:

Background: Hormone Insulin is a drug used for the treatment of type 1 and type 2 Diabetes Mellitus. Insulin used in this experiment is derived from bovine and pork pancreas, as well as through recombinant technology. Patients with diabetes mellitus face an inability to utilize glucose from blood due to either less secretion of insulin, or the inability of the insulin to act; As a result of this glucose levels in the blood rise. The prevention and treatment of type 2 Diabetes Mellitus one is world's major public health issues. Natural alternatives have a big role to play in this field. This study aims at discovering functional foods rich in Insulin like proteins. Here we are reporting Insulin-like proteins synthesizing during the embryo development stage of *Glycine max*: soybean, *Vigna radiata*: moong and *Vigna unguiculata*: cowpea seeds. Hence, germination transforms these seeds containing human insulin like proteins.

Methods: In our investigation we have provided protein extraction with Enzyme-linked immunosorbent assay (ELISA). The plant materials weighing 1g were crushed in mortar and pestle, and the protein from the plant materials was extracted with 20 ml of 0.05 M sodium phosphate buffer (pH 7.6). The suspensions were centrifuged at 6000 rpm for 15 min, and the clear supernatants were subjected to Enzyme linked immunosorbent assay (ELISA) for the

detection of insulin-like proteins. We have used USDA nutritional data sources for the analysis of new products.

Results: Our results demonstrate that Insulin is not expressed in dry mature dormant seeds, but is expressed only during the embryo development stage. Dry mature dormant seeds and the seeds germinated for 24 hours, 48 hours, 72 hours, and 96 hours of *Glycine max*, *Vigna radiata* and *Vigna unguiculata*, were investigated for expression of insulin through immunodetection using anti-insulin antibodies. Dry dormant seeds of all the three seeds showed zero expression at 450 nm for insulin, while significant presence of insulin showing positive immuno-reactivity towards anti-insulin antibodies were observed at 24 hours, 48 hours, 72 hours, and at 96 hours of germination.

Conclusion: The study is suggesting that insulin-like proteins are synthesized only during the process of embryo development, the sprouts of such legumes, particularly soybeans, can be a good source of insulin.

Key words: Germination, insulin, seed embryo development, sprouts.