Breeding better seeds

Pioneer Hi-Bred's sophisticated AYT™ system gathering steam for higher yields, greater pest resistance

By Heather Hudson

Soybean, corn and canola growers may expect higher yields and improved defensive seed traits thanks to a technology that is advancing seed research and the genetic development process.

The accelerated yield technology (AYT™) system is a suite of tools developed by Pioneer Hi-Bred, a DuPont business. It includes molecular breeding techniques which allow researchers to quickly scan and identify genes responsible for increasing yields and then incorporate the most favourable genes into elite varieties and hybrids. Though initially developed for soybeans in the mid-1990s, the AYT™ system is expanding and becoming increasingly more sophisticated.

"Using molecular markers, we can genetically profile experimental lines and determine a number of genes associated with yield or with resistance to specific pests and diseases," said John Soper, vice president, Pioneer crop genetics research and development.

What does this mean for growers? According to Dave Harwood, technical services manager for Pioneer Hi-Bred in Canada, soybean producers in Ontario have been handed a distinct advantage when using seeds engineered with the AYT™ system.

"Soybeans are where we first commercialized products that benefited from the AYT™ approach. Growers have observed a resistance many soybean varieties have to specific pests like cyst nematode, which is a very important pest in southwestern Ontario.

"Because of the use of molecular markers which are part of the package of the AYT™ system, we've been able to deliver a large portfolio of very high performing products with an excellent reaction to soybean cyst nematode without sacrificing yield. It has eliminated that compromise that one very often has to make when obtaining resistance to a specific pest."

The technology has also resulted in gains in other defensive traits. "In soybeans, we've used molecular markers to improve resistance to brown stem rot, soybean aphids, Phytophthora and Asian soybean rust, and we're exploring improvements against frogeye leaf spot, stem canker and others such as white mold and sudden death syndrome," said Soper.

Growers are also taking notice of advances in corn and canola with tools under the AYT™ umbrella. Here are just a few of the state-of-the-art techniques used to screen and evaluate corn genetics:

Soybean, corn and canola growers may expect higher yields and improved defensive seed traits thanks to a technology that is advancing seed research and the genetic development process.

- Functional Analysis System for Traits – A combination of high-throughput biotech plant production and automated analysis to evaluate hybrids for traits. The system allows researchers to grow experimental corn in less time than typically required.
- Laser-assisted seed selection – A process using lasers to slice off sections of a seed, enabling breeders to review the plant's DNA, saving enough of the seed for researchers to plant later.
- Doubled-haploid technique – A breeding technique that reduces the amount of time it takes to produce a corn inbred, allowing for more rapid hybrid development from the vast Pioneer genetic library.
- Boreas wind machine – A proprietary, giant mobile wind machine that simulates wind pressure and direction to test stalk and root strength in experimental hybrids.

"As the name implies, the AYT™ system accelerates the rate of genetic progress for yield. It sets out tools that allow plant breeders to be more effective in making selections for higher yielding materials," says Harwood, adding that all Pioneer soybean, corn and canola products deployed in the Canadian market have been developed using the AYT™ approach.

"These products' performance is a function of the fact that we've had AYT™ to identify the genes responsible for increasing yields."

Soper says Pioneer continues to develop more specifically adapted hybrids and is testing with trials and evaluations on growers' farms in the hopes of offering better quality data collection over the growing season.

For more information on Pioneer's AYT™ system, visit www.pioneer.com. ◆