The EU Green Deal aims to increase the sustainability of EU agri-food systems and public health. Food and nutritional security are of paramount importance to ensure social sustainability in line with environmental and economic.

Plant breeding is at the basis of our agri-food systems and is solely responsible for ~66% of production gains over the past two decades.²

Scientific and technological advances enabling faster, more precise, and more efficient plant breeding must be leveraged to both maintain food and nutritional security and improve public health.

For more information on plant breeding, see our factsheet “Plant Breeding is the Basis of our Food Systems”. 
Tomato (Solanum lycopersicon)

Tomato is among the world’s largest and fastest growing vegetable crops, with global tomato production currently around 180 million tons over 5 million ha. Leading producers are China, India, Turkey and the US. In Europe, Italy and Spain are the main producers and in the top 10 producers globally.

Vitamin D deficiency: a global health problem

Vitamin D deficiency is associated with multiple health risks, including cancer, cardiovascular diseases and depression. Uptake of vitamin D occurs through exposure of the skin to sunlight or from dietary sources. About 40% of Europeans are vitamin D deficient and up to 13% are severely deficient.

Vitamin D - fortified tomatoes

Like most fruit and vegetables, tomatoes contain low concentrations of vitamin D. Using targeted mutagenesis, researchers have developed a tomato that accumulates provitamin D (the precursor of vitamin D) in the fruit and leaves.

Vitamin D - fortified tomatoes can provide a new dietary source of vitamin D, while the leaves can be used to create vitamin D supplements.
Breeding for vitamin D – fortified tomato

New genomic techniques
Targeted mutagenesis using genome editing can be performed directly in most commercial varieties, reducing the breeding time to 2-3 years.

Conventional breeding
Obtaining the donor tomato plant using classical mutagenesis would take 3-4 years and be very resource intensive.
The donor plant would be used to introduce the mutations to commercial varieties, which would take an additional 4-5 years.

Expected impacts
Consumption of one vitamin D - fortified tomato is expected to provide about 30% of the recommended daily intake⁶, thereby contributing to consumer and societal health.
The leaves of vitamin D - fortified tomato, can be used to extract vitamin D for vitamin D supplements, thereby providing an additional source of income for farmers and contributing to better circularity.

Vitamin D - fortified tomato can contribute to the socio-economic sustainability goals of the EU Green Deal and the UN SDGs:

1. Zero hunger
2. Good health and well-being
3. Decent work and economic growth
4. Industry, innovation and infrastructure
Plants for the Future calls on EU policymakers to exclude plants developed using NGTs (targeted mutagenesis or cisgenesis) from the scope of the GMO directive, so that they may contribute to the transition towards more sustainable food systems.

About us
Plants for the Future (Plant ETP) is a multistakeholder platform representing the plant sector, with members for academia, industry and the farming community. Plant ETP considers the challenges and opportunities of agricultural value chains and develops a vision for future food systems. For more information see our website: www.plantetp.eu. Contact secretariat@plantetp.eu

References
1. Noleppa and Cartsburg (2021)
2. Bremmer et al. (2021)
3. Barreiro-Hyrle et al. (2021)
4. FAO (2022)
5. L et al. (2022)
6. Amrein et al. (2020)

Check out our other factsheets here!