

## PROTECTING CROPS FROM SEED TO HARVEST: 100% plant-based solutions for the formulation of microbial products

### INTRODUCTION

With the rising demand from growers for greater sustainability, microbial-based products bring a strong alternative to conventional products in agriculture for plant protection.

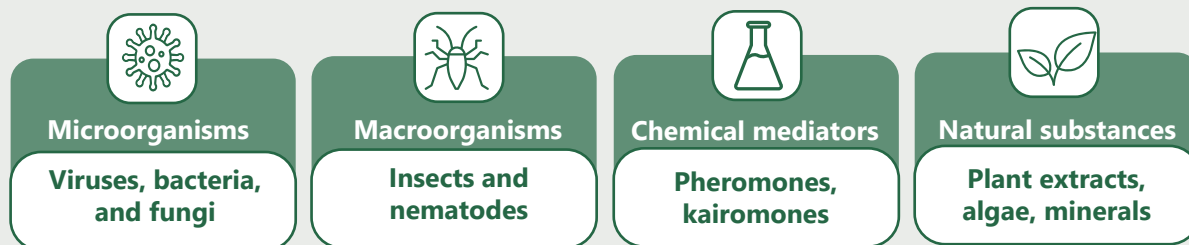
Developing a successful commercial biocontrol product from a promising microbial strain remains a substantial challenge. **The need is for formulations that are stable, cost-effective, high quality, and easy to apply, and that deliver consistent and marked improvement in the field.**

### HARNESSING THE POWER OF BIOCONTROL FOR SUSTAINABLE AND EFFECTIVE PEST MANAGEMENT

Biocontrol is the use of living organisms to control pests and diseases that affect plants, and it offers several advantages as a sustainable and environmentally friendly approach to pest management.

Biocontrol products can be highly specific to the target pest or disease, and they can be used in combination with other pest management techniques. Additionally, they have a shorter residual period than conventional pesticides, reducing the risk of pesticide buildup in soil and water.

The four categories of biocontrol products are microorganisms, macroorganisms, chemical mediators and natural substances.



### A DEDICATED RANGE FOR CROP PROTECTION

Roquette, a global leader in plant-based ingredients, has developed a range of plant-derived products that can be used to formulate and manufacture stable biocontrol products.

This portfolio includes GLUCIDEX® maltodextrins, MICROCEL® microcrystalline cellulose, and a range of polyols notably NEOSORB® sorbitol and PEARLITOL® mannitol.

In the development and manufacture of **stabilized microbial formulations**, Roquette products can act as the following:

- High-performance, biodegradable, readily soluble drying supports
- Water absorbent fillers that promote granule disintegration
- Binders, flow and extrusion aids, and compression agents to improve the efficiency of wet and dry granulation processes
- Stable fillers/bulk excipients with excellent biocompatibility
- Cryoprotectants for use in freeze drying applications
- Functional ingredients for the reduction of water activity

**PLANT-BASED CARRIERS FOR MICROBIAL DELIVERY**

Studies were conducted among our portfolio of plant-based ingredients to identify the most consistent and effective live microbial formulation for spray application. In one specific study, the formulation was required to be water soluble, or able to pass through sprayer nozzles, with a final microbial cell count of 10<sup>8</sup> CFU/g (Colony Forming Units/g).

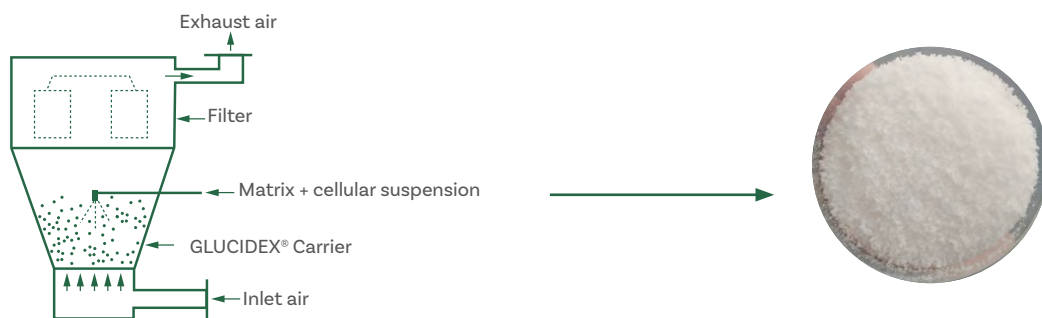


Figure 1: Schematic of a fluidized bed dryer set-up for microbial stabilization studies (left); an example product from the study (right).

The live culture was mixed with different stabilization matrices at concentrations of 10, 20 or 30% to produce candidate formulations and subsequently applied to an inert carrier, GLUCIDEX® IT 19 maltodextrin, using a table-top fluidized bed dryer (see figure 2). Figure 2 shows data from stability/viability studies of the resulting products, involving measurements of cell count over a period of 30 days.

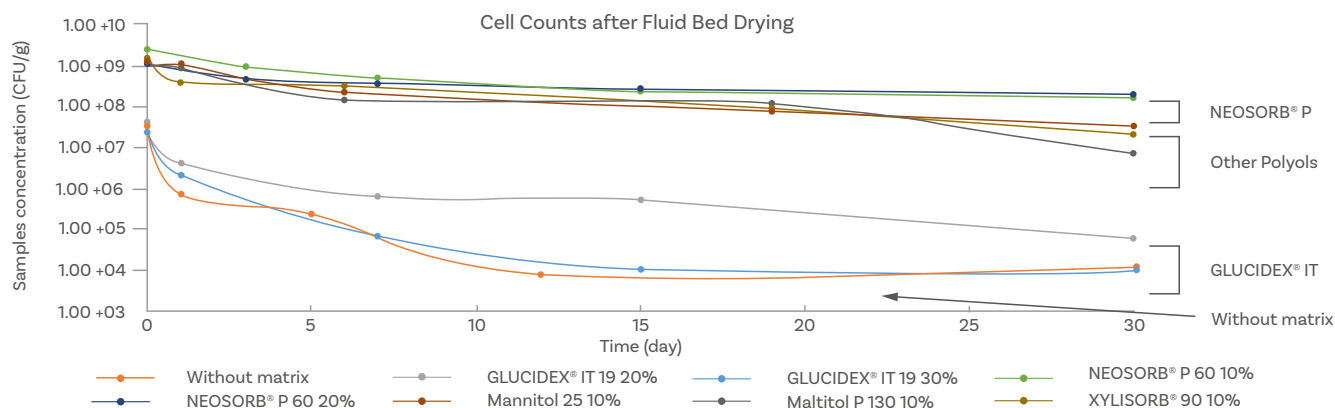


Figure 2: NEOSORB® P 60 sorbitol-based formulations exhibit optimal stabilization for this bacterial strain but other polyols also perform well and almost all matrices improve performance relative to the baseline “no matrix” case.

These results show that for this species and fluidized bed process, NEOSORB® P 60 sorbitol offers optimal performance, though the other polyols tested also perform well. NEOSORB® and the other polyols act as stabilization matrices that protect the bacteria during the drying process, as evident from higher Day 0 cell counts, and enhance stability.

Cell counts with NEOSORB® P 60 sorbitol are in excess of the 10<sup>8</sup> minimum at 30 days and relatively stable suggesting good shelf life, especially when compared with the formulation containing no matrix. No significant concentration effect is observed.

In summary, in this example, a formulation containing 20% NEOSORB® P 60 sorbitol, in combination with a GLUCIDEX® IT 19 maltodextrin as a carrier, produced a stable microbial product that maintained the required cell count throughout the 30-day test period. With a >93% dry matter content and good water solubility, this product meets all initial requirements.

**EFFECTIVE PLANT-BASED SOLUTIONS FOR BIOCONTROL FORMULATION**

Biocontrol solutions can help to deliver the land productivity required to feed growing populations while at the same time reducing reliance on synthetic products. Better stabilization and formulation is equally important when it comes to using them into the field.

Roquette offers a portfolio of plant-based products that formulators can use to develop products that are well aligned with the goals of microbial product use.

**A COMPREHENSIVE PLANT-DERIVED PORTFOLIO FOR BIOCONTROL AND PLANT CARE**

To find out more about our plant-derived products for plant nutrition and protection products and how they can help you formulate an optimized plant care solution for your needs, check our [website](#) and [contact us](#)

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