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Application of proteomic tools in assessment of soybean protein variance

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Abstract

Soybean provides an economical source of protein for humans and animals. In order to address global demand, genetically modified (GMO) soybeans aiming to improve quality and yield have become prevalent. To ensure the safety of the crop for consumers it is important to determine the natural variation in seed protein constituents as well as any unintended changes that may occur in the GMO as a result of genetic modification. Understanding the natural variation of seed proteins in wild and cultivated soybeans that have been used in conventional soybean breeding programs is critical for determining unintended protein expression in GMO soybeans. In recent years, proteomic technologies have been used as an effective analytical tool for examining modifications of protein profiles. We have standardized and applied these technologies to determine and quantify the spectrum of proteins present in soybean. We used two-dimensional polyacrylamide gel electrophoresis (2D-PAGE), matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF-TOF-MS/MS), and liquid chromatography mass spectrometry (LC-MS/MS) for the separation, quantification, and identification of different classes of soybean seed proteins. We have observed significant variations of different classes of proteins and profiled storage, allergen and anti-nutritional proteins between non-GMO, cultivated and wild soybean varieties. This information is useful for scientists and regulatory agencies to determine whether the unintended expression of proteins found in transgenic soybean is within the range of natural variation.

Biography

Natarajan has received her Ph.D from the University of Madras, India and post-doctorate from Michigan State University. She is a lead scientist on a risk assessment program at the Department of Agriculture (USDA) and serves as Adjunct Associate Professor at University of Maryland. She authored more than 93 publications, 4 U.S. patents, and presented her research in USA, Brazil, Egypt, France, India and China. She serves as a reviewer of 20 journals, Fulbright senior specialist grants, committee member of Ph.D. panels, and as an editorial board member of several journals. Natarajan received several honors and awards including Fulbright Senior Specialist Award and “Best Scientist of the year 2008”award from the Maryland Governor.