

Stewardship Guidelines on Seed Treatment & Handling of Treated Seed

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GUIDE PREPARED BY THE
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and CropLife International



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i. About this guide

Seed treatments are an excellent example of how the seed industry and crop protection industry provide farmers with pioneering tools to meet ongoing food security challenges. Seed treatments act as a delivery mechanism for pest and disease management products to improve the production and yield opportunities of the crop. They are specifically tailored to meet farmers' pest and disease control needs.

The Seed Treatment Stewardship Guidelines promote the safe handling and management of treated seed, while protecting farmer health and the environment.

This guide is useful for customers who have purchased treated seed and are looking for information on best practices about planting, handling, and disposal of any surplus seed. The guide is also useful

for applicators of seed treatment as well as seed companies to guide their management and handling of treated seed according to label, regulations and best practice.

The guidelines have been developed jointly by CropLife International and the International Seed Federation (ISF) and are meant to be consulted by users of seed applied products, farmers, trainers and other agricultural workers using treated seed. In addition to these guidelines, ISF offers more detailed documents regarding the subject of seed treatment and handling of treated seeds under 'Resources' on the ISF website:

<http://www.worldseed.org/resources/papers/seed-treatment/>

The protection of intellectual properties is vital and as such, Plant Breeders Rights must be respected.



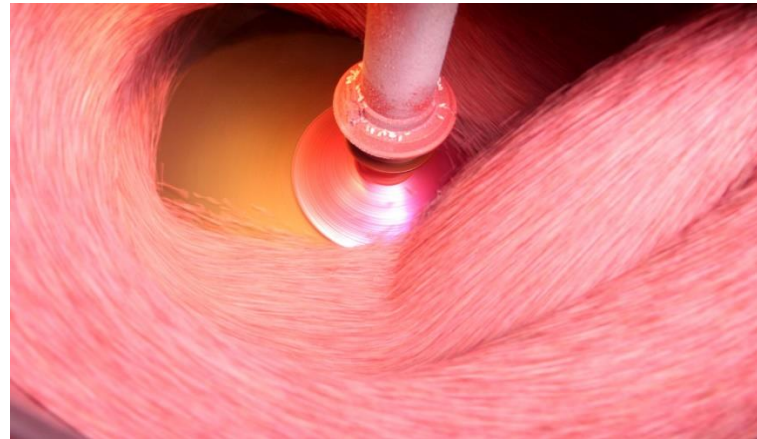
ii. Introduction

The objective of these guidelines is to improve the knowledge of treated seed by farmers, handlers and applicators while minimizing risks and maximizing benefits. All approved crop protection products, including seed treatments, are rigorously assessed by the industry and regulatory agencies to achieve registration for their use as seed treatments. When used in accordance with label instructions, crop protection products present acceptable risk to users, consumers and the environment.

While a rigorous regulatory scheme is essential for assuring the successful use of crop protection products, regulation can only go so far. Stewardship is an essential complement to regulation that allows management processes and procedures to be efficiently implemented to best manage these products throughout their lifecycle. This includes transportation, usage, storage and disposal of unwanted product, empty containers and packaging.

These guidelines apply to seed treatment operations. Seed treatment operations must be performed under controlled and thorough conditions with all necessary precautionary measures to ensure safety of workers and the environment.

Successful stewardship requires collaboration, engagement and support by all stakeholders. Where this occurs, the public can be assured that best practices are being consistently implemented for safety of users, consumers and the environment – including managing any risks to pollinators.



iii. Definition of seed treatment

Seed treatment is an integral part of crop protection and defined by this guidelines as the application of chemical ingredients and/or biological organisms to seeds intended for agricultural use to control, suppress or repel plant pathogens, insects, nematodes or other pests that can damage seeds, seedlings or the developing plants as well as improve soil health and utilization of crop inputs. Other ingredients such as specific polymers or colorants may be added to further improve the quality of the treated seed. Treated seed is intended for planting only and must not be allowed to enter food or feed supply channels or be used in oil processing.

iv. Benefits of seed treatment

Grower benefits

- Accurate placement of treated seed in the seed bed or furrow reduces the risk of exposure and therefore improves worker, grower and by-stander safety compared to other application methods.
- Seed treatment protects the intrinsic value of the seed itself as well as genetic expression and, in case of GM seeds, the value of the trait included by genetic modification.
- Seed treatment safeguards yields and harvest quality.
- Seed treatment is a cost effective method for growing crops to produce high value products.

Healthier crops

Seed treatment:

- may contribute to earlier and faster planting, higher plant populations and higher crop yields.
- offers an effective method of protecting seed from pathogens, insects and other pests, and contributes to the healthy, uniform stand establishment of a variety of crops.
- contributes to a uniform seedling emergence, healthier plants and significantly reduced insect and disease damage.
- offers effective control against early season, below-ground and above-ground pests and diseases, and reduce the need for additional rescue treatments or replanting of a failed crop.
- offers relief from abiotic stress such as cold, wet and drought and improve the plants' performance in the soil biome to avail from nutrition and essential minerals.

- increases the value of the harvest and reduces the risk of loss of revenue.
- allows the full expression of the variety.

Positive environmental impact

- Seed treatment is compatible with Integrated Pest Management (IPM) practices with a selective approach towards using pesticides.
- In accordance with IPM principles, the use of treated seed can vastly reduce the pesticide loading on a given planting area because of the low quantity of active ingredient released to the environment.
- Seed treatment places the crop protection product on the surface of a small seed, effectively reducing the need to apply products over the entire field.
- Application is made precisely where the product is required, rather than as a broadcast, post-emergence application. This minimizes non-target organism impact.

Precision application

- The precise application of a crop protection product via seed treatment reduces soil surface exposure by up to 90 percent compared to in-furrow applications and up to 99 percent compared to a surface application.
- Polymer seed coatings bind crop protection products directly to the seed, has the potential to reduce dust exposure to people who handle and plant the seed, as well as to non-target organisms.

v. The importance of pollinators

Along with other pollinators, bees are essential to producing crops from flowering plants. Farmers rely on pollination services from both wild bees and domesticated honey bees. Global increases in the demand for food mean that bees are being called upon to pollinate even more crops. At the same time unfavourable conditions including environmental pressures, parasites, viruses and other toxins continue to place increasing stress on bees.

Some seed treatment products may present risks to bees. To minimize this potential risk it is important to ensure that at each stage of the seed treatment process, appropriate risk assessment and mitigation measures are put in place.

When applied and used correctly, insecticidal seed treatments have proven effective as their nature allows targeting specific plant pests while not affecting predatory insect species and other beneficial insects like bees.



1. Selection of seed treatment products

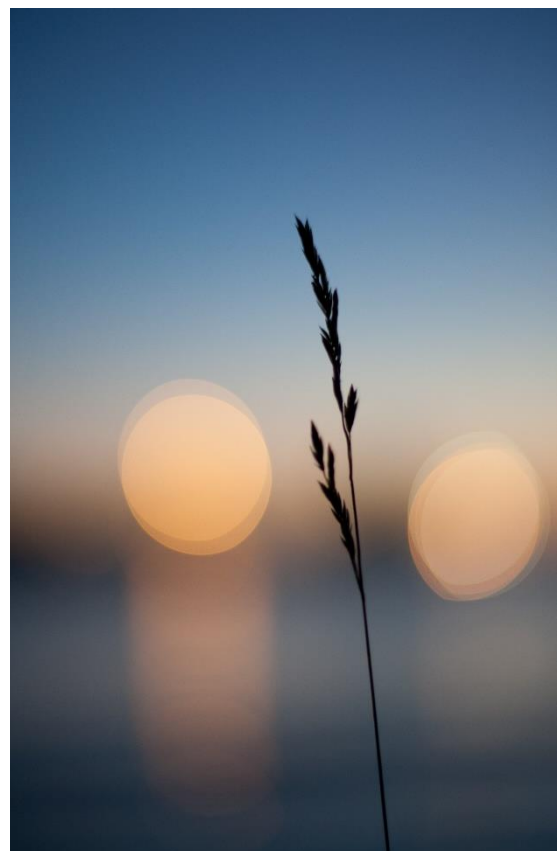
The selection of the seed treatment products, coating materials, micronutrients and other additives is the key factor in performance, health, safety and environmental impacts of seed treatment.

Selection of products and their respective combinations should be based on evaluation of significant reputable data. Selection should also take into consideration the product's suitability for use as a seed treatment and the application process to be used.

Key aspects are to be considered when selecting the seed treatment products according to the farmer's needs:

Fundamental recommendations

- Consider seed treatment products from reputable and authorized suppliers only.
- Consider plant protection products that are registered or authorized according to local legal regulation for the intended use and crops only.
- Suppliers of seed treatment products, colorants, polymers and other seed treatment/coating additives should be consulted for proper guidance in the use and application of their products.
- Suppliers should provide information to seed treatment application facilities and users of treated seed to support the effectiveness of their products. This includes data on efficacy, seed safety, flowability, plantability, dust levels of treated seed, and limitations/requirements for the treating process.
- At a minimum, effective application should be demonstrated by visual assessment of treated seed (e.g. treatment uniformity, product adherence to the seeds, absence of dust in seed bags).
- Adherence to PPE requirements on the label for both treaters and growers.



Efficacy

- Consult product labels for pests controlled and rates required. Use products suitable for crops to be treated and the pests of concern.
- Use recommended rates to control pests of concern as defined on the label.

Seed safety

- Seed germination may be affected by seed applied technology and must be verified prior to using a specific product or combination of products.
- Verification of seed safety should include germination tests of treated seed over a period of time equivalent to commercial storage of treated seed.

Treating process recommendations

Seed to be treated must be clean and free from dust and foreign material. Application facilities and locations must be appropriate for a safe treatment process:

- Setup of treatment facilities and organization of work must be suitable for environmental and worker safety.
- Appropriate treatment equipment must be used and appropriate PPE and training is required.
- Machines have to be maintained regularly.
- Dosing equipment (e.g. scales for dosing of seeds or slurries) must be checked regularly for functionality and accuracy.

Selection and application of suitable treating/coating technology is very important.

- A suitable seed coating polymer may minimize dust off and therefore reduces risk of drift potentially affecting non-target organisms.
- Seek and follow recommendations of suppliers or other experts.
- Stabilized recipes (such as composition and dosage of all ingredients in slurries and powders; and verified machine settings) have to be used when they have proven to deliver acceptable qualities in a consistent manner.
- The application process must achieve a high product quality (e.g. accurate and uniform coverage of the seed, product adherence to the seeds, and absence of dust).

- Keeping accurate written records of all seed treatment applications including not only the applied plant protection products used, but all products (polymers, colorants...), their dosages and recipes and the volume of seed treated (species, variety and lot number).

Ready-to-use products vs mixtures

- Ready-to-use products are designed to treat seed effectively without using additional components other than water.
- Manufacturers should provide data to demonstrate the performance of these ready-to-use formulations.
- If other components are added to a ready-to-use product, the compatibility of the combination should be verified.
- Mixtures include seed treatment products, coating materials, micronutrients, and other additives that form the recipe.
- The specific combination must be evaluated and verified to be suitable. Physical and seed safety compatibility of mixtures should be verified.

Subsequent treatment

- Subsequent treatment is the application of products to previously treated seed. Such applications may be in addition to a base commercial treatment to provide protection against pests of concern in the local environment, such as fungicides.
- Subsequent treatment may critically affect seed quality as well as the quality of the treatment firstly applied. So it should be used only after careful testing.
- The suitability of such additional treatment to previously treated seed should be verified, for safety of the process for workers, possible loss of first treatment, seed safety and dust levels.

Label directions for use and restrictions

- Comply with all product label requirements.
- When working with multiple registered products, comply with the most restrictive label requirements of the individual components.



2. Treating seed and using seed treatment products

Once the selection process is complete, the safety of users, farmers, contractors, other workers or by-standers that might come in contact with seed treatment products is a key concern.

Instructions for the safe and responsible use of seed treatment products are detailed on the product label. Additional information can be found on the material safety data sheet (MSDS). All documents should be easily accessible for all personnel in contact with the products or treated seeds. Only authorised and trained personnel should access the treatment products.

Whenever workers are using or handling treatment products or treated seed, they should wear personal protective equipment appropriate to the product and the activity. Workers applying seed treatment should also undertake thorough training in aspects such as storage, transportation and safe handling of treated seed. (See Training section)

Safe handling and use of seed treatments and treated seed

Follow product label instructions to minimize exposure to seed treatments, treated seed, and dust from treated seed such as:

- The signal heading (e.g. Caution).
- Safety directions including PPE.
- Seed treatment product use and disposal restrictions.
- Treated seed withholding periods.
- Specific seed planting and storage recommendations.
- Industry recommendations.
- In the event of specific product questions or emergency, contact the manufacturer.



Personal protective equipment

- When wearing personal protective equipment (PPE), always read and follow product label and/or seed tag instructions.
- Minimum PPE may include long trousers, long-sleeved shirt/overalls, chemical resistant gloves, safety shoes and socks.
- Wear waterproof and chemical-resistant gloves that are flexible and fit the hands comfortably.
- Additional PPE may be required for operating equipment. Refer to PPE indicated by the equipment manufacturer.
- Additional PPE may include foot, ear, eye, breathing and head protection.
- Factory management should motivate staff members to use PPE and check its use.
- Remember to regularly check the PPE is in working order, clean down the PPE often and replace defective PPE.

Treating seed safely

- Use seeds respecting Intellectual Property. They will have high quality with regards to genetic and technical purity, as well as germination.
- Only cleaned seeds free from dust and debris must be used for treatment.
- Read, understand and follow product label instructions. If there are any instructions that you do not understand, then seek advice from someone who does.
- Look for warning symbols, pictograms or additional safety instructions to know if precautions need to be followed in addition to the general safeguards or if any specific actions are to be taken (e.g. for additional PPE to be worn).
- Seed treatment chemicals and dust can come in contact with the body through the skin, the eyes, by breathing and through the mouth. To avoid this, use Personal Protective Equipment (PPE) as directed on the label.
- Follow responsible use guidelines.
- Do not eat, drink or smoke while handling seed treatment products.
- Do not touch your face or other bare skin with contaminated hands or gloves.
- Use suitable equipment for measuring out, mixing and transferring seed treatment products.
- Never use hands as scoops or for stirring liquids.
- Wash hands and face before eating, drinking smoking, or going to the toilet.
- Wash contaminated clothing with soap and water, separately from other clothing.
- Do not wash near, or discard washing water into watercourses such as sewers, streams or lakes.
- All treated seeds must have a clearly visible colouring distinguishing them from untreated seeds.
- Follow the label recommended dose rates. Do not apply more product than the label directs.
- Only use the seed treatment on the specific crop indicated on the label.
- When testing, treat a small quantity of seed using equipment similar to the equipment needed for treating the total seed lot.
- Ensure that the working environment is well organised and clean.
- Spilled slurry or treated seed should be securely covered and collected immediately to prevent exposure to humans, animals and the environment.
- Ensure emergency contact information is easily accessible.
- In the event of emergency, call the manufacturer's Product Emergency Number written on the label, or other appropriate institutions.



Disposal of rinse water from seed treatment equipment

- All equipment used in treating seed should be thoroughly washed after use to remove residual traces of the seed treatment product.
- Minimise rinse water – only wash out equipment when necessary.
- Do not discharge rinse water to ground, water ways, surface water or septic systems.
- Reuse rinse water if possible to dilute the next batch of formulation only if using the same product or product combination. Beware of the potential for cross contamination if the new formulation contains different active ingredients. Factor in the potential for increased concentration of active ingredient if significant amounts of rinse water are used.

Disposal of empty containers of seed treatment products

- Always follow local requirements and regulations when disposing any empty seed treatment container/pack/bag.
- Recyclable containers should be triple rinsed, punctured and returned to an authorised collection point.
- Returnable containers and refillable containers should be returned to the point of purchase (distributor/dealer).
- Seed packs and bags should be collected and returned to an authorised collection point. Left-over dust in empty seed bags should be collected into an empty seed bag and returned to the authorised collection point.

Storage of treated seed

- Keep treated seed in a secure storage facility with restricted access. Keep treated seed out of reach of children, livestock, wildlife and unauthorised persons.
- Treated seed should always be stored separate from food and feed stuff, other grains and seeds, as well as chemicals, paints and solvents.
- Keep treated seeds in good storage conditions and protect them from heat and moisture.

Training

- People responsible for seed treatment operations should be appropriately trained and competent. Written records of training and content of training should be maintained and reviewed regularly.
- Workers – including mixers/loaders, applicators, equipment operators, packers, baggers and fork lift truck operators – should receive documented training before starting activities covering:
 - all relevant procedures.
 - specifically the use of PPE.
 - handling hazardous material
 - understanding product labels and material safety data sheets (MSDS).
- Training should be refreshed regularly and/or when necessary (e.g. when new products are processed).

3. Treated seed handling and planting

Use seeds respecting Intellectual Property. They are high quality with regards to genetic and technical purity, as well as germination.

Labeling of treated seed

Treated seed must be labelled according to local legal requirements.

In addition to seed information, species and variety, and lot number, the label should contain the following information.

- The names of plant protection products applied to the seeds and/or their active substances.
- Safety instructions, such as the following.
 - “Not for human or animal consumption.”
 - “Store properly out of reach of children, unauthorized people, animals and separate from food and feed stuff.”
 - “Use appropriate personal protection equipment.”
 - “Wash hands.”
 - “Do not contaminate surface water and ditches.”
 - “Minimize dust generated at drilling.”
- Advice for safe use of treated seeds.
- Avoid spillage of treated seeds.

The use of pictograms has proven to be useful.

Safe handling of treated seed

- Comply with all label instruction for seeding operations.
- Use high quality dust-free seed.
- Wear gloves when handling treated seed and when planting.
- Wear dust masks when opening and/or emptying treated seed packaging to minimise contact with dust.
- Avoid soaking pre-treated seed, such as rice, in rivers or streams as it could become contaminated with chemicals.
- Properly dispose of any spillage to prevent exposure to humans, animals, or the environment.
- Ensure emergency contact information is easily accessible.

Transportation of treated seed

- Treated seed should always be transported separately from people, animals and food and feed.
- Avoid undue abrasion and other mechanical damage to treated seed.
- Protect treated seed from heat and moisture. Shield seed and components from sunlight and extreme temperatures.
- Where treated seed is spilled, it should be collected immediately to reduce exposure risks.

Environmental safety for planting

Environmental safety involves managing treated seeds to minimise the risks to non-target organisms and natural resources.

- Use high quality dust-free seed.
- Avoid generation of dust when opening seed containers, and during filling or emptying of the drill/planter.
- Plan planting operations with respect to possible dust contamination of the environment. Factors such as wind speed and direction should be considered for potential escape of dust.
- Be aware of the presence of bee hives or crops or weeds in the flowering stage. If they are within or adjacent to the field, they could attract pollinators.
- Avoid times of the day when bees are actively foraging.
- Consider nearby waterways and plan planting operations to avoid contaminating them with dust from planting.

Planting depth

- To protect birds, mammals, and the environment, follow planting depth instructions as described in the seed tag or as given by technical institutes.
- Cover all treated seeds in the field by incorporating into the soil at proper planting depth, in particular at row ends and field corners.

Planter equipment (where they exist)

- On vacuum or positive air pressure planters direct air exhaust downward towards the soil surface, to avoid dust emission to the atmosphere.
- Always plant at the recommended sowing/planting rate.
- Calibrate planting equipment thoroughly.
- Always clean and maintain equipment correctly.
- Fill the planter at least 10 metres inside the field to be planted, avoiding proximity to apiaries, hedges, flowering crops or weeds.
- When opening seed bags or when filling and emptying the drill/planter, position your back to the wind and avoid breathing released dust.

Disposal of empty treated seed containers.

- Bags that held treated seed should not be used for any other purpose.
- Dispose of seed packaging and/or containers in accordance with local requirements and container return policies.

Disposal of small quantities of pesticide-treated seed

Small quantities of leftover seed that have been treated with a pesticide should be planted in fallow or other non-cropped areas of the farm. Treated seed may be hazardous to wildlife and must be planted according to seed label and bag instructions. The same practices and precautions should be followed as when planting treated seed for growing a crop.

- Never compost treated seed.
- Use an agronomically acceptable seeding rate and normal practices for that crop.
- Plant treated seed at a depth greater than 2.5 cm. If the seed is broadcast on the soil surface, incorporate it immediately. This will decrease the likelihood for bird or wildlife ingestion of the seed.
- Unless restricted by label language, you may double sow seed around the headland.
- Leftover treated seed may be double planted within a portion of the field at an agronomically acceptable seeding rate.
- Return leftover treated seed to its original seed lot containers, if treated seed is intended for storage and subsequent planting.
- If the treated seed no longer has acceptable germination or has been damaged, possible disposal options include incineration by a waste management facility.

Disposal of large quantities of pesticide-treated seed

Large amounts of left-over treated seed pose a more difficult scenario to the farmers. Please act according to the following recommendations.

- Never compost treated seed.
- Review and seek information on local regulations on disposal of large amount of left-over treated seed.
- Contact authorized waste companies such as cement kilns or incinerators that can handle large amounts of treated seed.
- Some countries allow municipal landfill for treated seed; contact the local authority and follow local regulations at all times.

Equipment washing

All equipment used for planting treated seed should be thoroughly washed after use to remove residual traces of the seed treatment product. All rinsate must be responsibly disposed of.

- Do not discharge rinse water to ground water, surface water or septic systems.
- Minimise rinse water and wash out equipment only when necessary.

