

# Legume Sprouts as a Source of Protein and Other Nutrients

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I welcome this opportunity to say a few words about a source of vegetable food proteins which has been neglected during this meeting. I refer to sprouts of beans and other seeds which are consumed in quite large amounts in many parts of the world and which could be of considerable interest also as a source of several of the products which we have discussed.

We have in my laboratory made a detailed literature survey of what is known about the chemical changes which take place during germination and sprout formation of legume seeds. Subsequently, we have done a series of experiments to check and supplement some of the conflicting data which have been published. Time does not permit discussion of differences in composition of different seed sprouts, but it is possible to draw some general conclusions about the changes which take place during germination which are of nutritional significance.

First, some of the reserve materials of the seed are degraded and used partly for respiration and partly for synthesis of new cell constituents of the developing embryo. The amino acid profile does not change dramatically, but the chemical score of the seed is never decreased during sprout formation, and it is sometimes increased. Trypsin inhibitors, if present in the dry seed, do not disappear during sprout formation, but we have found that at least some lectins are degraded.

Second, the flatulence-producing carbohydrates largely disappear during the germination process. We have thus found that the levels of stachyose and raffinose are quite low in sprouts.

Third, sprouts contain significantly higher levels of vitamins than the dry seed. Some sprouts are excellent

sources of ascorbic acid. As an example, mung bean sprouts contain more than 50 mg ascorbic acid/100 g fresh weight. Vitamins of the B-group increase 100-300 % during the germination and sprouts are often a remarkably good source of vitamin B<sub>12</sub>.

Fourth, the phytic acid in the seed is degraded by the phytase synthesized during the germination. This makes the trace minerals present more available than in the original seed.

Legume sprouts have always been an important constituent of diets in countries such as China, Bangladesh, India and Egypt. Unfortunately, there is now a tendency toward decreased consumption in some population groups that may well have depended on sprouts for a substantial part of their intake of vitamins and minerals. On the other hand, vegetarians and food faddists in many western countries have recently advocated raw sprouts as a remedy to all kinds of health problems. This development is unfortunate because it makes sprouts suspect in the eyes of the professional nutritionist. More research is definitely needed to study the composition of different kinds of sprouts and how they should best be prepared and incorporated in different types of diets. Sprouts are easy to prepare either in the home or in a village type industry, but they can also be made on a large industrial scale.

A special advantage is that they require very much shorter cooking times than dry seeds to become palatable. It would also be interesting to see if they could be used as a raw material for the preparation of some of the food ingredients such as protein flours, concentrates, and flavoring agents that have been the main objects of this meeting.