#SaveOurSeedTreatments

BAYER

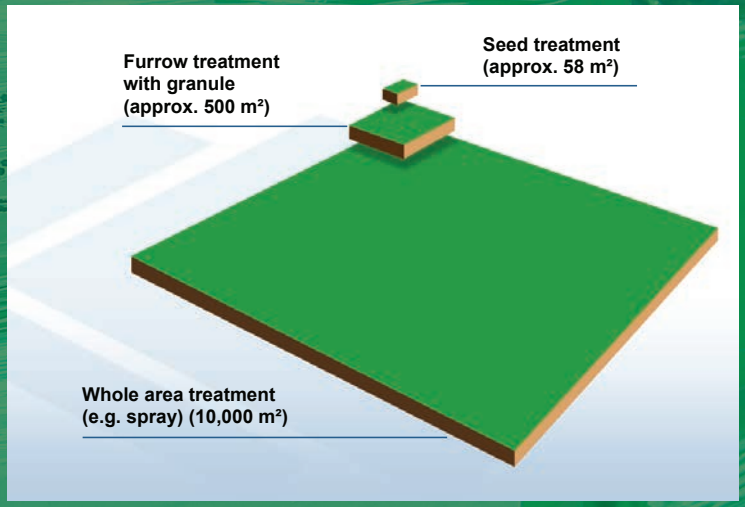
Excellent establishment and crop performance with minimal impact.

How to use seed treatments safely and effectively.

Bayer SureStart
For crops that perform

The ideal approach for early crop protection.

Seed treatments are highly sophisticated and designed with a simple aim – strong crop establishment and healthy growth with minimal environmental impact.



Seed treatments are the most environmentally desirable method of crop protection. They contain low quantities of active substances, very precisely applied and highly targeted in use. The equivalent amount of seed treatment used over a 10,000 m² (hectare) field is just 58 m², without the risk of overspraying.

Advantages of seed treatments.

Seed treatments differ from sprays in two key respects. First, because the treatment targets each seed **individually** for maximum effectiveness, there is only limited effect on the soil around the seed or the environment above ground. Compared to sprays, seed treatments are applied to less than 0.6% of the field area - see opposite.

Second, the treatments are applied at low doses in an enclosed environment by professional seed treatment companies away from the field environment.

This highly-targeted application of low doses of seed treatments are an environmentally friendly method of treatment. However, seed treatments are crop protection products and need to be handled as such and used carefully and safely to avoid risks to the user, environment and wildlife.

On farm, the main risks come from:

- Accidental seed spills
- Seed not covered by soil during drilling that could be eaten by birds or mammals
- Dust abraded from seed

About this guide

As a world leader in seed treatment products and application technology, Bayer has produced this short guide to help you understand both the rewards and potential risks of using seed treatments, as well as the farm practices that produce the best results with the least effect on the surroundings.

The guide is divided into five main sections; the last three are particularly important to help growers and drill operators in the field:

- Agronomic benefits of seed treatments
- Modern seed treatment technology
- Preparing to drill
- Sowing the crop
- Clearing up afterwards

Many of the points are second nature to professional drill operators, but everyone needs to be fully aware of all aspects of treated seed stewardship: it's the final attention to detail that can make the difference.

Agronomic benefits.

Seed treatment is by far the best means to protect cereal and other crops including sugar beet from seed- and soil-borne pests and diseases and pest-borne virus infections. However, it offers a range of further important benefits.

Seed-borne diseases

The right broad-spectrum seed treatment can effectively eliminate cereal seed-borne and seedling diseases such as loose smut, covered smut, leaf stripe and bunt. None of these diseases can be treated using foliar sprays, and there is no commonly-available genetic resistance in today's wheat and barley varieties, so seed treatment is the only option.

Pests and pest-borne problems

Insecticidal seed treatments can significantly reduce the incidence and severity of pest-borne viruses and diseases, including those that occur after crop establishment. A key example is BYDV in winter cereals.

In addition, seed treatments control soil pest threats, such as wireworm and grain hollowing by slugs in wheat. For example, clothianidin, a modern neonicotinoid seed treatment in Redigo® Deter®, repels slugs to reduce the damage they cause to seed.

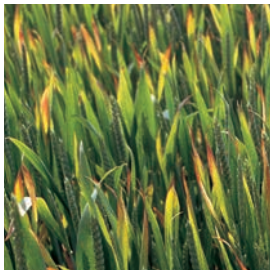
Greater efficiency

Seed treatments are compatible with Integrated Pest Management (IPM) approaches. They also reduce the need to treat crops after emergence, such as with pyrethroid sprays or slug pellets.

They are more environmentally friendly than spray treatments which also need careful timing. Moreover, a single seed treatment may well do the job of multiple sprays. Since seeds can be precisely and professionally treated before reaching the farmer, seed treatment is as convenient and reassuring as a genetic trait.

Improved workload and inputs

Seed treatments can ease farm workload and aid crop management with fewer inputs. For example, Redigo Deter eliminates the need for an early post-emergence aphid/BYDV spray in winter cereals and allows more flexible timing with herbicide tank mixes.



BYDV in wheat

Loose smut in barley

Grain hollowing by slugs

In addition, seed treatments reduce diesel consumption, energy use and manpower post-emergence by saving passes of the tractor in the crop.

Resistance and environment

Many farmers in the UK use treated seed to reduce the risk of varietal or chemical resistance. They also see seed treatment as effective in environmental stewardship since significantly lower quantities of an active substance are needed for disease or pest control, with a smaller and highly-targeted part of the field being treated.

Further benefits

In addition to slug grazing, seed treatment is an easier way than other alternatives to reduce take-all disease in cereals and reduce viability of ergot or *Sclerotinia* sclerotia in seed lots. These aren't always specifically targeted by seed treatments or genetic traits, but are major benefits. For more information on Bayer products, visit www.cropscience.bayer.co.uk.

Bird damage to seedlings

Seed treatments save on diesel

Modern seed treatment technology.

Modern seed treatments are applied at very low active substance doses. These not only need to adhere to the seed but must be applied accurately so that each seed receives the correct dose. Seed treatment application equipment uses sophisticated technology to ensure correct application and allow full quality control.

At Bayer, we place great importance on seed application technology. The company not only conducts research on formulants and other products that help crop protection chemicals work effectively and adhere to the wide range of seeds that farmers use; we actively develop new application machinery and systems to meet the need of modern seed treatments and seed processing plants. This is the core of the Bayer SureStart programme.

Bayer SureStart

Bayer is involved in all critical areas of seed treatments:

- Understanding pests and diseases
- Producing relevant products
- Design and manufacture of application machinery
- Operator training and support
- Developing new treatment aids such as stickers and powders
- Advice on safe and effective use on-farm

Bayer SureStart has been developed over the last ten years to cover all aspects of seed treatment technology and use. It's used by most of the major UK seed treaters to ensure Bayer products are applied to our exacting standards. To achieve this, the company's scientists, engineers and stewardship experts always work together when developing seed treatments and when considering the application recipes required.

The programme ensures that appropriate coatings are used, such as stickers, powders and sealants, where necessary to keep the treatment on the seed. However, if treatments are applied to a lesser standard there is a risk of seed coatings rubbing off during transit or when loading the drill.

Using lower applied doses of modern products helps create smaller, more manageable, packaging with less waste; we support collection and disposal of empty liquid seed treatment containers to reduce the packaging waste burden of seed treatment plants and farms.

Evolution seed treater control panel

Bayer SureStart
For crops that perform

Machines and more

Full testing, calibration and machinery maintenance support for professional treaters come as standard. Quality assurance assessment and recording of treated seed is built in, ensuring that seed batches are coated to a strict specification and monitored by a treated-seed analysis programme. There's full quality assurance, monitoring and feedback for the operator and farmer customer, providing confidence of accurate seed loading, uniform coverage for the best performance and value for money.

Bayer seed treatments are designed to minimise dust. This helps the seed flow smoothly through the drill without clogging – vital in saving time in the field; it also improves working conditions for operators and farm workers and aids environmental stewardship.

In addition, Bayer SureStart ensures that everyone who works with treated seed has hands-on advice and technical information plus practical and stewardship training.

It is now a legal requirement that seed treatments should only be applied in professional seed treatment facilities (including mobile units). Those facilities must apply the best available techniques in order to ensure that the release of dust during application to the seed, storage and transport can be minimised.

Evolution seed treater

Preparing to drill.

It is now a legal requirement that adequate seed drilling equipment shall be used to ensure a high degree of incorporation in soil, minimisation of spillage and dust emission. Always ensure that drills are properly maintained and calibrated. Before starting work, check that drill components and coulters are set up correctly.

Take time to prepare good seedbeds appropriate for the crop and the drill that is to be used. If a contractor is going to drill your crop, discuss seedbed preparation with them beforehand.

Always handle bags of seed with care to avoid abrasion

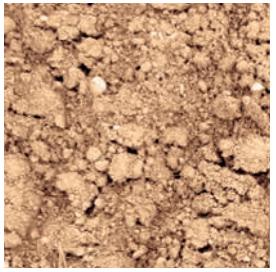
Handle large or heavy bags safely (fork lift operators must be trained). Before handling or drilling seed, take these precautions:

- Read seed tags and follow requirements
- Wear appropriate PPE when handling seed
- Wash hands immediately after use
- Handle large or heavy bags safely
- Ensure operators are appropriately trained
- Do not re-use seed sacks except for storage of unused seed
- Dispose of waste seed bags safely such as via an approved disposal contractor

Avoid dust from treated seed

In the past, the risk of dust emission from seed seldom received the same focus as spray drift. However, there are some situations where this comparison is relevant. Pneumatic precision drills with a vacuum-based sowing system are used for some crops such as maize; these can emit exhaust air into the environment. Dust can drift considerable distances on windy days, so you need to consider wind strength and direction. Abrasion of seed before loading and by the drill can result in low concentrations of seed treatment active substances being emitted in the dust.

To minimise this risk, it's important to avoid creating unnecessary dust and prevent discharge of any dust created by drills. The first step is to check that seed delivered on farm is not obviously dusty. If it is, don't use it, but return it to the supplier for exchange or reprocessing.



Poor seedbeds result in poor seed cover: start with good seedbed preparation

Seed bags must be handled with care

Do not drill too fast

Dust left in seed bag must be disposed of safely

Prevent dust discharge from drills

Mechanical and pneumatic pressure drills operate so that dust is not discharged into the air. They therefore don't pose a great risk when used as per manufacturers' recommendations. However, older conventional vacuum-type pneumatic drills are likely to need adapting with an engineering control to discharge the drill's air stream into the soil or close to the surface. This will minimise emission of abraded seed treatment particles from drills. Drills now on the market are supplied ready adapted.

Help with drill modification

If you have an older vacuum drill, or one that you haven't used recently, please contact your drill manufacturer; they may provide a modification kit.

Avoid unnecessary dust

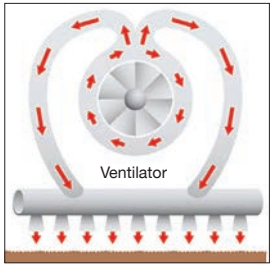
- Handle seed bags with care, especially when loading the drill
- When filling drills don't drop seed from height but pour carefully
- Don't tip any dust into the drill; leave it in the bag for safe disposal
- Don't drill too fast, particularly if the soil is dry, uneven or poorly prepared
- Use seed from a European Seed Association- or Bayer-approved supplier

Seed spills

These are one of the greatest risks and usually caused by poor operational practice such as:

- Sloppy filling of the drill
- Poorly maintained machinery
- Checking drill operation or calibrating without catching seed
- Failing to ensure seed is not being released when drill is in transit or not in work

Vacuum drills must be manufactured or adapted to prevent dust being released into the air



Drill modification principle

Always wear PPE when handling treated seed

*Clear up seed spills immediately**

* Source: FERA

To avoid spills:

- Take time and care when loading or emptying drills and when calibrating
- Load drill on field area to be drilled or in yard where spills can easily be collected but ensure this is away from drains. Also avoid areas with public access
- Do not fill drill or calibrate on grass or over other vegetation as spilt seed cannot be recovered
- Ensure no seed can be spilt while travelling outside the field
- Use the most appropriate drill for the task in hand

Any size of spill is important. Deal with it immediately.

Always catch seed when checking drill.

Dealing with spills

- Small in-field spill – bury where it is
- Large spills and any spill outside field – collect **immediately** and store in original bag for disposal. Never leave until later
- Don't dispose of treated seed in margins or non-crop area

Carry a spill kit, which should comprise:

- Spade to cover or retrieve spilt seed
- Spare bag including label to save seed recovered
- Canvas sheet for use when calibrating the drill

Fill drills in areas where spills can be cleared up

Remove bags from field as soon as drilling is completed or field unattended

Sowing the crop.

Set up and check drill operation on a part of field yet to be sown – never check over grass where any spilt seed is difficult to clear up. Be aware of the risky conditions ahead of drilling, such as stony or cloddy soils, or where there might be a lot of surface trash.

Seed not covered by the drill

Drills cannot perform properly on poor seedbeds. Even on better-prepared fields, conditions on headlands and **especially in corners** can be less than ideal, causing the drill to leave seed uncovered.

Always use a drilling technique that places treated seed into the soil and never broadcast or autocast (this is not permitted on seed treatment labels).

Best drilling practice – top tips

- Never drill around tight corners; this will force coulters out of the soil
- Select drilling speed according to the manufacturer's recommendations; drilling too fast can leave seed uncovered
- Ensure that the drill is moving forwards before lowering coulters into the ground; this will ensure that all seed is covered
- Take care when lifting the drill in and out of work. Shut off seed mechanism a metre before row ends so that no seed will spill from the coulters as the drill is lifted

After drilling

Before leaving a drilled field, check areas where there is greatest risk of seed remaining uncovered. In particular, check cobbly areas of fields, headlands and corners. Also recheck areas where the drill was filled, set up and emptied. Bury any visible seed.

Also check the main body of the field for areas of poor seed cover. If there are large areas of exposed seed, the only solution is to harrow and then roll as advised by product labels.

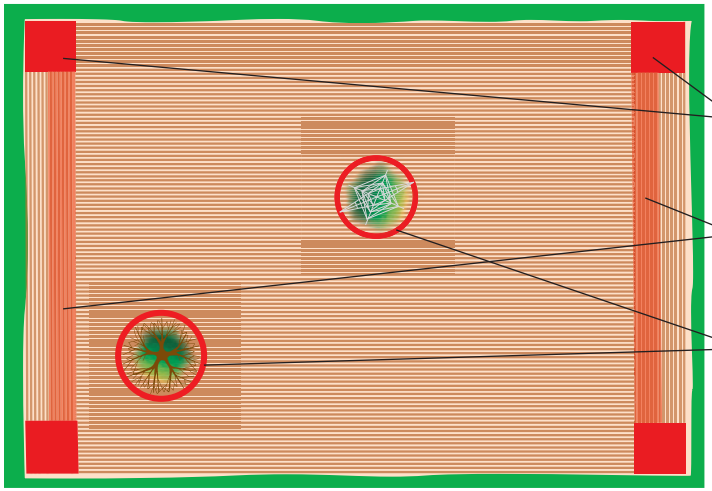
* Source: FERA

*Clear up or bury spills; catch seed when calibrating**

*Cover exposed seed**

*Do not fill the drill in public access areas**

Drilling into trashy seedbed risks leaving seed on surface



Advantages of sowing headlands last when using cereal drills.

After drilling, continued:

It is good practice to keep a record of the drilling operation to show diligence and to confirm that seed coverage has been checked. There's an example form overleaf. You can also download it from www.cropscience.bayer.co.uk.

- When you have completed drilling, remove all seed from drill, ensuring that all seed and dust is collected for safe disposal. Never burn treated seed on farm – it's illegal
- Collect up all empty sacks before leaving field
- Never re-use bags that have contained treated seed for any other purpose than storing original treated seed
- Store left-over seed in original bags with labels, in a secure store for later use or safe disposal
- Use seed in season of treatment and do not store treated seed more than three months unless label states otherwise
- Ensure dry, safe storage of seed that prevents access by pets, livestock, birds and small mammals
- Wash hands immediately after use and before eating or drinking
- Use bird scarers where necessary to deter bird feeding activity soon after drilling
- Take special care to avoid spills and collect empty bags near footpaths and areas of public access

Drilling stewardship – checklists.

Three important reminders about handling and using treated seed:

1. Wear appropriate PPE (personal protective equipment) including gloves and coverall. Seed treatments are pesticides and should be handled as such. In addition, **read seed tags**
2. Prevent the accidental emission of dust into the atmosphere from seed during loading and drilling
3. Don't leave treated seed exposed on the soil surface for birds and wildlife to eat

Major points to remember:

- ☐ Don't broadcast or autocast any treated seed
- ☐ Handle bags of seed with care – abrasion results in dust; damage may result in spilt seed
- ☐ Check that the drill has been properly maintained, calibrated and cultivators set up properly
- ☐ Critically assess the prepared seedbed; does it have stony, cloddy or trashy areas which might limit the coverage of the seed?
- ☐ Don't tip dust into the drill – leave it in the seed bag
- ☐ Keep bags secure, and dispose of waste seed bags and their contents safely
- ☐ Clean up spills immediately – do not fill drills on grassy areas as spills will be harder to clear up
- ☐ Ensure the drill will not drop seed when transported or when lifting in and out of work at headlands
- ☐ Ensure the drill (especially if precision vacuum drill) does not vent into the air – if necessary fit an air deflector system
- ☐ After you've finished drilling, check fields carefully – particularly headlands and turning areas to ensure seed is well covered. If any seed is exposed, cover it

Drilling stewardship record.

Basic details

Farm: _____ Crop: _____

Field name/no: _____ Variety: _____

Date drilled: _____ Seed treatment: _____

Drill type: _____ Seed rate: _____

Maize drill adapted to emit air to soil: ☐ Yes ☐ No Weather during drilling: _____

Preparing to drill

	Any spill?	*Remedial actions:* *Spill buried*	*Spill collected and bagged for disposal*
Filling in yard:	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Transport to field:	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Filled outside field margin:	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Filled on cultivated area:	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Calibration check:	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Seed condition (dust):	☐ No dust	☐ Low dust	☐ Dusty
Seed bag condition:	☐ Excellent	☐ Acceptable	☐ Some splits

Field and soil

Soil moisture level:	☐ Dry	☐ Moist	☐ Wet
Soil preparation:	☐ Plough/cultivate	☐ Minimal tillage	☐ Direct drill
Seedbed conditions:	☐ Excellent	☐ Acceptable	☐ Difficult
Seedbed notes:	☐ Stony	☐ Surface trash	☐ Cloddy

Drilling results

	Excellent	*Good*	*Partial*	*Remedial action*
Seed coverage in field:	☐ Yes	☐ Yes	☐ Yes	☐ Yes ☐ No
Seed coverage on headland:	☐ Yes	☐ Yes	☐ Yes	☐ Yes ☐ No
Seed coverage on corners:	☐ Yes	☐ Yes	☐ Yes	☐ Yes ☐ No

Additional comments

(Including details of remedial actions taken)

Drill operator name (CAPS): _____ Signed: _____

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