

Abstract

The Potentials of Green Coffee Proteins as New Functional Food Components [†]

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Abstract: Proteins/enzymes, peptides and free amino acids in green coffee beans are the main contributors to the development of coffee flavor and quality during roasting, as a result of the Maillard reaction, and are ultimately responsible for the formation of the coffee aroma. Only 0.15–2.5% of free amino acids are present in the green beans. A crude protein content of 8.5 to 12% after correction for caffeine and trigonelline has been reported. The proteins can be classified into storage, structural and metabolic proteins. A recent UniProt data bank search (May 2023) delivered some 104 reviewed proteins, with mostly enzymes listed. The most abundant were the legumin-like 11S seed storage proteins, accounting for about 45% of the total proteins in the coffee bean. An accumulation of 11S during bean development/maturation is consistent with its storage function and ultimately is a source of amino acids. Recent data reveal that the proteins are being modified even before coffee roasting, and can be impacted by post-harvest treatment. Coffee's own phenolic compounds are subject to oxidation reactions and can subsequently attack the amino acid side chains of the proteins. Such interactions result in unique properties in the coffee bean proteins, with enhanced antioxidative properties, altered structural properties and differences in solubility, surface hydrophobicity and emulsification. These naturally present protein modifications provide new potential uses of green coffee bean proteins for the food, cosmetic or pharmaceutical industry.

Keywords: coffee beans; coffee proteins; protein modifications; bound phenolic compounds; protein functionality; potential applications



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