

phytoengineering

Phytowelt GreenTechnologies is a worldwide operating company whose core business is agricultural science and plant biotechnology. Our mission is to bridge white and green biotechnology expressed in our motto

“plantdustrial – linking plant and industrial biotechnology”

Phytowelt possesses a unique and wide-ranging service termed **phytoplus** to exploit plant biodiversity and gain added value in and out of plants. This service package consists of the modules **phytoanalysis** (detection and analysis of plant biodiversity by morphological, biochemical and molecular marker techniques), **phytochemistry** and **phytomining** (isolation, development and exploitation of renewable plant substances, plant metabolites and enzymes for industrial use) as well as **phytodiversity** (plant biodiversity creation by intra- and interspecific hybridization) and **phytoengineering** (modification of plant genomes).

phytoengineering overcomes limitations of plant breeding by employing state-of-the-art genetic engineering technologies to generate added value in plants e.g. improved fruit yield. In most plants fruit set requires pollination and seed formation, which then triggers synthesis of plant hormones promoting cell division and expansion in the developing fruits. In consequence, lack of pollination due to bad environmental conditions results in poor fruits yields.

Parthenocarpy is a pollination independent alternative pathway naturally occurring in certain plants (e.g. bananas) leading to the production of seedless but otherwise normal

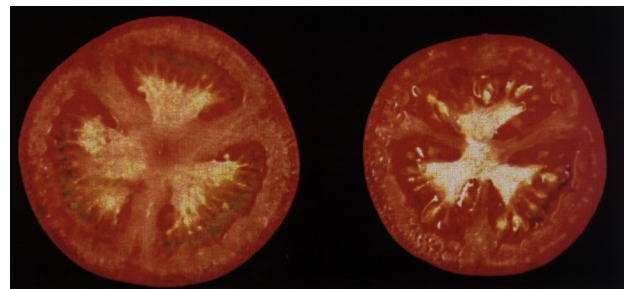


Figure 1: Engineered parthenocarpy: wild-type tomatoes (left) possess numerous seeds. Engineered parthenocarpic fruits (right) look normal but do not contain seeds.

- **Reliable fruit yields**
- **Reduced production costs**
- **Improved taste**
- **Novelty**
- **Breeding independent**
- **Fast technology implementation**

fruits. In fact, for food production parthenocarpic fruits have numerous advantages. Lack of pollination-dependence reduces constraints concerning environmental conditions (e.g. weather, insect pollinators, growing season) and labour (fertilization, seed removal during processing) resulting in greater reliability of crop yields, reduction of production costs and, in addition, improved taste (due to improved sugar content and/or lack of bitter flavours).

In fact, seedlessness, high solids and taste are valuable traits for both, **breeders** and **processing industry** and several edible parthenocarpic fruits have already been bred in the past (pineapples, cucumbers, grapes,

oranges and grapefruits). However, this is always time-consuming, laborious and sometimes not feasible at all. Induction of artificial parthenocarpy by means of hormone treatment works in a number of plants, but drastically increases production costs.

Phytowelt GreenTechnologies **phytoengineering** approach employs genetic engineering to successfully overcome these limitations and produce added value plants giving rise to parthe-

nocarpic fruits. For example, tomatoes (fig. 1) and eggplants proved to be **pollination independent** showed **less browning** of the fruit flesh upon cutting as well as **reduced bitterness** due to lowered seed amounts.

Transfer of this technology to other plants is feasible and will open new routes and possibilities for the molecular breeding of new and optimized cultivars.

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