

# technical data sheet

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## ***Bacillus subtilis* FZB24® TB (dry coating)**

a plant growth-promoting rhizobacteria and biocontrol agent

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### **1. Introduction**

**FZB24® TB** is a natural product containing *Bacillus subtilis*-spores, a non-pathogen microorganism occurring naturally everywhere in the soil.

Several strains of *Bacillus subtilis* are clearly defined as natural and not genetically modified strains of *Bacillus subtilis*, which are selected out of different strains because of its broad spectrum of activity and used as plant growth-promoting rhizobacteria and biological control agent for the control of various soilborne diseases.

Following effects could be observed:

1. improved germination
2. improved rooting of plants
3. improved yields, height or blowing
4. earlier yield or blowing
5. higher vitality of plants
6. reduced disease intensity and frequency
7. delay on-set of disease

### **2. Physical Properties**

The formulation **FZB24® TB** is an insoluble powder containing living spores with  $\geq 1 \times 10^9$  cfu/g (culture forming units per gram). The carrier of the formulation is talc with about 98 % of weight.

The formulation is stable for more than three years at 20 °C. Please keep it dry and in well closed packing on storage.

### 3. Toxicology

Different biological studies for *Bacillus subtilis* FZB24<sup>®</sup> used as biocontrol agent including acute toxicology studies and ecotoxicology studies showed no harmful effects (studies on FZB24 are available).

Neither phytotoxic nor phytopathogenic effects were observed in greenhouse and field trials in Germany.

### 4. Biological Activity

*Bacillus subtilis* FZB24<sup>®</sup> stimulate the growth of roots, increase the tolerance against abiotic stress and the yeald of plants.

Studies for the mode of the PGPR actions of *B. subtilis* strains have shown that mechanisms are based due to a hormonal push on plant growth by released bacterial precursors of auxins and other compounds related to plant growth hormones and biofertilizing effects exerted by the activity of the enzyme phytase.

*Bacillus subtilis* FZB24<sup>®</sup> is a biological control agent active against a wide range of soil pathogens (fungal and bacterial), tested *in vitro*:

- *Alternaria* sp.
- *Botrytis cinerea*
- *Curvularia radicola*
- *C. inequalis*
- *Fusarium avenaceum*
- *F. culmorum*
- *F. oxysporum* f.sp.callistepi
- *F. oxysporum* f.sp.cucumerinum
- *F. oxysporum* f.sp.dianthi
- *F. oxysporum* f.sp.gerberae
- *F. oxysporum* f.sp.gladioli
- *F. oxysporum* f.sp.lycopersici
- *F. oxysporum* f.sp.narcissi
- *F. oxysporum* f.sp.tulipae
- *Gaeumannomyces graminis*
- *Gerlachia niveale*
- *Phoma chrysanthemi*
- *Phomopsis sclerotioides*
- *Phytophthora cryptogea*
- *Pyrenochaeta lycopersici*
- *Pythium ultimum*
- *Rhizoctonia solani*
- *Sclerotinia sclerotiorum*
- *Stromatinia freesia*
- *Verticillium albo-atrum*
- *Corynebacterium michiganense*
- *Erwinia carotovora*

**but not against:** *Pseudomonas fluorescens*, *P. putida*

In soils with high moisture or a high humus content or high microbial activity the efficacy of *Bacillus subtilis* can be reduced.

Various combinations with fertiliser and fungicides showed additional effects indeed.

## 5. Application

The formulation **FZB24® TB** is useable for seed coating and mixing with soil.

### Seed coating:

- For dry seed coating use - 200 g **FZB24® TB** per 100 kg seed (potatoe)
- 5-15 g **FZB24® TB** per kg seed (vegetables, ornamentals, flower bulbs)

### Mixing with soil:

200 – 250 g **FZB24® TB** will be well mixed with 1 m<sup>3</sup> soil before use the soil for planting.

## 6. Safety Precautions

Wash hands and exposed skin before eating, drinking or smoking and after work.

Keep it far from food and children.

## 7. Disclaimer

The uses as described have not necessarily been approved by any regulatory authority.

This Technical Data Sheet in no way constitutes a recommendation to apply *Bacillus subtilis* for unregistered uses.