Soybean phytoestrogens: Quantitation and the accumulation of isoflavonoid phytoalexins

Stephen M. Boue, Carol H. Carter, Kenneth C. Ehrlich and Thomas E. Cleveland
Southern Regional Research Center, USDA, New Orleans, LA 70124

Recent research has shown that isoflavones, a group of phytoestrogens found in soy-derived foods, are compounds that reduce the risk of several health problems when consumed in the diet. Populations consuming a diet high in soy isoflavones have a lower incidence of several diseases, including breast and prostate cancer. Also, recent research has shown that soy isoflavones may lower blood cholesterol levels and lessen menopausal hot flashes. Research is underway at Tulane's Center for Bioenvironmental Research and Biochemistry Department to identify the phytoestrogenic activity of soy isoflavones that could benefit the nutritional health of the population in general, particularly older women. Techniques are also being developed by USDA scientists to manipulate phytoestrogen levels in soybean seed and soy-based products to maximize health benefits by their consumption. Several biotic and abiotic elicitors have been evaluated for potential use as effective inducers of beneficial isoflavones.

In this presentation, isoflavone levels from several different soy varieties will be determined. Isoflavone profiles will be established for several commercially available seed varieties, including tofu and edamame. This data will provide baseline isoflavone levels in dry seed before food processing where isoflavones are lost. Once established, isoflavone profiles will allow the screening for soy varieties containing beneficial isoflavones determined by bioassays.

Second, data will be presented on the induction of isoflavones using several fungal elicitors. Recent research in our laboratory has focused on the fungal species *Aspergillus sojae* and *A. oryzae*. These two *Aspergillus* strains are commonly used in the fermentation of soybeans for the production of koji, the starting material for soy sauce, miso, tempeh, and sake. An interesting result of the biotic induction of soy isoflavones is the presence of several phytoalexins called glyceollins not found in current soy foods. Phytoalexins are low molecular weight antimicrobial compounds that are synthesized *de novo* and accumulate in plants after exposure to microorganisms. Currently, the estrogenic activity of glyceollin from induced soy seeds is being investigated, and the potential exists for the production of a value-added food product.