

Analysis of Structures Related to Allergenicity of Salt-Soluble Proteins in Plant Seeds

Nobuyuki Maruyama

Kyoto University, Graduate School of Agriculture

Summary

Soybeans, although an essential element of food in regular diets, are also a major cause of food allergies. It is well-known that many patients with immediate-type hypersensitivity to soybeans are sensitive to 7S globulin and 11S globulin. 7S globulin is composed of multiple subunits; however, the differences in allergenicity among subunits and their relationship to structure are unknown. Therefore, the objectives of the present study were: to analyze the allergenicity of 7S globulin from soybeans at the subunit level; to analyze the epitope regions as well that contribute to allergenicity; and to obtain findings on salt-soluble soybean protein structures related to allergic symptoms.

Soybean 7S globulin consists of three subunits: α , α' , and β . In assessment of IgE antibody titers specific to patients' serum, a greater number of patients demonstrated reactivity to the α and α' subunits than to the β subunit. This result suggests that the α and α' subunits of 7S globulin are the major proteins which cause soybean allergies. Furthermore, the epitopes of the α' subunit were analyzed using an array in which a synthetic peptide based on the primary structure of the α' subunit was bound; this analysis demonstrated that epitopes are distributed throughout the molecule, including the extension region and the core region. When compared to epitopes in the peanut 7S globulin Ara h 1, several epitopes were present in the same positions of both proteins in the alignment. In the future, similar analyses of more plant species may aid in determining the plant seed salt-soluble protein structures that contribute to allergenicity.