

# phytodiversity

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**, an approach to detect and analyse plant biodiversity by morphological, biochemical and molecular marker techniques, **phytochemistry** to exploit renewable plant substances for the chemical industry and **phytomining** to take advantage of plant metabolites and enzymes. An import element of this service package is **phytodiversity** to create plant biodiversity by intra- and interspecific hybridization.

**phytodiversity** enables us to exploit the genetic potential of natural biodiversity by modern biochemical and molecular biology technologies. For an **optimal exploitation** of the available potential, traits scattered in different varieties and even species should be combined within a single plant prototype. In order to develop new plant varieties with improved qualitative and quantitative traits, we apply somatic hybridization by **high efficient** electrofusion of isolated protoplasts.

**Somatic hybridization (SH)** means the combination of nuclear and cytoplasmic genetic information by fusion of somatic cells. Three forms of hybridization can be distinguished, namely intra-, inter- and intergeneric hybridization.

By **intraspecific hybridization**, protoplast fusion of sexual incompatible plants in one genus results in highly heterogeneous hybrids. These hybrids may reveal the "hybrid vigour", meaning improved growth characteristics based on the **heterosis** effect. By **interspecific hybridization**, the transfer of genetic

information from wild to cultivated species is of considerable interest for crop improvement. In most cases, however, it is hindered by incompatibility barriers. Protoplast fusion allows bringing about limited genes for example **disease resistance** from wild species into cultivars. Through **intergeneric hybridization**, combinations between distantly related species that are impossible by conventional crossing procedures can be realized. This may serve as bridges to transfer desirable new genes to species of interest.

**Modern methods** like **SH** enables us to use plant breeding in a sophisticated way beyond the limitations of the past. Phytowelt makes

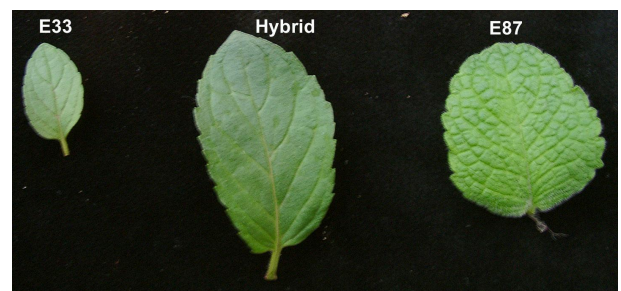


Figure 1: Example of **somatic hybridization**. The hybrid mint leaf (centre) is an intermediate of size, shape and texture of the parents.

use of **SH** for various species, e.g. of the genus *Solanum* or *mentha* (Mint). This allowed us to produce a high number of intraspecific **Mint hybrids** harbouring different **valuable economical traits** like increased biomass or enriched metabolites.

- Transfer of multiple genes and traits
- No need to identify and isolate specific genes or promoters
- Increase the number of chromosomes and to design polyploidal plants for increased yield
- New combinations of organelles, a restriction of classical breeding
- New combinations of organelles and nucleus, e.g. for cytoplasmic pollen sterility or increased photosynthesis rate
- Gene transfer beyond the restrictions of sexual reproduction
- Somatic hybrids are not considered as GMOs
- Market approval is not restricted by lengthy and costly GMO investigation

Box 1: Advantages of **somatic hybridization**

## **plantdustrial** – linking plant and industrial biotechnology

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