# Grapeseed as a Possible Source of Food Protein

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Materials of various provenience have been considered from the viewpoint of their protein content: 1. raw grapeseed, hand-separated from pomace and air-dried at room temperature; 2. toasted grapeseed from distillery; 3. defatted and defibered grapeseed meal of industrial provenience, for animal fee.

Apart from analytical results on the composition of these materials, which help to improve the knowledge of the grapeseed as a raw material of food interest, there will be reported here, as they seem particularly significant, only the results of some tests on grapeseed nitrogen extractability.

On a defatted and defibered meal (19.4% crude protein and 10.5% polyphenols) prepared from raw grapeseed, and comparatively on the same material partially derived of phenolics (21.9% crude protein and 3.8% polyphenols), the water extractability of nitrogen was examined at pH 2 through 11, at room temperature and 5% (w/v) meal conccentration.

Solubility curves showed that partial elimination of phenolics greatly improve the nitrogen solubility in the whole pH range from 2 to 9.

In particular the nitrogen extractable at pH 7, which represented only 5.7% of total nitrogen in the original meal, was increased to 38.5% in consequence of the partial elimination of phenolics.

At pH 8 the extractable nitrogen rose from 15.7 to 45.4% of total nitrogen.

Extraction of proteic constituents from raw grapeseed meal requires a preliminary minimization of phenolics to improve the nitrogen solubility at pH values favorable to protein integrity. From the partially phenolics-freed meal, a protein isolate containing 87.5% crude protein and 2.5% polyphenols was prepared by extraction at pH 8 and isoelectric precipitation. For the raw grapeseed meal, this polyphenol content seems to be the phenolic fraction which is more strongly bound to proteic constituents of grapeseed. The nitrogen solubility as a function of pH was examined as well, under the same conditions, in samples of grapeseed meal of industrial provenience. For this material containing partially oxidized polyphenols, a partial elimination of phenolics did not improve the nitrogen solubility, which was nearly 28% at pH from 7 to 9. Higher extractability values, but not above 50%, corresponded to pH levels between 10 and 11.

From an industrial meal containing 25.9% crude protein and 7.4% polyphenols, a protein isolate containing 87.6% crude protein and 0.5% polyphenols was prepared by extraction at pH 8 and isoelectric precipitation. The protein-to-polyphenols ratio, equal to 3.5 in the original meal, increased to 175 in the isolate.

Investigations are in progress on toasted grapeseed from a distillery. This represents the intermediate step of a technological chain from raw grapeseed to industrial meal.

The nitrogen extractability of a toasted grapeseed meal, without a preliminary elimination of polyphenols, was of 30-35% in the range of pH from 7 to 9 and reached 40% at pH 11.

These experimental results permit some preliminary considerations. 1. For raw grapeseed material rich in natural polyphenols, the partial elimination of these is necessary to extract protein with relatively good yield at convenient pH level. But raw grapeseed as a source of protein is only a reference material of scientific and experimental interest. 2. From industrial defibered meal containing partially oxidized polyphenols and showing a fairly good nitrogen solubility at pH from 7 to 9, it is possible to prepare protein isolates with a very low polyphenol content, without an elimination of phenolics, but with a low yield protein. 3. There are good reasons to believe that the toasted grapeseed from a distillery could become a convenient source of food protein through a process for simultaneous recovery of protein and oil.

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# Development of Lupine Proteins

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## ABSTRACT

Lupine is a potentially valuable seed protein producing crop for temperate climates. Alkaloid-free varieties have been developed. The true seed protein content varies from 30% to 45%. Protein quality and digestibility compare favorably with those of soya. Oil yields come upward of 10%, and the composition is similar to soy bean oil. Lupine is relatively free of antinutritional factors present in other legumes. Large scale nutritional trials have been carried out. Lupine isolates have been used in preparation of foods.

Lupine is being investigated in several countries as a potential seed protein producer. Its possibilities are particularly appealing for areas in the world where soy does not grow.

Lupine is tolerant towards a wide variation of soils and of climatic conditions. It is grown as an aestival crop in cold temperate areas and as a winter crop in temperate and warm temperate ones; it tolerates frost and drought. It requires sandy and silt-sandy soils from strongly acid to calcareous ones with preference for moderately acidic (1). The adaptability of lupine to poor soils on which other crops would not survive provided it with the sinister reputation that it conferred barrenness on land on which subsequently other crops were unsuccessfully cultivated. On the contrary, its nitrogen-fixing capacity causes a saving of fertilizers which is estimated at up to 80-100 kg N per hectare.

The presence of toxic quinolizidine alkaloids in the