

B-204

Development and characterization of a soybean experimental line lacking several abundant seed storage proteins

Bo Song^{*}, Department of Plant Science, University of Missouri, Missouri, USA

Nathan W. Oehrle, USDA-ARS, University of Missouri, Columbia, MO, USA

Shanshan Liu, Key Laboratory of Soybean Biology, Northeast Agricultural University, Harbin, China

Hari B. Krishnan, USDA-ARS, University of Missouri, Columbia, MO, USA

The quality of tofu is influenced by the protein composition of two abundant soybean seed protein families: the 11S glycinin and 7S β -conglycinin. Several mutants lacking specific components of both the 11S glycinin and 7S β -conglycinin have been previously identified and their role in tofu quality has been established. However, these mutants have not been well characterized at the biochemical level. We developed a soybean experimental line (BSH-3) devoid of a subset of seed storage proteins by crossing a mutant donor line 'HS99B' with a Chinese cultivar 'Dongnong47' (DN47). High-resolution 2-D gel electrophoresis revealed the absence of group I and IIa glycinins and the α' subunit of β -conglycinin in BSH-3 seeds. Elevated accumulation of Kunitz trypsin inhibitor, Bowman-Birk protease inhibitor and glycinin IIb indicated seed proteome rebalancing in BSH-3 seeds. Immunoblot analysis using sera from soybean allergic patients demonstrated the complete lack of a major allergen (α' subunit of β -conglycinin) in BSH-3 seeds. However, it still retained other proteins that were recognized by IgE antibodies present in the human serum. Transmission electron microscopy observation of mature seeds of BSH-3 revealed striking differences in the appearance of the protein storage vacuoles as compared to that of DN47. BSH-3 seeds also accumulated high levels of free amino acids as compared to DN47 seeds, particularly arginine, and the amount of several essential amino acids were significantly elevated in BSH-3 seeds. Tofu made from BSH-3 seeds has increased gel hardness and chewiness relative to that made from DN47 seeds. Despite the lack of several abundant seed proteins, BSH-3 seeds still contain 38% protein, higher than seed from a control line (DN47, 34% protein) which accumulates the full complement of seed storage proteins.