Soybean Quality Traits Analytical Standards Program

In response to competition from foreign markets and to changing consumer preferences in the domestic market, U.S. soybean producers are being asked to grow beans of higher quality. Farmers and seed breeders are rising to the challenge by developing compositionally enhanced soybeans having superior oil attributes, such as low saturated fat and low linolenic acid contents, improved amino acid profiles, and better phosphorus availability. Overall, these beans are more healthful and also are environmentally friendlier than the ones they supersede.

Improvements in quality/genetics are rewarded in the marketplace. That is, the market will pay prices that reflect value. But individual producers are unlikely to see higher prices unless the enhanced traits, such as oil and protein composition, can be verified when the beans reach the elevator. And until the producer can see those higher prices, there is little incentive to make the effort to achieve those higher values.

The Better Bean Initiative, inaugurated by the United Soybean Board (St. Louis, Missouri, USA) in the mid-1990s, has as its purpose to accelerate the development and availability of soybeans with enhanced composition traits. For example, soybean oil containing less than 3.5% linolenic acid can (in some cases) replace partially hydrogenated vegetable in human foods; use of oils with a low saturated fat content (50%) can lead to finished products with reduced levels of saturated fat. One aspect of this purpose was completed in 2006 with the commercial marketing of low linolenic acid-containing varieties.

As an outgrowth of the need to measure the desired traits accurately, the American Oil Chemists' Society (AOCS) and the United Soybean Board jointly formed the Soybean Quality Traits (SQT) Analytical Standards Program. The purpose of this research-oriented association of analytical laboratories, plant breeding organizations (private and public), and U.S. Department of Agriculture laboratories is to create uniform standard methods for measuring soybean traits, including protein and oil contents and fatty acid and amino acid profiles. A secondary purpose is to increase confidence in the ability to identify soybeans with enhanced quality traits.

Currently, the SQT program tests the reliability of measurements for moisture, oil, and crude protein content, as well as for fatty acid composition.

The goal of the program is to create a set of processes, methods, and standards that can form the framework for a sustainable system of uniform soybean quality trait measurement across the soybean industry.

The SQT program has been developed to respond to requirements of its users, including seed companies, referee and private laboratories, end-user laboratories, and elevator and crop-handling facilities. It includes the use of proficiency testing and standards, both of which are available through in-place programs within AOCS.

The SQT program began a study of the applicability of near-infrared (NIR) spectroscopy as a tool in analysis of soybean products in 2006. This technology provides fast analyses and is easy to use. The intention is that results can be analyzed statistically and incorporated into the calibrations that NIR manufacturers provide, allowing analysts to compare data with those from other participants and increase the validity of the results.

In April 2007 the SQT program will offer a free testing program for NIR proficiency using whole soybeans and soybean meal. Three schemes are available: NIR Soybean (required tests: moisture, protein, oil, acid detergent fiber, neutral detergent fiber); NIR Soybean Meal (required tests: same as for NIR Soybean); and Wet Chemistry (required tests: moisture, protein, oil, fatty acids). The program is open to any institution with a NIR instrument that wants to participate; quality control laboratories, NIR instrument manufacturers, and government laboratories in particular are encouraged to sign up. Participants will receive five fresh 400-g samples each calendar quarter. Quarterly reports will then be generated using internationally approved statistical guidelines. For further information contact Amy Lopez, SQT Project Manager, P.O. Box 17190, Urbana, Illinois 61803-7190 USA; phone: +1-217 693 4836; fax: +1 217 693 4879; e-mail: amylo@aocs.org. ■