HISTORY

Although Lallemand focused on the production of yeast for the North American baking industry in the early 20th century, by using the acquired knowledge and the technological assets in microbiology and fermentation as a base, Lallemand has come to serve the needs of other industries through the production of specialty yeast and bacteria, and their derivatives.

Through the acquisition of Verdera Oy in Finland and ITHEC in France, Lallemand has become an active proponent of biological plant care solutions by developing and producing fungal, bacterial and yeast biocontrol products, biofertilizers and biostimulants for application in forestry, agriculture, horticulture, turf management and consumer gardening.

PRODUCTION

Lallemand Plant Care specializes in supplying biological plant protection, biostimulation and biofertilization products that improve productivity and plant vitality, without releasing pesticide residues into the environment. Biological plant protection utilizes nature’s own methods for the prevention of plant diseases and pests. Pathogens are controlled by their natural enemies – microbes isolated from nature. Biostimulation is another method used to improve plant resistance to disease and stress. Studies are currently underway to evaluate the stimulation of natural plant defence mechanisms. Biofertilization optimizes soil resources to stimulate root growth, permitting better mineralization of the organic matter and solubilizing minerals already present in the soil, but in forms that cannot be assimilated by plants.

QUALITY ASSURANCE

Due to the unique nature of the organisms used in production processes, all Lallemand Plant Care products are developed in-house. Many of our products are based on traditional submerged liquid fermentation. Other products are grown using a solid-state fermentation method that has been developed and patented. Once the final product is ready, a series of rigorous tests is conducted to ensure the performance, purity and stability of our products.

Lallemand products contribute to ecological balance. They prevent the formation of resistant pathogen strains – a risk often associated with the use of plant protection products. They do not leave harmful residues in the plants or in the surrounding environment, and do not require a safety period between application and harvest.

RESEARCH AND DEVELOPMENT

New products are constantly being evaluated and developed for all areas of plant care, from greenhouse to golf course to the open field. Lallemand works closely and in concert with clients and academic institutions to maintain both technical and marketing advantages.

From biological plant protection product idea to final commercial product, biological and process development go hand in hand. Research on biological applications investigates rates and treatment methods on different crops under various cultivation and irrigation systems, while research on process development looks at fermentation and downstream processing, especially the drying of living microorganisms, process optimization, product formulation and the scale-up of production processes.
Lallemand is actively investigating and developing biological solutions for plant protection and nutrition, creating environmentally friendly solutions.

**FERTILIZERS, SUPPORTERS AND ENHANCERS**

**AGRICULTURE AND HORTICULTURE**

**Bioreveil**: Yeast derivative improves mineralization of organic matter and stimulates growth. Can be spread on ground, mixed with peat or fertilizers, or used as a seed coating treatment to improve crop yield.

**Cilus**: Based on specially selected soil bacteria, including *Bacillus* sp., it colonizes the region around the plant roots and secretes metabolites that enable a better uptake of plant nutrients, such as phosphorous and metallic ions. In addition, the bacteria help to exclude pathogens. The overall result is healthier plants with higher yields.

**Natural defences enhancer**: Based on a specially selected yeast extract that has exceptionally high levels of oligosaccharides. It improves natural plant defences (developed in French vineyards). It also shows increased levels of stilbenes.

**GlioMix**: Root inoculants that strengthen root systems and promote seedling growth.

**Greenstim / Bluestim**: A patented product, it is the most pure (97%) naturally occurring glycinebetaine. In plants, glycinebetaine acts as an osmoprotectant by adjusting the osmotic balance inside the plant cells and tissue. This anti-stress agent helps the plants overcome environmental stress situations, like drought, high and low temperatures and soil salinity.

**Rhizocell GC and Rhizocell C**: Both formulations are a mixture of Lallemand specialist inactive yeast strains and plant growth promoting rhizobacteria (PGPR). PGPR colonize the rhizosphere (the area surrounding the roots) using the plant root exudates as nutrients which, in turn, exclude potential pathogenic bacteria in a probiotic effect. PGPR solubilize phosphorous, stimulate root growth, secrete growth metabolites, chelate minerals for better uptake and also secrete natural mucagel (biofilm), which improves the soil structure through aggregate formation. Rhizocell GC is recommended for arable crops such as cereals, corn (maize), canola and sugar beets, while Rhizocell C is recommended for horticulture.

**Folwin**: Biostimulant that enhances yield and stress resistance.

**MYC**: The MYC range of products is based on the *Gliomus intraradices* species categorized as arbuscular endomycorrhiza. The fungal hyphae are able to penetrate the plant cell membrane (but not the protoplast), increasing the contact surface area between the hypha and cell cytoplasm to facilitate the transfer of nutrients between them. The mycorrhizal mycelia can access nutrient sources (such as phosphate, potassium and microelements) and make them available to the plants they colonize. MYC products are produced by a second generation bioreactor process enabling high and specific levels of viable spores to be produced without artefacts and plant debris.

**TURF MANAGEMENT**

Lallemand has produced commercial turf products since 2005 and now services golf courses in Belgium, Estonia, Finland and Sweden, with trials underway in Holland, Japan, Korea, Canada and South Africa. Lallemand has developed an integrated treatment program using natural micro-organisms or natural products. This is a year-round program that reduces the need for chemicals and hence pollution, closure periods, etc., and also the need for irrigation. The program uses:

**Verdera Turf PG**: Beneficial microbial liquid treats turf and lawns during colder seasons.

**Verdera Turf PS**: Beneficial microbial liquid treats turf and lawns during warmer seasons.

**Bioreveil** against slow early season growth

Antistress agents, such as **Greenstim** and **MYC**

**PLANT PROTECTION PRODUCTS**

**AGRICULTURE AND HORTICULTURE**

**Mycostop** and **Mycostop Mix**: Both biofungicides control seed- and soil-borne diseases, such as *Fusarium* and *Alternaria*. It has also been to be effective against *Pythium*, *Phytophthora* and *Phomopsis*. Both products are based on the naturally occurring and non-pathogenic Streptomycyes sp. K61, which is listed in Annex 1 to The EU Directive 91/414/EEC.

**Prestop** and **Prestop Mix**: Both biofungicides control foliar diseases such *Botrytis* sp. and also seed- and soil-borne diseases such as *Pythium*, *Phytophthora* and *Rhizoctonia* and *Fusarium*. Both formulations are based on *Gliocladium catenulatum* J1446, a naturally occurring soil fungus. It has been shown to protect plants against in foliar applications and also soil pathogens. *Gliocladium catenulatum* J1446 is listed in Annex 1 to Dir 91/414/EEC.

**POST-HARVEST**

Lallemand has developed of a number of yeasts for post-harvest treatment, primarily for the protection of pip fruit from such fungal pathogens as *Botrytis cinerea*, *Penicillium expansum* and *Muco priformis*. One of these products is based on *Cryptococcus albidus* and formulated under the name Yield Plus®.

**FORESTRY**

**Rotstop**: This biofungicide controls root and butt rot on conifers.

**NPV**: Bioinsecticide controls the European pine sawfly.

www.verdera.fr
www.ithec.fr