Bayer CropScience

Crop improvement trends for the next 10 years

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Second generation biotech products: First trend

The most recent new trait introduction is the commercialization of double and triple stacks : building on the first generation biotech products by improving and stacking traits to answer various demands.

Farmers: herbicide tolerance, insect tolerance all combined in one seed

- Added value for the farmer (very high demand);
- Economic value;
- A trade-off.

Second generation biotech products: Second trend

The next trend in trait introduction is further stacking where input traits are improved and coupled with favourable output traits such as:

- Farmers: improved herbicide tolerance, pest tolerance, stress tolerance, yield improvement;
- Processors: feed, food, renewable fuel, ...;
- Consumers: improved oil quality, altered carbohydrate content, improved fiber quality.

Second generation biotech products: the horizon

- A complex combination of traits resulting from various genetic tools such as genetic engineering, genomics, molecular breeding, conventional breeding and using broader germplasm basis;
- Assembling input traits for the farmer and output traits for processors and consumers;
- For precision farming (new agricultural practices);
- In a dynamic environment where non-GM varieties are no longer competitive

  Ex. Canola 2006 variety trial inscriptions in Canada:

  only 2 conventional varieties versus 48 herbicide tolerant varieties

Selection of comparators for multiple stacks: Canola InVigor™

A decade ago:

InVigor™ was launched as a GM hybridization system: Ms8xRf3

Because canola is a self pollinated crop, the choice of comparators for the hybrid Ms8xRf3 is limited: difficult to do handcrossing to make non-GM hybrid seeds in sufficient quantities.

Therefore, the hybrid Ms8xRf3 was tested in the transformation background, an old public OP line, instead of being evaluated in a real hybrid background and the comparator is a non-GM parental material.

Selection of comparators for multiple stacks: Canola InVigor™

In 2007 - 10 years later:

Ms8xRf3 is in all Bayer's varieties: Bayer canola varieties are all hybrids. Bayer's canola breeding is "hybrid breeding": we breed within the GM system. With current varieties, Rf3 does not even have a non-GM male line counterpart. The original transformation background is no longer relevant.

- If the additional traits are GM traits → (multi)triple GM stacks.
- The non-GM genotypes necessary for comparative safety assessments should be created on purpose each time a new stack is intended for regulatory approval.
- At least 2 years of introgression to create genotypes with no commercial relevance.

Selection of comparators for multiple stacks: Canola InVigor™

Alternative for the choice of the comparator: GM Ms8xRf3 commercial hybrids

- Ms8xRf3 has been recognized as safe;
- The evaluation of the stack will be done in genetic backgrounds more adapted to current agricultural environment;
- More uniform field quality because of herbicide tolerance trait in all entries → improved data quality;
- Significant gain of time to generate the material for the safety assessment studies (at least 2 years);
- Improved flexibility to create new products and address the market demand.

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Thank you for your attention