



## 1. Introduction

**FZB24® 24 I.** contains spores of *Bacillus amyloliquefaciens*, a non pathogen microorganism occurring naturally everywhere in the soil.

The strain *Bacillus amyloliquefaciens* FZB24 is clearly defined as natural and not genetically modified strain of *Bacillus*, which is selected out of different strains because of its broad spectrum of activity and used as plant growth-promoting rhizobacteria and biological control agent for control of various soilborne diseases.

The formulation **FZB24® 24 I.** is a water based liquid formulation containing living spores with  $> 2.5 \times 10^{10}$  cfu/g (culture forming units per gram) and 20 % preservatives.

Following effects could be observed:

1. Improved germination
2. Improved rooting of plants
3. Improved yields, height or flowering
4. Earlier yield or flowering
5. Higher vitality of plants
6. Reduced disease intensity and frequency

## 2. Application rate

Always apply the product diluted. The application rates indicated are recommended values. The application is to adapt the technological procedure.

potatoes	500 ml/ha	
corn	200 ml/ha	
strawberries	1,0 L/ha	
salad	350 – 500 ml/ha	
tomatoes, cucumbers	1,0-2,0 L/ha	2x
carrots, kohlrabies	350 – 500 ml/ha	
ornamental plants	1,0-2,0 L/ha	2x
flower bulbs	1,0-2,0 L/ha	
seeds	100 – 500 ml/ha /100 kg (dependent on size of seeds)	
herbs	1,0-2,0 L/ha	
lawn	1,0 L/ha	2x

## 3. Mode of action

**FZB24® 24 I.** contains living spores of *Bacillus amyloliquefaciens*, which germinate in contact with growing plant roots which will be colonised if soil moisture is enough and temperature about 10°C and more.

Substances produced by *Bacillus amyloliquefaciens* FZB24 stimulate the growth of plants, increase yield and induce plant resistance against stress and pathogens. In soil no direct activity of these substances against pathogens (fungal and bacterial) could be indicated.

**FZB24® 24 I.** has a preventive, but not a curative activity. The use of **FZB24® 24 I.** is more effective after soil disinfection or when the infection risk is low.



## 4. Application

The liquid formulation of **FZB24® 24 I.** is easy to use.

Shake the bottle and put the product into water, then stir it and clean the bottle.

The ready for use solution should be applied immediately within 2 hours or it must be stirred.

Use the solution within 8 hours.

This formulation is for soil application – not recommended for foliar application.

### ORNAMENTALS, VEGETABLES, OTHER CROPS – drench application

**IN SEEDBEDS OR CUTTINGS** 0,02 % (2 ml / 10 Litre water), drench or spray suspension with max. 1 l/m<sup>2</sup> before or just after sowing, planting or other plant setting forms on moist soil

**IN ESTABLISHED CULTURES** 0,04 % (4 ml / 10 Litre water), drench or spray suspension with max. 2 l/m<sup>2</sup> before or just after sowing, planting or other plant setting forms on moist soil. It is recommended to have a first application on seedling production with a small amount of solution.

Depending on crop repeated applications (after 2-4 weeks) can be useful (max. 2 x).

**SEED TREATMENT** 2 – 5 ml per kg sand

- dip seed into a small amount of solution for 15 – 30 min
- spray solution on seed and then retry it

**TREATMENT IN HYDROPONICS** 0,02 % (0,2 ml / litre water), drench young plants (rockwool cubes) with 0,1 – 0,5 l suspension. It is recommended to have a first application on seedling production with a small amount of solution.

or 0,02 % (200 ml / 1000 litre nutrient solution), drench young plants about 7 days before planting and 1 to 14 days after planting.

Depending on crop repeated applications (after 4-6 weeks) can be useful (max. 2 x).

### Potatoes

Against *Rhizoctonia solani* and *Streptomyces scabies*

**Dip-treatment before planting** 0,2 % (2 ml / litre water), approximately 14 days before planting seed potatoes (stimulated for germination) will dip into a solution for about 20 – 30 minutes, dry the tubers on air before planting



Spray-treatment before planting	200 ml per 3 -5 l water per ton tubers, spray the tubers with a solution while out-of store on conveyor belt
Spray-treatment during planting	500 ml per 80 l water per ha (10.000 m <sup>2</sup> ), tubers (stimulated for germination) should be sprayed during planting as a row-spray or in furrow-spray. It is important, that the surface of seed tubers is wetted 100 % with solution.

## 5. Toxicology

Biological studies on various *Bacillus subtilis*/*amyloliquefaciens*-strains used as biocontrol agent including acute studies and aqua toxicology studies showed no harmful effects.

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

## 6. Biological Activity

*Bacillus amyloliquefaciens* FZB24 stimulate the growth of roots, increase the tolerance against abiotic stress and the yield of plants.

Studies fort he mode oft he PGPR actions of *Bacillus amyloliquefaciens* 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 oft he enzyme phytase.

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

Vorios combinations with fertilizer and fungicides showed additional effects indeed.

## 7. Safety Precautions

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

Wear respiratory protection when handling powders or very volatile materials or spray overhead.

Keep it far from children.

Read the Material Safety Data Sheet.

## 8. Transport information / storage information

### Transport:

No special demand.

### storage:

Keep it far from children and unauthorised persons.

Do not store it together with food, pharmaceutical or fodder.



The Formulation is stable for more than one year at 20°C, if not opened.  
Store it dark and cool.

In combination with chemical substances the stability is not proved and no guarantee is given.

## **9. Waste disposal**

Do not use empty packaging again.  
Dispose of empty and swilled packaging in compliance with administrative regulations.

## **10. Disclaimer**

The uses as discibed have not necessarily been approved by any regulatory authority. This Technical Information sheet in no way constitutes a recommendation to apply *Bacillus amyloliquefaciens* for unregistered uses.