



Winter 2006-2007, No. 6

CROP NUTRITION, FOOD QUALITY, AND HUMAN HEALTH

Interest in the effects of food quality and components on health has grown rapidly. Surveys show that many Americans are adding specific foods or ingredients to their diet in an effort to improve or maintain health. The aging and increasingly health-conscious “baby boom” generation is a major reason for the increased interest in food, health, and longevity.

Functional foods have been defined as foods that may provide health benefits beyond basic nutrition. They contain biologically active components thought to enhance health and wellness. These components are not among traditional nutrients, i.e., carbohydrates, fats, proteins, minerals, and vitamins. Rather, they are phytochemicals (plant chemicals) such as lycopene, beta-carotene, and isoflavones. These phytochemicals or functional components may be extracted and consumed as supplements or may have therapeutic value when consumed in whole foods.

Functional foods and their active components are associated with the prevention and treatment of several leading causes of death, including cancer, hypertension, and heart disease. Their modes of action are diverse, including antioxidant, anticarcinogen, probiotic, phytoestrogen, and anti-bacterial activities.

Crop nutrition has been shown to influence the quality and functional components of some foods. A few examples follow.

- An early study demonstrated that total carotenoid (including lycopene) content of tomatoes generally increased with increasing amounts of potassium in nutrient solution.
- A Rio Grande Valley (Texas) study has shown that potassium nitrate produced grapefruit with higher vitamin C concentrations than the control. Additionally, fruits receiving potassium nitrate foliar spray treatments had significantly higher beta-carotene concentrations than the control.
- An ongoing study in the Rio Grande Valley of Texas is showing that foliar potassium application to cantaloupe between flowering and maturity positively affects fruit external and internal firmness, earliness, sugar levels, and beta-carotene and vitamin C content.
- In Ontario, soybeans grown at various levels of fertility in several field trials were analyzed for potassium and total isoflavone content. These analyses revealed a positive relationship between potassium and isoflavone concentrations in the harvested soybeans. There was also a positive association across these sites between yield and isoflavone concentration. The results of this study suggest that when potassium is deficient for yield, it also limits isoflavones. In fact, high yield was positively associated with high isoflavone levels.

The medical and nutritional science communities have been investigating the health benefits of functional foods and their associated phytochemicals for years. However, there is a need for more work in the area of soil fertility and fertilization and its influence on food quality. Perhaps value-added opportunities associated with functional components will be needed before widespread interest is generated. Nevertheless, crop and soil scientists must work toward improving grower economic viability and the health and nutrition of humankind. The current interest and trends in functional foods and their active ingredients may ultimately provide such an opportunity.

—WMS—

For more information, contact Dr. W.M. (Mike) Stewart, Southern and Central Great Plains Director, PPI, 2423 Rogers Key, San Antonio, TX 78258. Phone: (210) 764-1588. E-mail: mstewart@ppi-far.org.