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Optimizing potato quality: resilience to viruses and sustainable starch for food processing

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Content

Potato

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- Potato is number three of the staple crops in the world
- More than 8 million tons of potato produced for starch production in Europe

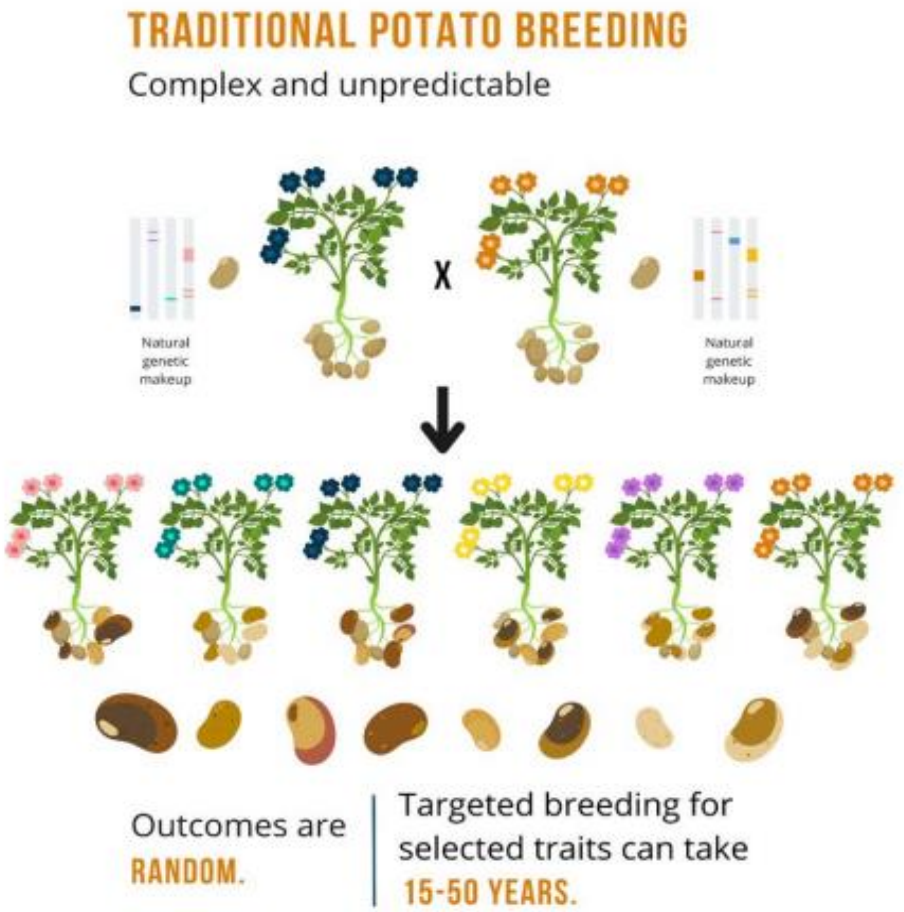
  + High yield, protein, vitamins, minerals, fibre, carbohydrates
  - High input needed: water, fertilisers, pesticides, downstream processing of starch
  - Genetically challenging (tetraploid, heterozygous)

- Plant breeding can solve the challenges of potato production and processing!
- Need for sustainable resistance

Conventional breeding versus use of NGTs

- Traditional breeding methods are long term, e.g cross breeding, traditional mutagenesis
  - **12-15 years**

- With NGTs, we can add new traits without disturbing the genetic background + create good pre-breeding material much faster
  - **5-7 years**



@RegenZ

NGTs strategies for potato quality

NHEJ

Gene knock out

HDR

Sequence insertion or replacement

PE

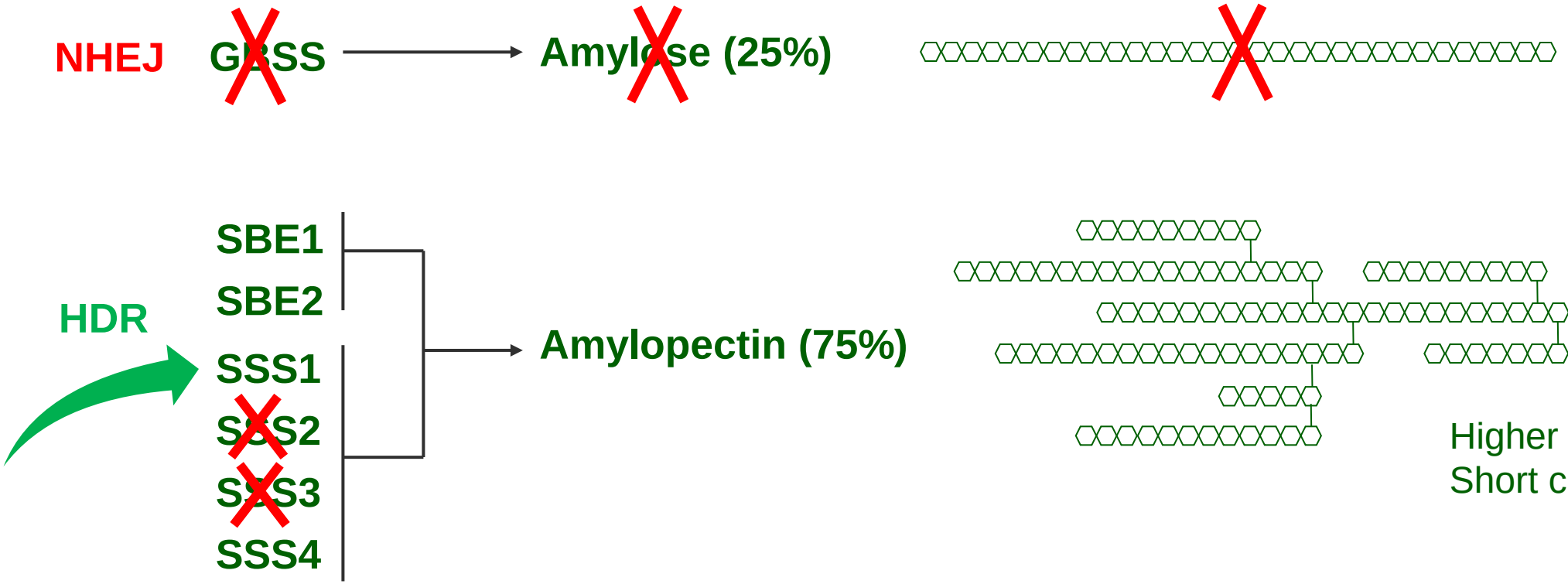
Short sequence replacement

Starch quality

- Unique thickening and gelling properties
- Low storage stability in food products (native starch)
- Up to 75 000 metric ton chemicals are used for starch modification in Europe
- With NGT we eliminate the problem with mutations induced in three genes
- SUSTAINABLE STARCH!

Source: Lyckeby.com

Our approach



+ Eliminates the need of chemical modification!

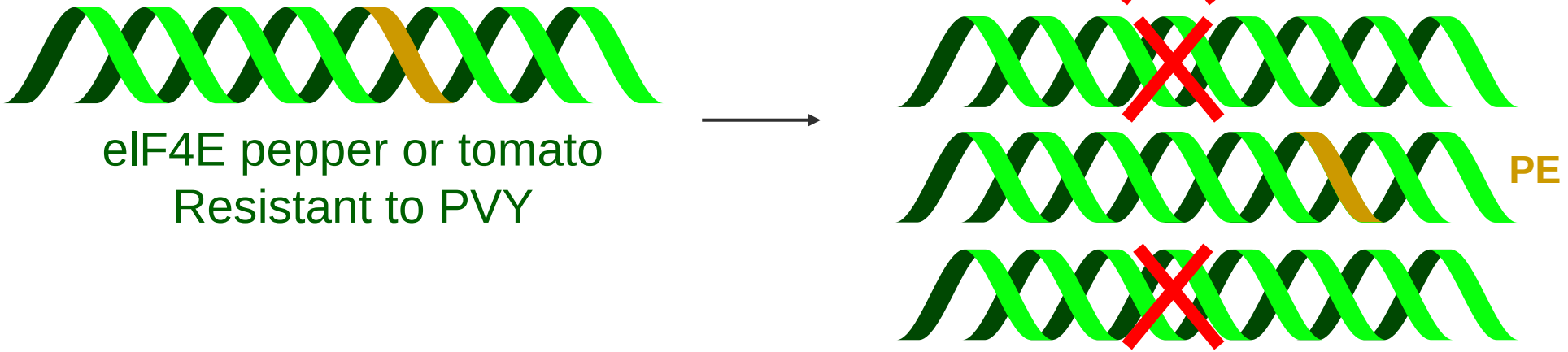
- Slight starch yield loss

Improving PVY resistance

- Up to 20-50% yield loss due to virus infection of seed potato (PVY)
- PVY is transmitted by aphids
- Cost for control and management (prophylactics, insecticides)
- PVY use a plant protein (eIF4E) for infection cycles

Source: inov3pt

Our approach



eIF4E pepper or tomato
Resistant to PVY

eIF4E Potato

Resistant to PVY
Functional protein

Combining the traits

- We are, in a starch potato cultivar, adding both traits
- We will perform field trials in Sweden
- And we do it like nature could have done it, but more precise and quicker

Source: SolEdits

Take home messages

1. NGT1 potato lines could make a huge impact for sustainability
   Less waste - Less chemicals - Less energy

2. Plant breeding is part of the solution for many global challenges
   NGTs can reduce potato breeding time

3. We need combination of tools to quickly solve the challenges we have in agriculture

4. The 2 traits, starch quality and PVY resistance, will be stacked into 1 potato cultivar (work ongoing + field trials)

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Connect with us!