# ***phytodiversity*** – Our Protoplast Fusion

**Products by phytoinspiration** is the mission of Phytowelt GreenTechnologies. The ***phytodiversity*** technology platform is the central pillar of our plant tissue culture department. Around the knowledge of how protoplasts, single plant cells without cell walls, are isolated, fused and regenerated, Phytowelt offers numerous breeding accelerating services. Customers get the opportunity to obtain an unsurpassed number of crosses in the shortest possible time as well as to bring new genetic diversity into their breeding populations.

### ***phytodiversity*** – Added value through a combination of old and new technology!

We have developed a powerful platform for modern plant breeding! It is based on a long-established cell culture technique, protoplast fusion, and combined with our expertise in plant regeneration and state-of-the-art analytics. Depending on the breeding objective, the appropriate starting material is selected. From this, protoplasts, i.e. cells without a cell wall, are isolated and fused by means of e.g. electrical pulses, comparable to the natural fusion of germ cells (Fig.1). To obtain the desired plant from these cells, special know-how is required, and this is our core competence.

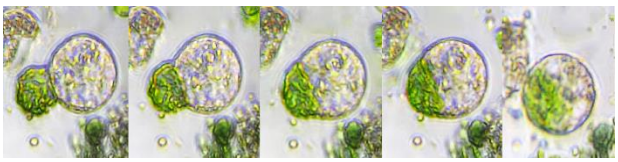

**Figure 1. Timeline of a protoplast fusion**

### Overcoming breeding obstacles with protoplast fusion!

This versatile tool offers wide-ranging applications and advantages over conventional breeding methods, e.g. accelerating the breeding of trees, vines and other species with long generation times. In addition, useful traits of hard-to-cross species can be combined.

### Use our regeneration systems!

Our established systems for plant regeneration from protoplasts, can be used in various ways (see also ***phytoediting***) and have been applied to more than 40 species of mono- and dicotyledonous plants, including medicinal, food, ornamental, fodder and energy plants. For example, we have introduced new resistance genes from wild potato species in cultivated potato varieties. Different resistant hybrids with an increased tuber yield have been selected. (Figure 2).

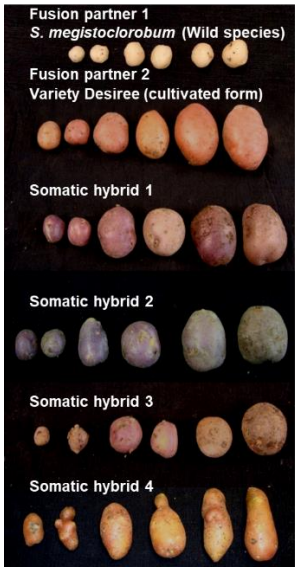


**Figure 2: New biodiversity by means of protoplast fusion: potato hybrids compared to fusion partners (Top: cultivar and wild species).**

In barley, we have successfully introduced new traits from related sweet grasses and developed a protoplast-based system for CMS transfer. In various mint varieties that can only be propagated vegetatively, we have expanded the gene pool by fusions with other species and improved quantitative (biomass) and qualitative traits (secondary metabolites).

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### Possibilities

- Barrier-free crossing
- Independent recombination of nuclei/organelles
- Polyploidisation
- Partial genome transfer
- Independence from generation cycle
- Crossing in asexual reproduction

### Customer Benefits

- New, unique trait combinations
- Editing CMS systems (hybrid breeding)
- Increasing biomass/yield
- Minimisation of crossing effort (backcrossing)
- Accelerated breeding (e.g. tree breeding)
- Optimisation of plants that can only be propagated vegetatively

In order to breed new polyploid poplar varieties for bio-mass production in short rotation coppices, we have successfully crossed eight different poplar and aspen species by protoplast fusion. Within only three years, Phytowelt has registered three new poplar hybrids. These new varieties show a significantly higher biomass increase compared to the parent plants.

**The history of our company is your advantage!** ***phytodiversity*** has been developed as an alternative breeding method to genetic engineering and opens up new possibilities to maximise the potential of your plants without being regulated by the Genetic Engineering Act. For this purpose, we can rely on already established systems or we can develop your specific platform.
Are you curious about this new technology? Then please contact us!

***phytodiversity***

- Accelerated breeding
- Overcoming crossing barriers
- Independent inheritance of nucleus and plastids
- Efficient single cell regeneration systems for diverse plant varieties and species
- Efficient systems for the transient introduction of editing constructs into plant single cells

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