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Omics-directed reverse genetics enables the creation of new productivity traits for the vegetable oil crop canola

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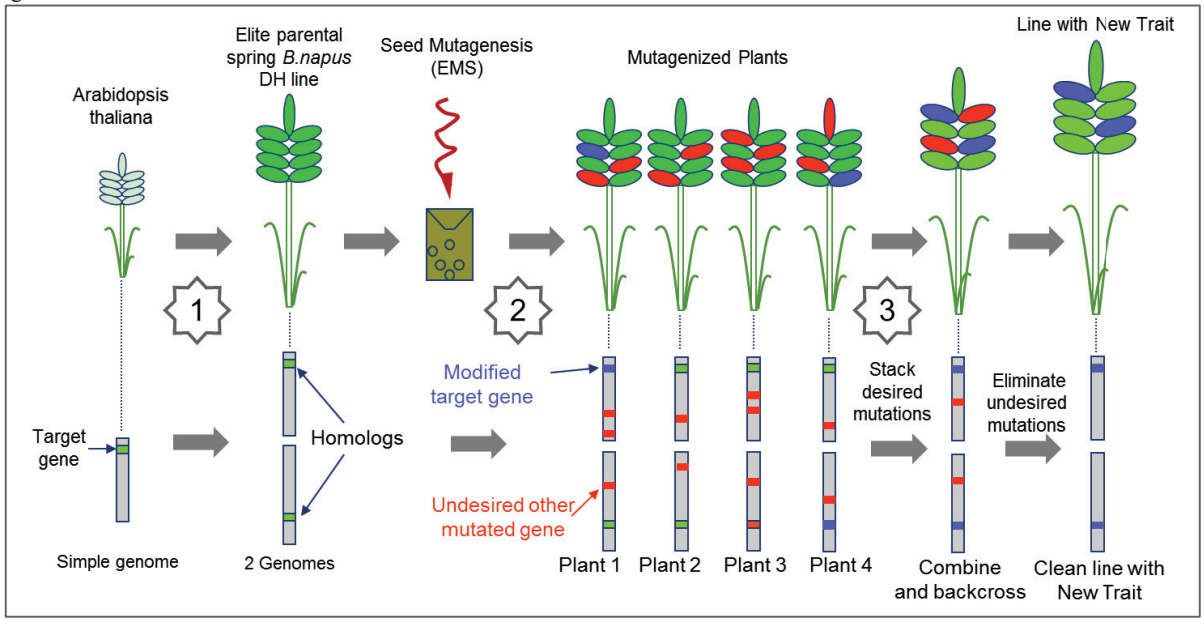
Bayer CropScience is a leader in the oilseed rape seeds business with a 2013 market share of 50% in Canada, based on the creation and use of a unique hybridization system enabling the development of high-yielding canola (B.napus) InVigor® hybrids. For the European markets, Bayer is developing non-transgenic hybrids that will be complemented with differentiating traits. To this end, a highly effective mutagenesis-based and omics-directed reverse genetics platform was established which enables the creation of novel productivity traits in canola.The reverse genetics process involves three major steps described in the following figure.



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The selection of relevant homoeologs is facilitated by Bayer's B.napus genome sequence and transcript atlas. The genome sequence allows the in silico identification of functional homoeologs and the transcript atlas enables to prioritize on homoeologs that are highly expressed in the right tissues. A new trait is created by stacking relevant mutant alleles in a single line. Bayer CropScience is using its canola reverse genetics platform to improve certain canola characteristics including pod shattering, grain yield and oil composition and to develop traits such as herbicide tolerance. Pod shatter reduction was the first trait developed with the platform. A first pod shatter-reduced InVigor hybrid, L140P, was commercially grown in Canada during the 2014 summer season. Bayer CropScience has established and is successfully using a this biotech-based platform for the improvement of the productivity of canola. The resulting traits do not require regulation and can be deployed in all continents. The major limitation of reverse genetics is that the scope of modification is limited to the crops' own gene content and the expression levels of these genes.

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Keywords: canola; reverse genetics; omics; pod shatter; InVigor

References

1. Dinneny J.R. and Yanofsky J.F. Drawing lines and borders: how the dehiscent fruit of Arabidopsis is patterned. 2004; *BioEssays* 27:42–49