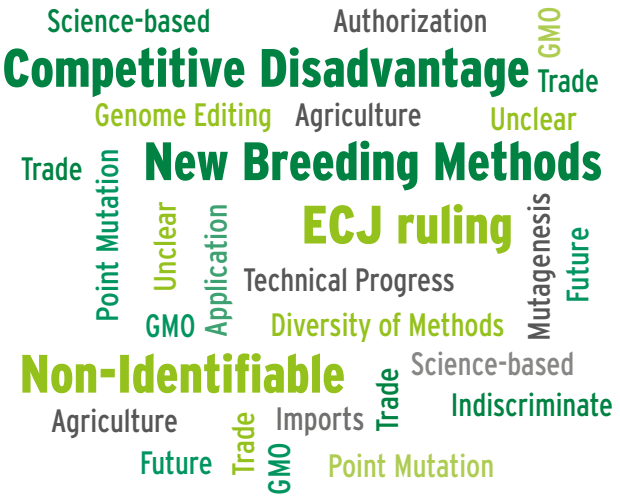
BDP
Plant Breeding and Seed

New Breeding Methods

Indiscriminate Classification Is Wrong

For more than 100 years, plant breeders have been improving agricultural and horticultural crops. For this purpose, they have continuously enhanced plant breeding methods. In July 2018, the European Court of Justice (ECJ) issued a ruling[1] that has grave consequences. According to this, plants bred with the help of new breeding methods are considered genetically modified organisms (GMO). This imposes disproportionately strict conditions on the utilization of new breeding methods and renders their application unlikely – to the detriment of agriculture and society.

In contrast to the assessment of scientific experts of European and national authorities, the European Court of Justice has classified plants bred with the help of mutagenesis across-the-board as genetically modified organisms, irrespective of the type of the resulting modification. The ECJ has only considered the breeding method, but not the result – a plant that could have occurred naturally.
In the future, products developed with the help of new breeding methods have to undergo a lengthy authorization process and are subject to stringent monitoring, labelling and traceability requirements.



The implementation of the ECJ ruling is facing serious practical problems:

Problem: Detection and Identification Methods

Already in 2017, the competent authorities of the German Ministry of Agriculture[2] had pointed out that mutations generated by new breeding methods cannot be distinguished from mutations that may occur naturally. This has also been confirmed e.g. by the Opinion of the Scientific Advice Mechanism (SAM) of the European Commission published in November 2018[3] and by the European Network of GMO Laboratories (ENGL) in March 2019[4]. In the light of these facts, it remains unclear how a plant breeding company is supposed to comply with the authorization conditions imposed on such plants, namely that the applicant has to provide methods for the detection and identification. In the absence of such methods, authorities responsible for monitoring and control of GMOs are unable to complete their task.

Problem: Trade and Import

At the same time, other countries have decided not to subject plants developed with the help of such breeding methods to biotechnology regulations. The decision of the ECJ is bound to create problems in international trade and puts the European economy at a competitive disadvantage. Particularly the absence of identification methods raises the question of how to deal with imports from third countries that may contain products developed with the help of these methods.

Implementation of the ECJ ruling in practice is impossible for plants resulting from new breeding methods. Thus, the legislation needs to be amended to accommodate recent scientific findings and latest developments in plant breeding. BDP believes that the indiscriminate GMO-classification of plants which were developed with the help of new breeding methods is technically and scientifically wrong. Plants that are indistinguishable from plants developed by conventional breeding should not be regulated as GMOs.

BDP
Plants – The Basis of Life

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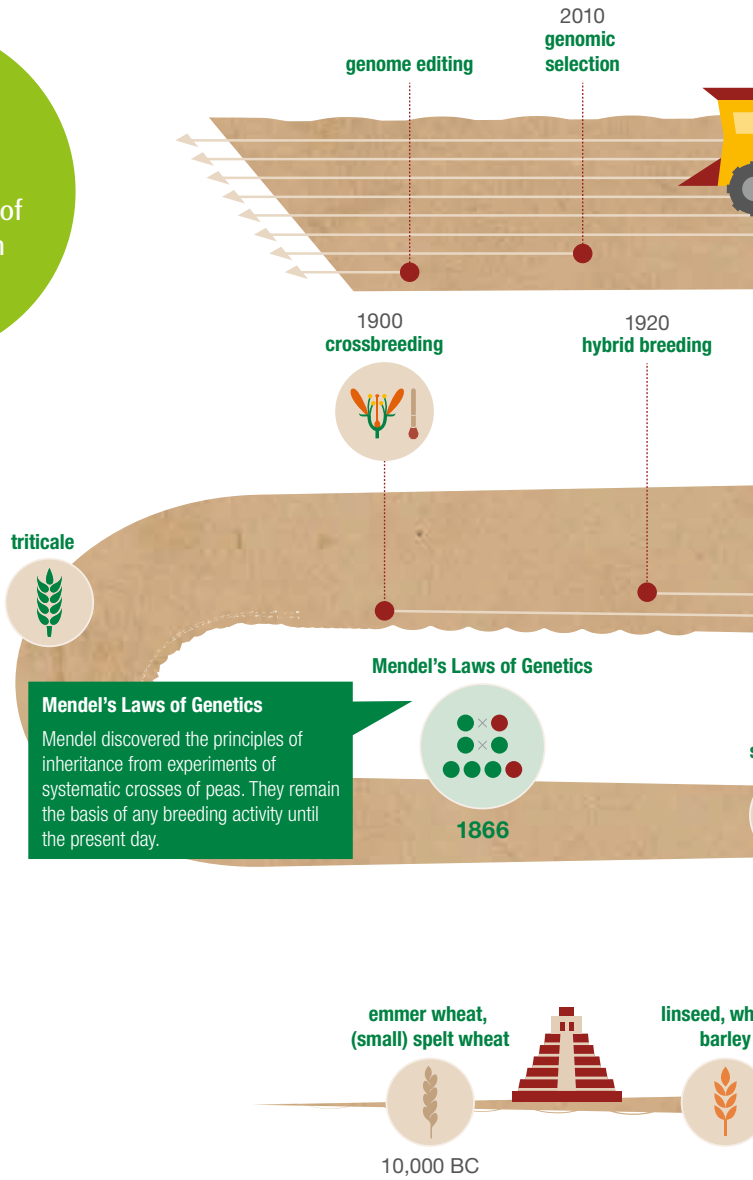
Enhancing Genetic Diversity in Plant Varieties – A Tradition for More than 85 Years

Back in the 1930ies, plant breeders started to actively increase the naturally occurring genetic variability in plants by exposing them to radiation or mutagenic chemical agents. The resulting progeny was subsequently screened for useful variants (mutation breeding). Therefore mutation breeding works by enhancing natural processes. The downside: Although the method creates a lot of variation, there is no control of the induced genetic modifications. There is no way to influence which properties are changed, nor how they are changed. Mutation breeding therefore is laborious and cumbersome.

Starting Point in Plant Breeding: Taking Advantage of Natural Variation

Genetic variation is a natural phenomenon and the basis of evolution. Each plant is different in some respects from another. These differences result from natural, random modifications in the plant's genes, caused e.g. by ambient radiation, sunlight etc. Such a modification means that individual DNA[5] base pairs of the plant have been changed by chance. Experts call this a point mutation. Consequently, the plant may display a slightly different property – in its appearance, resistance to drought, cold or certain pests etc. The plant breeder selects from the variation created by such natural processes those modifications that appear to be useful and that he would like to see also in other plants. He then proceeds to crossing the selected modified plant with others not carrying this property yet. For this purpose, he pollinates the receiving plants with pollen of the selected, modified plant and hopes that the desired property will show up in subsequent generations (crossbreeding). When successful, the breeder will have created a new plant variety. In practice, however, this process takes 10 to 15 years, since individual plants of the progeny will fail to express the desired properties or might even show unfavourable characteristics. The latter will be eliminated stepwise in the course of the breeding process.

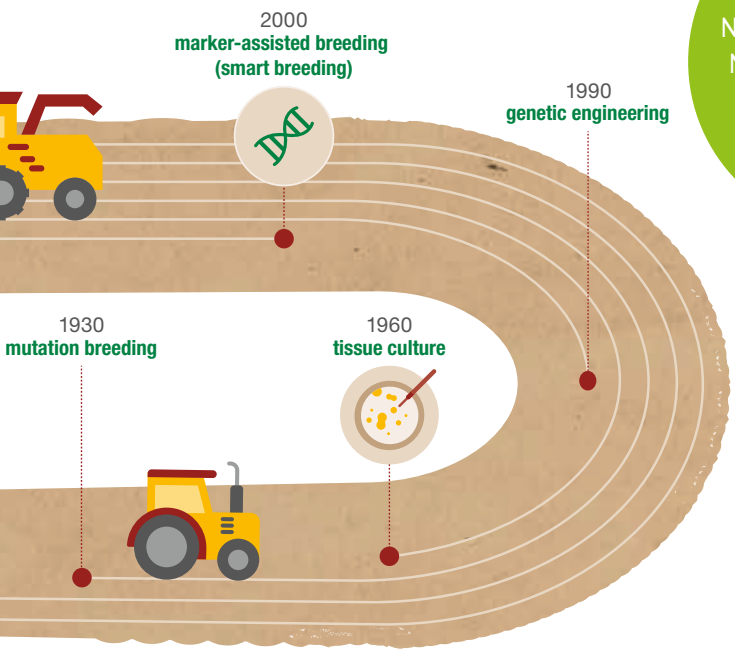
Milestones in plant breeding



New Breeding Methods

Overcoming Natural Recombination Barriers

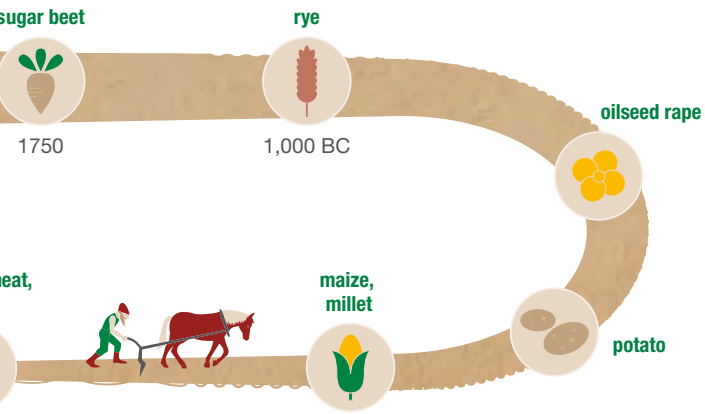
Since the 1980ies, new methods have been developed that do not change individual DNA base pairs, but transfer entire gene sequences (genetic engineering). These methods also allow to overcome natural reproductive barriers. It is possible, therefore, to create plants that could not occur naturally. Such methods use e.g. agrobacteria or the "gene gun". The legislator considered it necessary to regulate the methods and resulting organisms (Directive 2001/18/EC)[6]. Under this legislation, they are now subject to extensive procedural and safety regulations as well as labelling requirements. Here, the regulatory approach explicitly draws a line between processes that facilitate and enhance random, natural events of genetic alteration and processes that overcome natural barriers.



New Breeding Methods Need a Differentiated Assessment

For more than a decade now, methods have been developed that can be used to create point mutations within natural reproductive barriers. Compared to traditional approaches the advantage of methods such as Genome Editing resides in the fact that the exact location of a point mutation is not left to mere chance any more. It is now possible to create such a natural point mutation at a defined location in the plant DNA. We are now able to initiate precisely those natural variations which are desired. Some applications of the new methods are also suitable to overcome natural reproductive barriers. This means that these methods could also be used to create plants that would not have evolved naturally. The latter are without doubt GMOs. It depends on the specific application of these methods as to which type of genetic modification has been achieved.

Thus, from a scientific point of view, a differentiated assessment of these new plant breeding methods is needed. The current legislation needs to be amended to account for these facts.



[1] Case C-528/16

[2] Wissenschaftlicher Bericht zu den neuen Techniken in der Pflanzenzüchtung und der Tierzucht und ihren Verwendungen im Bereich der Ernährung und Landwirtschaft, 2017 (Scientific Report on New Techniques Applied in Plant and Animal Breeding and their Use in Food and Agriculture)

[3] European Commission: Statement by the Group of Chief Scientific Advisors "A Scientific Perspective of the Regulatory Status of Products derived from Gene Editing and the Implications for the GMO Directive", 2018

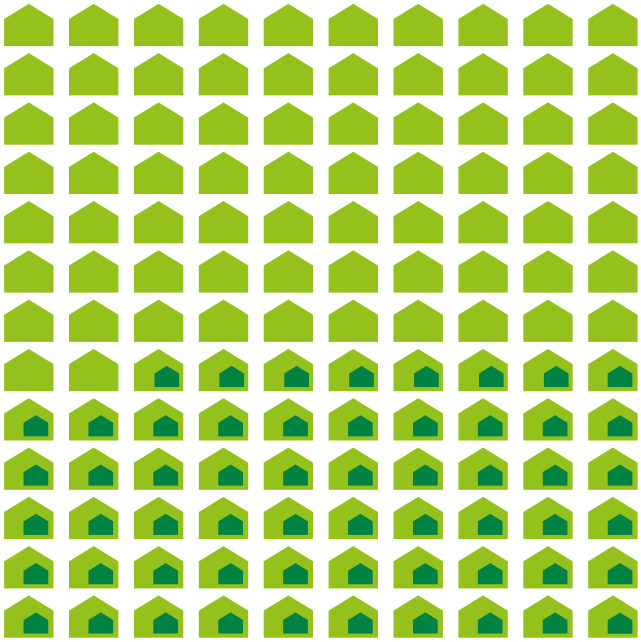
[4] European Network of GMO Laboratories "Detection of food and feed plant products obtained by new mutagenesis techniques", 2019

[5] DNA stands for deoxyribonucleic acid; the DNA carries the information on inheritable traits of an organism in units called genes.

[6] Cf. Directive 2001/18/EC, Article 2

Plant Breeding in Germany

130
Plant Breeders and Seed Traders



15.1 %
R&D-to-turnover ratio

German breeding programmes for more than **120** species

58
of which carrying out own breeding programmes

more than
3,000
registered plant varieties in Germany

The German Plant Breeders' Association (BDP):
The German Plant Breeders' Association (BDP) is seated in Bonn and Berlin and represents the professional interests of its approximately 130 member companies – plant breeders and seed traders of agricultural, horticultural and ornamental plants. With its R&D to turnover ratio of 15.1 per cent, plant breeding counts among the most innovative industries in Germany. It offers employment to some 5,800 people who work to lay the basis for successful farming and all subsequent branches in the value-adding chain.

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