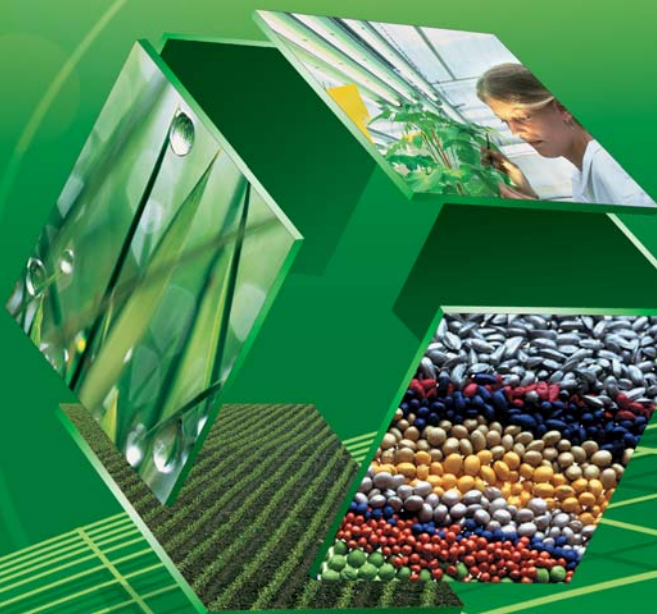


# Innovative Seed Treatment

 Advanced  
Seed Treatment  
Technology



Bayer CropScience

## Seed treatment – protection from the first day onwards

A plant seed contains all the genetic information needed for the growth of the plant since all the substances needed for germination and early growth, such as proteins, fats, carbohydrates and vitamins, are stored in the seed grain. This is what makes seed so valuable for breeders and farmers. A seed could perhaps be described as an unprotected “energy pack”. But this is what makes it such a rewarding target for pests and diseases which are also interested in getting their share of the nourishment provided.

The ancient Egyptians and Romans already had the idea of protecting plant seeds against pests and diseases by dipping the grains in an onion brew to disinfect them before sowing. Methods available nowadays are more effective. To ensure that the seeds are protected from the very first day onwards, a highly precise method is used for subjecting them to direct treatment with plant protection products.

Of all the uses to which plant protection products are put, seed treatments are one of the most specific, environmentally friendly and economical.

## When were chemical seed treatment products introduced?

Bayer can already look back on ninety years' experience with seed treatment products. A large part of the technical development was associated from the very beginning with the name Bayer – and Bayer CropScience is the market leader in this area. The first products based on mercury were introduced in the early 1900s as seed disinfectants. Modern seed treatment products aimed specifically against fungal pathogens or insect pests were introduced in the 1970s and 1980s, and the seed treatment range of Bayer CropScience now includes many high-performance products enabling pests and diseases to be efficiently and economically controlled in all key crops.



“The seed is valuable  
for breeders and farmers.”

## What is the effect of seed treatment?

The seed treatment is effective as soon as it's applied, disinfecting the seed surface, but it starts its major role shortly after sowing. The product forms a protective coating directly round the seed grain, forming a "protective zone" of active ingredient against insect pests or fungal pathogens in the soil. The seed can now germinate undisturbed. Many of these active ingredients can also be taken up by the roots during germination and in this way protect the growing plant "from the inside out" against pests and diseases.

## Why are seed treatments so progressive and environmentally friendly?

Protection of the environment is one vital motive for Bayer CropScience to continue developing new products and methods for seed treatment. The total amount of product needed to protect the plant is much lower than that used for spray treatments. A model calculation makes this clear: When plant protection products are sprayed, the field is treated over its entire area. This means 10,000 square metres for a field of one hectare. If the seed alone is treated, the same effect is obtained with less product, since the treatment is confined to the surface of the seed. With seed treatment, therefore, only 60 square metres come into contact with the product, i.e. one percent of the corresponding field area. But the seed treatment alone cannot protect the plant from all fungal or insect attacks, especially in the later stages of growth, which is why foliar applications are also necessary.

Seed treatment takes place under controlled conditions, often in closed systems, which are not only independent of the weather but also safer for health, because the user does not come into direct contact with the substance during application. It would be hard to imagine a more effective and environmentally friendly method of pest and disease control.

Seed treatment has become common practice mainly in crops from high-grade seed which involve intensive production methods. Treatment with insecticides and fungicides are among the standard methods used in cotton, sugar beet and market gardening. In many regions of the world the cultivation of wheat, barley and maize would no longer be considered possible without seed treatment.



**"The growing plant is protected against pests and diseases."**



## What diseases are seed treatment products used against, and in which crops?

Experts distinguish between pathogens which are transmitted via seed, soil and wind. Bunt, smut and fusarium fungi are just a few of the most dangerous diseases of cereal grains, causing yield losses of up to 60 percent. Typhula rot pathogens live in the soil and are a serious threat to crops such as winter barley. Powdery mildew is a wind-borne pathogen which threatens barley and wheat.

Seed treatment products ensure effective protection against fungi in all extensively cultivated crops.

Direct application of suitable fungicidal compounds to the seed has the effect of disinfecting the seed surface, controlling pathogens in the grain and protecting roots and young plants against infestation

## Why are seed treatment products for pest control so important economically?

Insecticidal compounds control biting and sucking pests on roots, stems and leaves. They account for just under half of all seed treatment products used today.

Scientific studies have shown that pest control is indispensable in modern agriculture. For example, failure to carry out pest control would result in harvest losses of up to 30 percent in maize crops. One of the particularly dangerous maize pests is the wireworm. This gets to work on the shoot, leading either to the death of the plant or at least to considerable disruption of its further growth. Seed treatment can ensure undisturbed germination and growth for 90 percent of the maize seed. In the USA, the western corn rootworm, is the major economic pest of maize, the larvae of which feed on the roots of the plant causing considerable damage.

Good overall protection during the early growth phase – including the use of specially tailored combinations of fungicidal and insecticidal compounds – results in healthy, vigorous plants which tolerate stress situations better and thus contribute towards considerably higher harvest yields. In many cases such treatment can even have a favourable effect on the quality of the harvested crops, since these are no longer contaminated with fungal spores which produce harmful toxins. In this way seed treatment is also of benefit for consumers by making their food safer. Moreover, seed treatment offers farmers many advantages such as fewer spray applications, a reduction in agricultural machinery and attendant maintenance costs, and considerable time saving, all of which help to increase income. For these reasons, progress in agriculture is bound inseparably with the development of modern seed treatment products.



“Good overall protection during the early growth phase.”

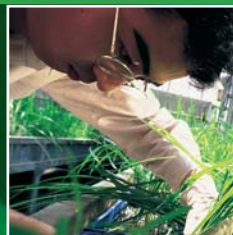
# Seed protection competence at Bayer CropScience



This particular type of application makes specific demands on the technique used for applying the product to the grains, and on the formulation of the active ingredients, i.e. the composition of the plant protection product(s) used. Seed treatment is carried out professionally and mostly in large-scale plants, where the active ingredient is distributed evenly and with extremely high precision over the seed. Modern seed treatment plants can treat cereal grains at a rate of up to 25 tonnes per hour.

Exact dosing is the key to success in seed treatment, and application technology enables this process. Through its Seed Treatment Application Centre in Monheim and Ceres Seed Technology, in Mereville, France, Bayer CropScience offers specialist application machinery advice and polymer based filmcoating products respectively. Filmcoating products improve the adhesion of the seed coat and significantly reduce dust emissions associated with the treatment and planting processes.

As the leading seed treatment company, Bayer CropScience throughout the world offers its customers technical support to ensure precise application. Bayer CropScience is a competent partner for farmers, thanks not only to its long experience but also to a comprehensive service package centred round seed treatment practice. The Bayer package is built up through a number of elements – an extensive product portfolio, advice on the right product for seed treatment, and detailed technical support for exact calibration of the equipment. It also includes a check on the success of the treatment. The quality of the treatment is analysed with state-of-the-art technology in the laboratories of Bayer CropScience. These analyses are an important factor for ensuring the required quality standards.



“Bayer CropScience is a competent partner in seed treatment for farmers.”

## What active ingredients are most often used?

Bayer CropScience supplies more than 15 active ingredients which enable efficient and economic pest and disease control in all major crops.

The greatest harvest losses in many crops are caused by insects, and successful agriculture depends largely on their effective and early control. Three insecticidally active ingredients widely used for the treatment of maize, cotton, cereals, sugar beets, oilseed rape or millet are imidacloprid, methiocarb and thiodicarb. These offer protection against pests such as wireworms, which damage the plants via the roots, or sucking insects such as aphids. Sucking insects can also cause considerable economic damage by transmitting virus diseases to plants. Imidacloprid is the biggest selling seed treatment active ingredient in the world.

With its fungicidally active ingredients tebuconazole, triadimenol and fluquinconazole, Bayer CropScience has for many years been offering farmers effective products which have found widespread use all over the world.

## New products

Clothianidin, an active ingredient which provides highly reliable control of all major pests in maize, was first introduced by Bayer CropScience in New Zealand and the USA in 2003. For the first time it became possible to use a seed treatment as an effective means of controlling the western corn rootworm, the most important maize pest in North America. This pest found its way a number of years ago into the Balkans, and is now advancing gradually towards Central Europe. Clothianidin is effective not only in maize, but also in oilseed rape, cereals and sugar beet, against all major early pests which threaten both the seeds and the young growing plants.

Bayer CropScience has also a number of new fungicidal and insecticidal active ingredients with improved biological profiles in the pipeline, which will help to step up progress in future seed treatment technology. For protection against fungal pathogens in cereals, Bayer CropScience recently developed the active ingredient prothioconazole, which will become available to farmers from 2005 onwards for use especially in wheat and barley. With its virtually complete spectrum of action, prothioconazole offers a new dimension in the control of fungal pathogens.

Once again, Bayer CropScience has made a major contribution to the development of efficient and environmentally friendly seed treatment products.



“Bayer CropScience has for many years been offering effective products which have found use all over the world.”

# More information required?

## Seed Treatment

- Bayer CropScience / Giving a crop the right start

[www.bayercropscience.com](http://www.bayercropscience.com)

- Bayer CropScience / Courier: Bayer  
90 years experience of seed treatment

[www.agrokurier.com](http://www.agrokurier.com)

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