

# Konventionelle und molekulare Pflanzenzüchtung

Detlef Weigel

Max-Planck-Institut  
für Entwicklungsbiologie  
Tübingen

Disclaimer



<http://weigelworld.org>

 @PlantEvolution



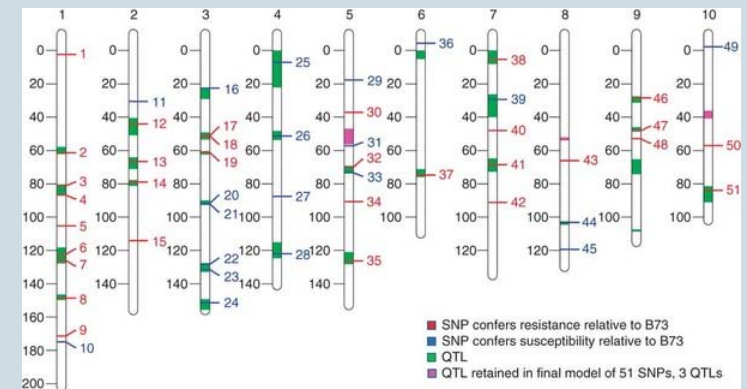
## 1 Domestizierung Selektion spontaner Mutanten



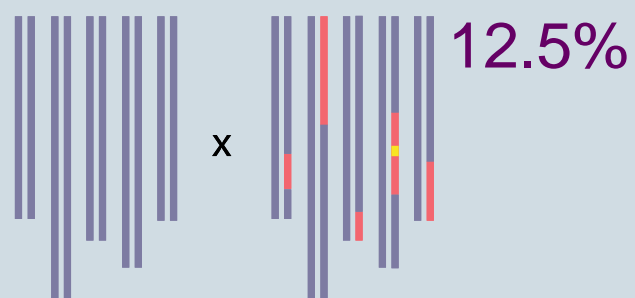
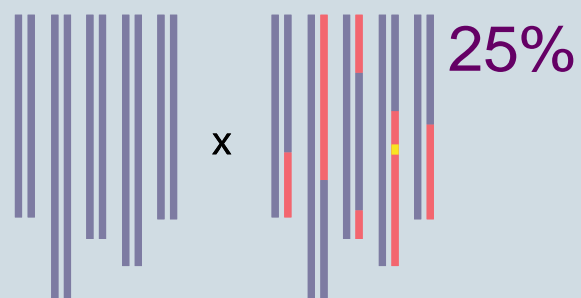
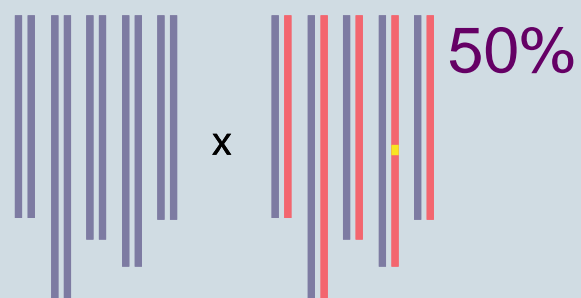
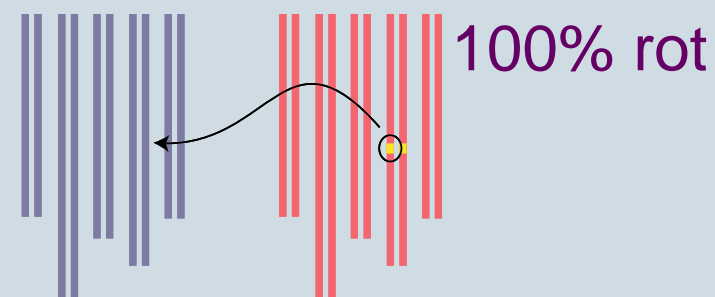
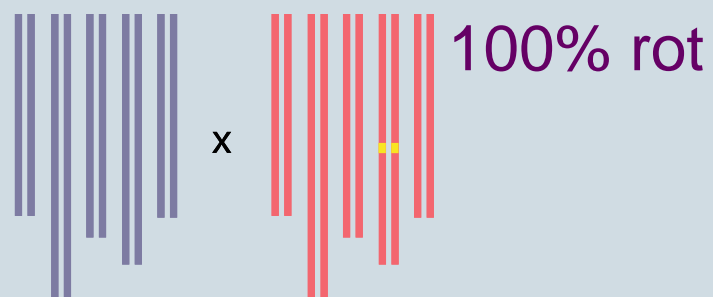
## 2 Verbesserung a) Massenselektion b) Linienselektion



## 3 Züchtung a) Kreuzungen & phänotypische Selektion b) Mutagenese c) Marker-gestützte Selektion d) Genomische Selektion/Vorhersage e) Transgene (GVOs)

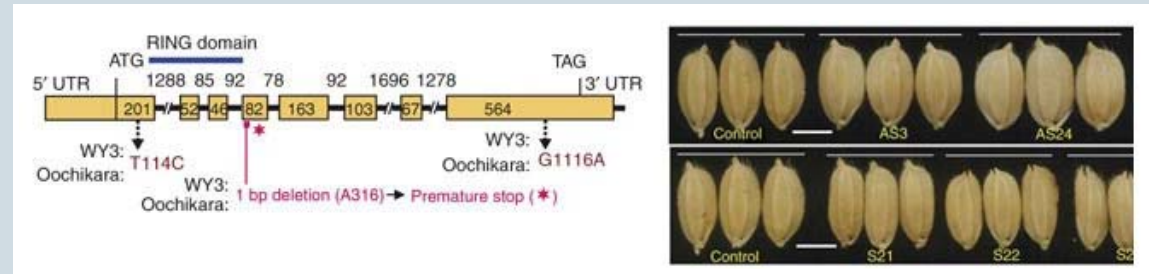


# Konventionelle Züchtung versus gezielte Mutagenese



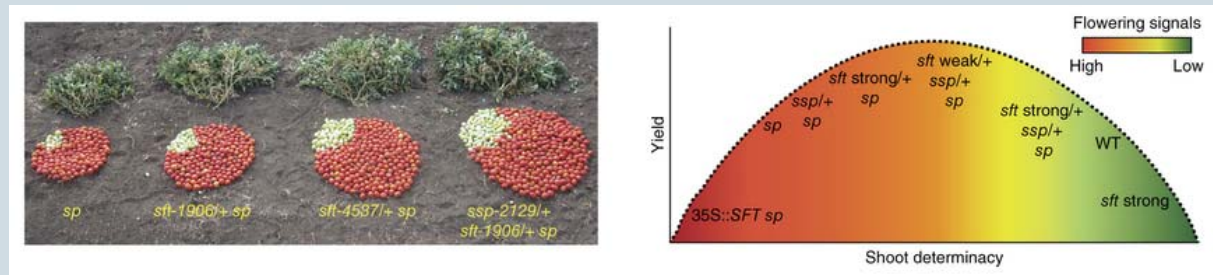


## 1 Gezielte Geninaktivierung



Song et al, Nat Genet 2007

## 2 Erzeugung allelischer Serien



Park et al, Nat Genet 2014

## 3 Transfer von Allelen



Van der Vossen et al, Plant J 2003



1 ODM (oligonucleotide directed mutagenesis)



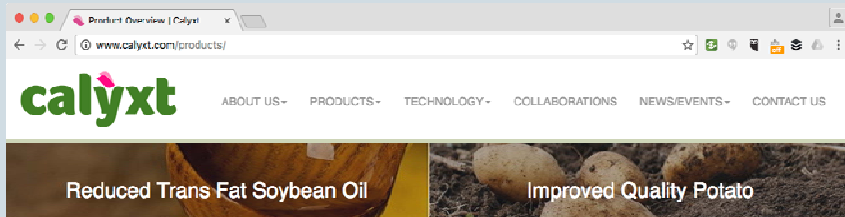
**CANOLA**

Cibus' new **SU Canola™** is a non-transgenic (non-GMO) sulfonylurea (SU) herbicide tolerant canola that is


- 1) now available in the United States;
- 2) on track to be available in Canada in 2017; and,
- 3) expected to be launched in other major global markets after 2018.

Visit  
[CibusCanola.com](http://CibusCanola.com)

2 ZFNs (Zinkfinger Nucleasen)  
TALENs (TALE Nucleasen)



Reduced Trans Fat Soybean Oil    Improved Quality Potato



**MONSANTO**    Careers | Investors | Select a Country

Who We Are    Products    **Newsroom**    Improving Agriculture

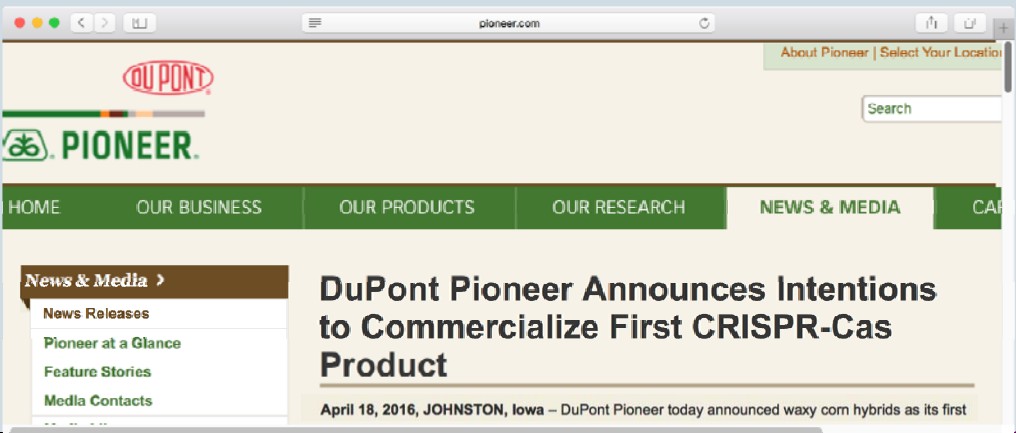
Newsroom

- Newsroom Home
- Spotlight
- News Releases**
- Social Media

**Monsanto and Dow AgroSciences Announce Global Licensing Agreement on EXACT Precision Technology Genome-Editing Platform**

Monday October 3, 2016

3 CRISPR/Cas9



**DU PONT**    About Pioneer | Select Your Location

**PIONEER**    Search

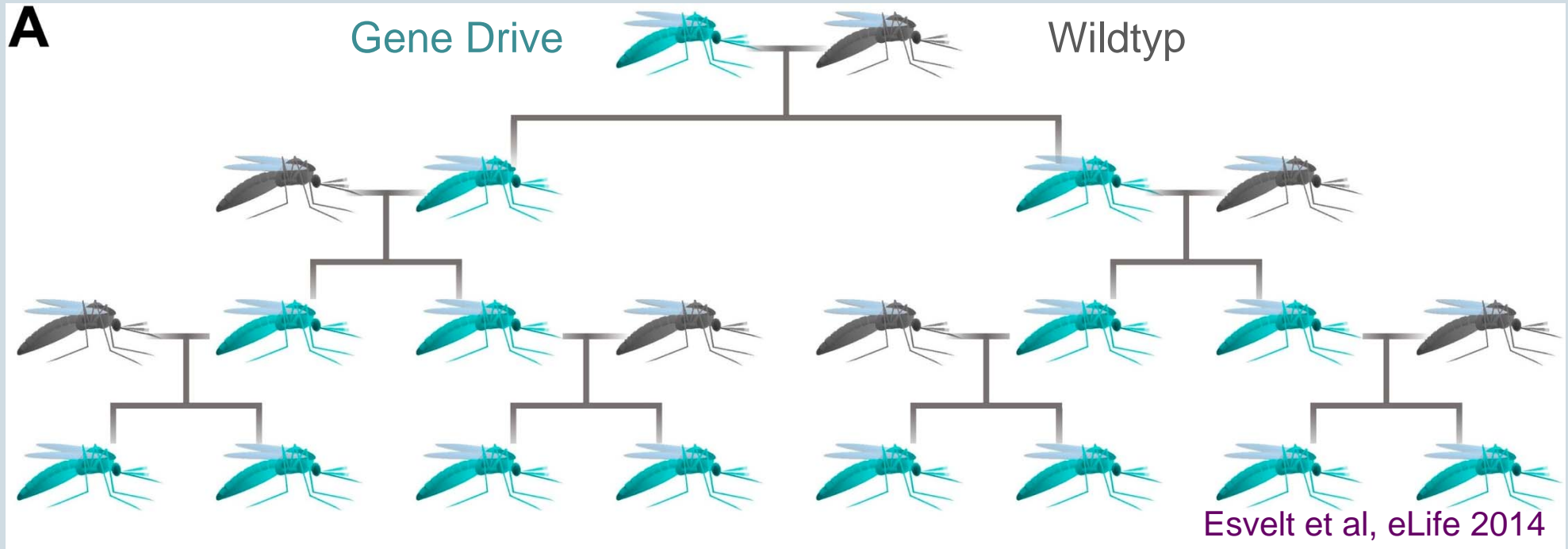
HOME    OUR BUSINESS    OUR PRODUCTS    OUR RESEARCH    **NEWS & MEDIA**    CAREERS

**News & Media >**

- News Releases
- Pioneer at a Glance
- Feature Stories
- Media Contacts

**DuPont Pioneer Announces Intentions to Commercialize First CRISPR-Cas Product**

April 18, 2016, JOHNSTON, Iowa – DuPont Pioneer today announced waxy corn hybrids as its first



## CASE STUDY 6: CONTROLLING PALMER AMARANTH TO INCREASE AGRICULTURE PRODUCTIVITY

### Objective

Create gene drives in Palmer amaranth (*Amaranthus palmeri* also called pigweed), to reduce or eliminate the weed on agricultural fields in the Southern United States.

### Rationale

Palmer amaranth infests agricultural fields throughout the American South. It has evolved resistance to the herbicide glyphosate, the world's most-used herbicide (Powles, 2008), and this resistance has become geographically widespread.

U.S. National Academies (8. Juni 2016)



Title 7, Code of Federal Regulations (CFR) 340.2

*Groups of organisms which are or contain plant pests and exemptions.*

- 1 Transgen enthält Pathogen (“pest”) DNA Sequenzen
- 2 Empfänger ist ein Pathogen oder Unkraut (“pest”)

## **§ 340.2 Groups of organisms which are or contain plant pests and exemptions.**

**(a) Groups of organisms which are or contain plant pests.** The organisms that are or contain plant pests are included in the taxa or group of organisms contained in the following list. Within any taxonomic series included on the list, the lowest unit of classification actually listed is the taxon or group which may contain organisms which are regulated. Organisms belonging to all lower taxa contained within the group listed are included as organisms that may be or may contain plant pests, and are regulated *if they meet the definition of plant pest in § 340.1*<sup>4</sup>

<sup>4</sup> Any organism belonging to any taxa contained within any listed genera or taxa is only considered to be a plant pest if the organism “can directly or indirectly injure, or cause disease, or damage in any plants or parts thereof, or any processed, manufactured, or other products of plants.” Thus a particular unlisted species within a listed genus would be deemed a plant pest for purposes of § 340.2, if the scientific literature refers to the organism as a cause of direct or indirect injury, disease, or damage to any plants, plant parts or products of plants. (If there is any question concerning the plant pest status of an organism belonging to any listed genera or taxa, the person proposing to introduce the organism in question should consult with APHIS to determine if the organism is subject to regulation.)

### **NOTE:**

Any genetically engineered organism composed of DNA or RNA sequences, organelles, plasmids, parts, copies, and/or analogs, of or from any of the groups of organisms listed below shall be deemed a regulated article if it also meets the definition of plant pest in § 340.1.

