www.freudenberger.net

Coated Seed

Enriched seed – for over 40 years

FELDSAATEN · FREUDENBERGER ·

OUR NEW COATED SEED

Water Efficiency during Climate Stress

COMPONENTS & CLIMATE STRESS

Every new generation of Coated Seed aims to find potential areas for improvement in the product itself while also tackling new challenges. In recent years, these challenges have predominantly been due to climate stress caused by lengthy periods of extreme heat. Consequently, one of the main areas of focus has been the search for coating components that have a positive effect on water use efficiency. Naturally, any change to the Coated Seed formula must retain all of the benefits of earlier iterations.

SAVE WATER RESOURCES

Using Coated Seed during increasingly prolonged dry periods should help ensure that the extremely limited water supply, often only available for short periods, is absorbed quickly and efficiently and passed along to the seedling as needed. This makes it possible to continually and sustainably improve existing stands or to sow new crops in spite of prolonged droughts.

IMPROVE WATER EFFICIENCY

Periods of warm weather in recent years have led to a spike in the use of irrigation on private land. At times, uneven or compacted soil can result in the formation of small puddles, resulting in improper alignment of the irrigation systems. Coated Seed can also protect against the effect of standing water in these conditions, serving as a buffer and ensuring reliable germination in spite of the saturated soil. The use of Coated Seed has advantages for new plantings (e.g. lawns) as well as for reseeding.

ADVANTAGES OF COATED SEED OVER UNCOATED SEEDS

FEATURES OF THE NEW COATED SEED

- Considerably **greater water use efficiency** in dry and wet conditions
- **Active seedling acceleration** (greater germination speed) and consistently **higher germination rates** (improved germination capacity) through the use of biostimulants

- Even seed distribution and homogeneous field emergence
- Higher emergence rates through improved soil contact
- Optimal early development of seedling
- Improved protection against abiotic (non-living) environmental hazards
- Improved clay-humus complex formation
- After breaking down, the material can be fully absorbed by plant roots
- Adjusted pH value
- Controlled release effect
- Long-lasting improvement to soil structure
- Low disease susceptibility and heightened resilience through vitalization of the young plants
- Harmless to humans and animals

UNCOATED VS. COATED SEEDS

EVAPORATION VS. WATER ABSORPTION

ENRICHED SEED

Individual, safe, high performance

The in-house production of Coated Seed at Freudenberger now represents a key element of modern seed technology. At the dawn of this era, more than 40 years ago, current Managing Director Manfred Freudenberger conducted the first trials, developing a product that enabled improvements in seed flow and storage.

A process of continuous development
Since then, Coated Seed has been steadily enhanced and refined to meet a wide variety of challenges, especially those related to climate change. This is done through an ongoing process of choosing and integrating beneficial coating compounds with a constant view to improving the overall end product without having to give up on any of the existing benefits.

New components, improved characteristics
The year 2020 brought yet another breakthrough in the development of the formulation. This time, the use of biostimulants was one of the main drivers of innovation. The innovative Coated Seed composition considerably improves water use efficiency, total germination rate, germination speed and plant vitality at germination. Numerous greenhouse and field trials show significantly faster germination across crops, as well as a 5-10% increase in the total germination rate compared to uncoated seeds. Germination speed varies by species: for example, germination and early development tend to be extremely slow and challenging in smooth-stalked meadow grass, lasting around 21 days. With the new Covered Seed formulation, this rather lengthy phase can be shortened by up to six days. These innovations make the difference in terms of competitive vigour when planting seed mixtures.

Tailored to every intended use
Whether it's individual colouration, variation in the coating thickness or the addition of different supplements, the sky is the limit when it comes to meeting customer requirements. With ongoing product development, new ideas and new challenges, we'll find a solution for every intended application.

Our Coated Seed Bio, Classic and Rhizo are approved for organic cultivation.

THE HISTORY OF COATED SEED

2007
Opening of the new production plant by Agriculture Minister Eckhard Uhlenberg in Krefeld (Germany)

2010
Organic Certification for Coated Seed and the production of the first organic seeds as Coated Seed Bio

2011
Innovation prize from the city of Krefeld for research in the area of seed technology and the development of Coated Seed

2014
Introduction of Coated Seed Vital with natural microorganisms for natural vitalization

2015

Breakthrough with the use of germination accelerators in Coated Seed for various species

2017

Combination of the components of different Coated Seed varieties

2018

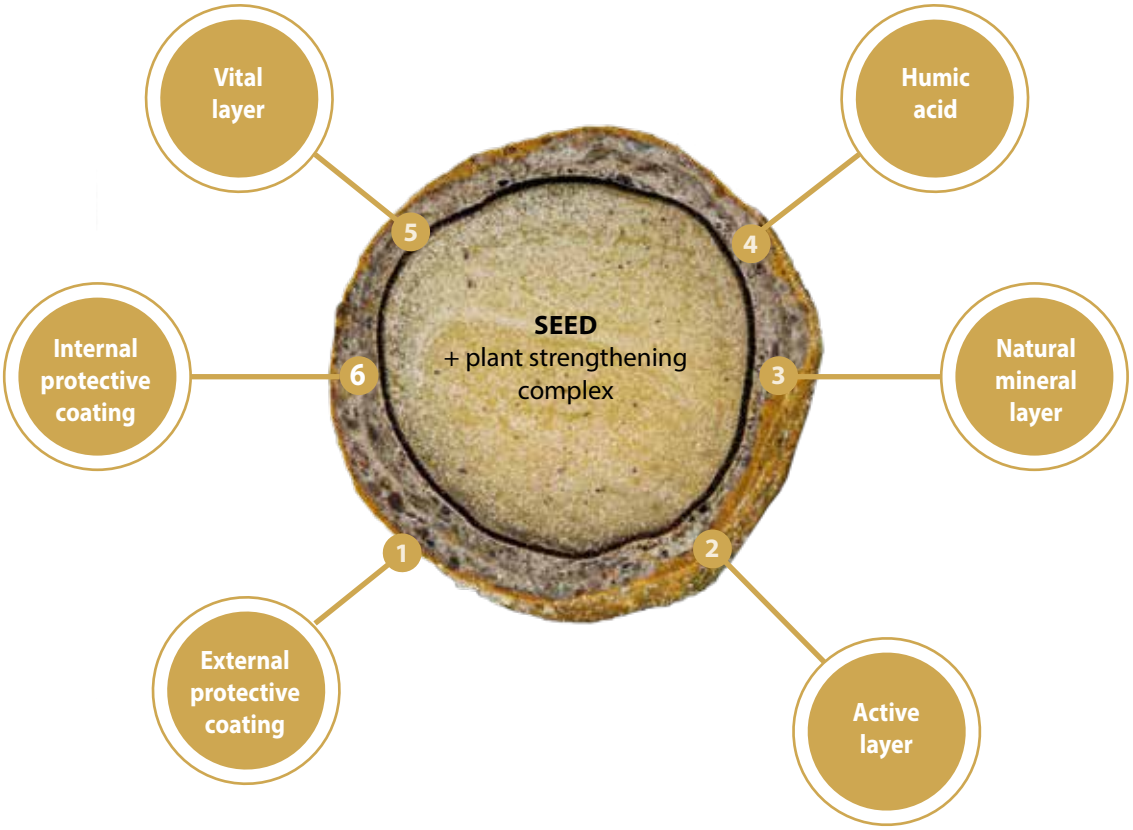
Entry of Coated Seed on the FiBL list, expansion of the supplements used

2020

Improved base formulation for all Coated Seed varieties for increased germination rate and speed

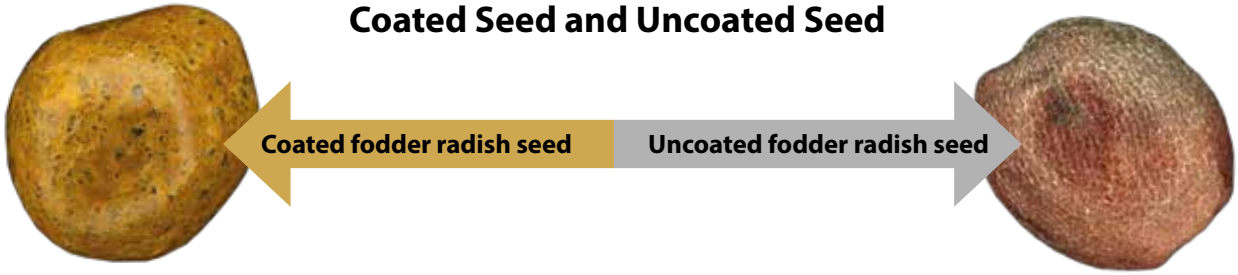
COMPOSITION OF THE COATING

Coated Seed: A Cross Section



MAGNIFIED VIEW

Coated Seed and Uncoated Seed



Coated Seed can be visually distinguished with ease from uncoated seed, even though the coating does not change the seed's basic shape. It is also possible to add specific colouration to the coating as well as varying the coating thickness or adding different supplements. The coating process gives the seed a smoother surface than an uncoated seed. This increases seed flow when Coated Seed is used, with the seeds simply sliding down into the soil. The smooth surface of Coated Seed also helps avoid seed bridging in the sowing machine.

COATED SEED VARIETIES

The right coating for every use

The basis of all **Coated Seed varieties**

With the **microorganisms** *Bacillus sp.* and *Azospirillum sp.* for natural vitalization

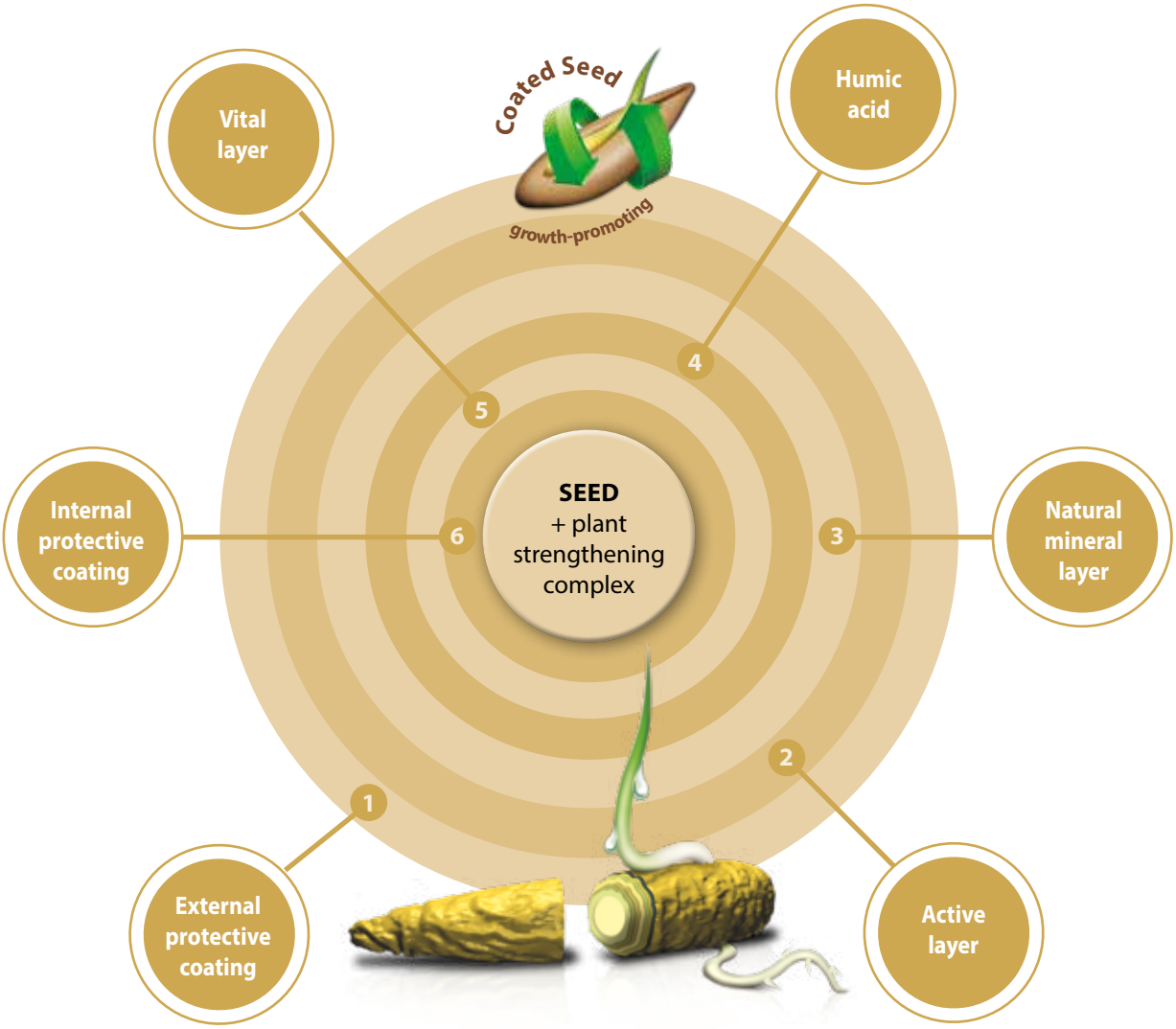
Supplemented with **rhizobia** inoculation for faster nitrogen fixation by legumes

With **organic certification**

COATED SEED CLASSIC

A smart shell with substance

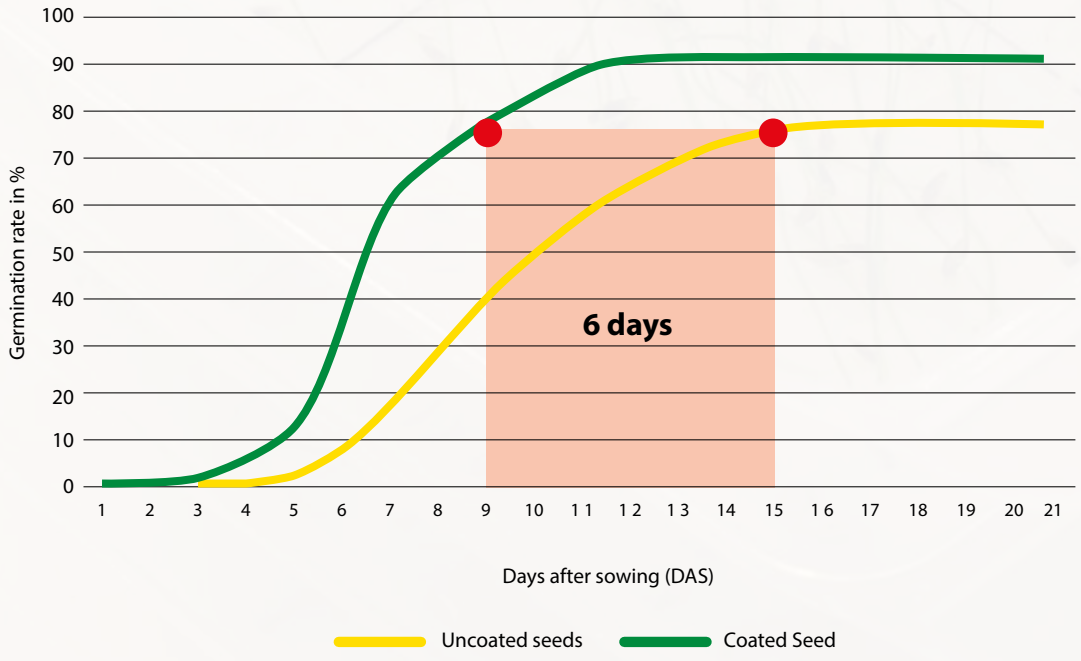
The classic Coated Seed consists of seeds coated with essential substances that promote germination. The coating is made up of several components, including calcium carbonate for pH regulation and various rock meals. In addition, macro- and micronutrients form important components of Coated Seed. Coated Seed can be visually distinguished with ease from uncoated seed, even though the coating does not change the seed's shape. The advantages of the coating apply to both individual seeds and seed mixtures, regardless of whether they are sown manually or mechanically. Soil preparation measures are not necessary on sites with extreme topography, which are difficult or impossible to cultivate (e.g. embankments and other sloping terrain).



THE ADVANTAGES OF COATED SEED CLASSIC AT A GLANCE

- Higher emergence rates thanks to better soil contact
- The coating can quickly absorb available water and give it up to the seedling as needed
- Improved establishment on challenging sites
- Best early development through optimal supply of nutrients to the seedling
- Easy sowing and even seed distribution thanks to improved flow
- Lower feeding damage by birds and rodents
- Uniform seeds allow for precise seed placement
- The plant health booster promotes health and increases the resilience of young plants
- Coated Seed remains securely in place – protection against seeds being carried away by wind
- Enhanced visibility simplifies visual control
- Coating can be individually coloured
- Easier reseeding since the smooth surface of the Coated Seed allows it to slide down to the ground

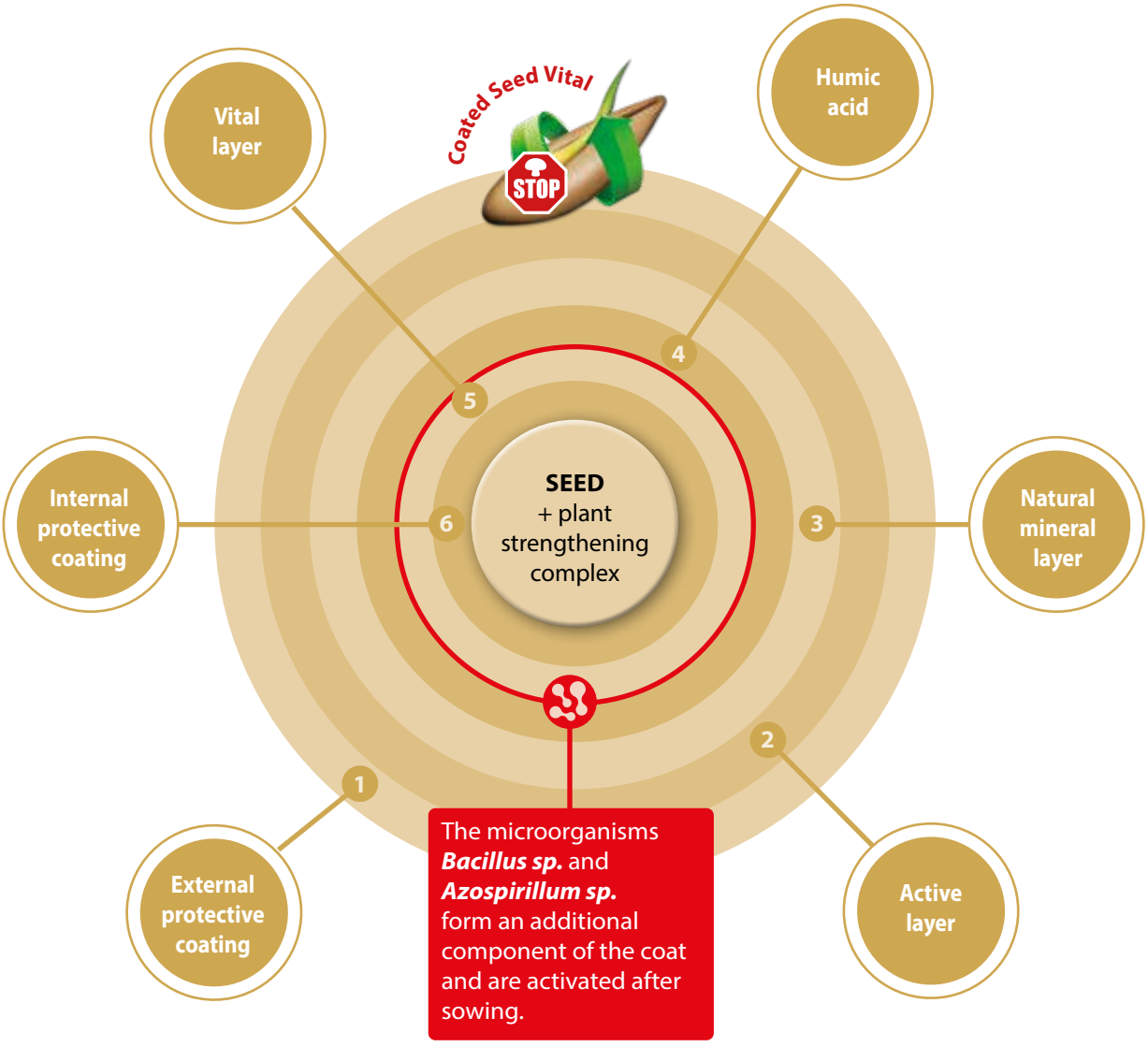
Germination speed of *Poa pratensis* up to 21 days after sowing



COATED SEED VITAL

Increases vitality of young plants

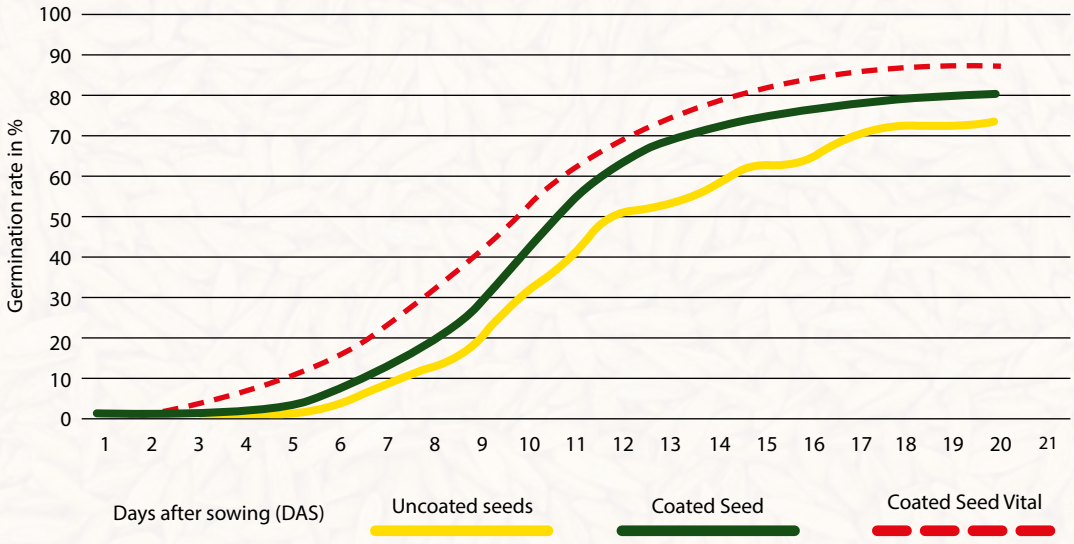
The growth-promoting microorganisms in Coated Seed Vital are activated as soon as the seed comes into contact with an adequate amount of moisture. Therefore, the rhizosphere can be colonized as early as possible. This creates optimal conditions for the interaction of root and microbiome throughout the life of the plant. The bacteria can help to stimulate the immune system of the plant and the root hair formation and to improve the absorbability of essential nutrients and minerals. Seedlings strengthened in this way are also better armed against adverse environmental conditions/abiotic stress factors due to beneficial microbial processes. The use of Coated Seed Vital can minimise losses and a vital stand can establish itself. Furthermore, the seed coatings also contain essential substances that strengthen the plants. The coating thickness can also be varied to accommodate variety-specific needs, match the thousand grain weight (TGW) of seed mixtures or ensure an even distribution when sowing.



THE ADVANTAGES OF COATED SEED VITAL AT A GLANCE

- In addition to its classic components, Coated Seed Vital contains a mixture of effective strains of *Bacillus sp.* and *Azospirillum sp.*
- Spores are highly stable and resilient and can grow even after long storage periods
- Established plants also benefit from *Bacillus sp.* and the addition of *Azospirillum sp*.
- More efficient nutrient use thanks to a more pronounced root system
- All of the advantages of Coated Seed Classic!

Average germination capacity of a grass mixture up to 20 days after sowing



COATED SEED RHIZO

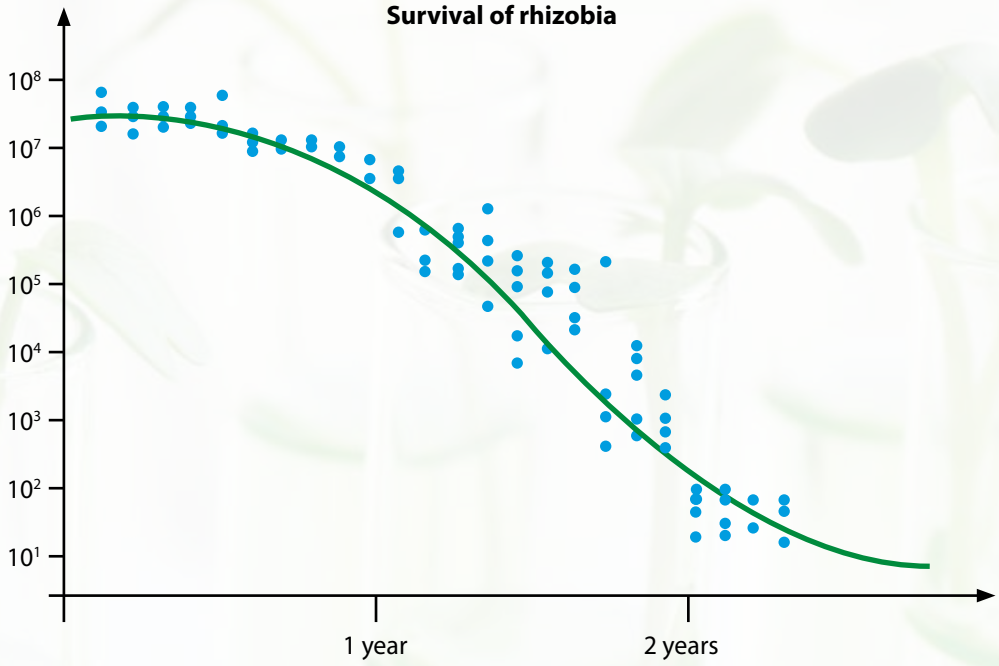
Coated seeds inoculated with rhizobia

Coated Seed Rhizo contains specific rhizobacteria or rhizobia strains that are adapted to the particular plant species. This means that all legumes have the correct rhizobia strain for peak performance. Legumes are only able to turn the nitrogen in the soil air into plant-available nitrogen with the help of nodule bacteria. These bacteria live in a symbiotic relationship with the legumes. As soon as the plant forms its first root hairs after germination, it excretes substances into the soil which attract bacteria. The bacteria then penetrate the root hair and form the first nodules. In the nodule, the bacteria receive the nutrients produced by the legume. In return, the bacteria take the atmospheric nitrogen from the soil and turn it into a plant-available form, which the plant can then use. The closer the nodule bacteria are to the emerging root hairs, the faster a nodule is formed.

THE ADVANTAGES OF COATED SEED RHIZO AT A GLANCE

- Immediately ready to use, simple and straightforward handling
- Higher yields than untreated seeds
- Rapid symbiosis through direct contact with the seeds, resulting in fast nitrogen fixing
- No additional use of any agricultural machines or prior inoculation required
- Individual colouration for simplified visual control
- All of the advantages of Coated Seed Classic!

Survival of rhizobia



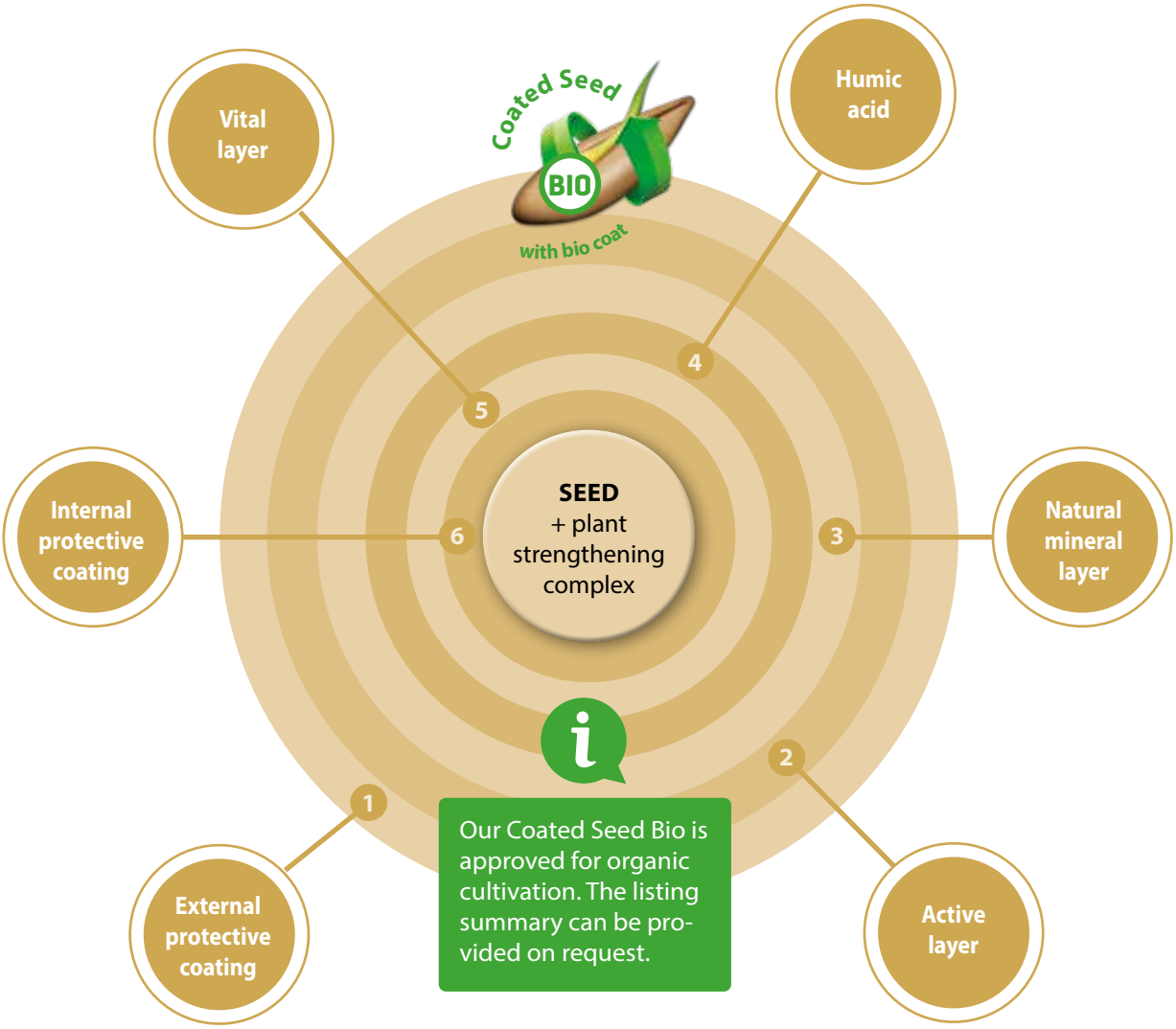
Nodule formation with (left) and without inoculation (right) in white clover

COATED SEED BIO

The coating for organic farming

The root formation in fodder radish from uncoated (left) and coated seed (right) compared at the same time after sowing.

Considerable advance in the growth of phacelia grown from coated (right) and uncoated seed (left) 25 days after sowing.



THE ADVANTAGES OF COATED SEED BIO AT A GLANCE

- Suitable for application on organic seeds
- Increased competitive vigour against weeds
- Natural components – suitable for use on organic operations
- Significant advantages over competing products, especially in dry conditions
- Especially beneficial during heat waves and droughts
- Water storage capacity 100 times higher
- Improved plant health thanks to the use of a plant health booster
- Unique on the market
- All of the advantages of Coated Seed Classic!

> The long periods of extreme heat seen in recent years mean that plants are coming under water stress like never before. Coated Seed offers options to counteract these effects. By using special coating components and effective biostimulants, the germination of the seeds and the establishment of seedlings can be reliably improved. This means that greater performance than conventional seeds can be attained even under conditions of water stress.

Interested in purchasing a product?

Feel free to contact our sales team!
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