



# AGRONOMIC SPOTLIGHT



## SEED TREATMENT OPTIONS FOR ONION PRODUCTS

- » Seed treatments and enhancements can improve stand establishment, survival, and quality and appearance of onions.
- » Seed enhancements include seed priming and seed coating procedures.
- » Seed treatment insecticides and fungicides can protect yield potential from losses to onion pests and diseases.

Onion seed can be treated in several ways prior to planting to improve the quality and yield potential of the resulting crop. The term “seed treatment” typically refers to the application of insecticides and/or fungicides to the seed to help protect the seeds and young seedlings from insect pests and fungal pathogens. On the other hand, the term “seed enhancement” usually refers to other processes, such as seed coatings or pelleting, seed priming, or post-priming procedures that are intended to improve the handling and planting of seed, reduce the time to termination, or increase uniformity of seedling emergence. Seminis sells onion seeds for different markets and growers can purchase seed with seed enhancements or seed treatments or both. Non-treated onion seed is also available.

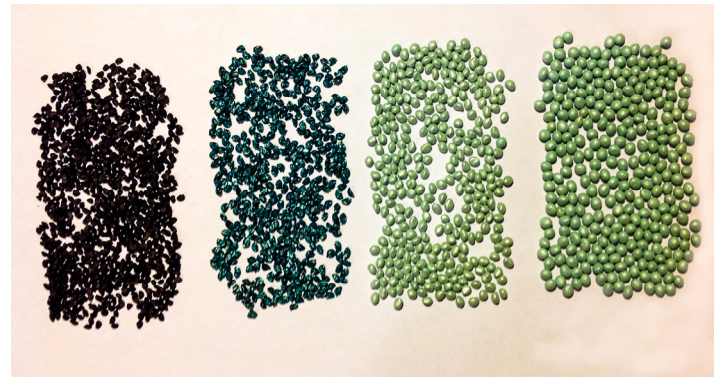
### SEED ENHANCEMENTS

The first step in germination is the imbibition of water by the seed. This imbibition of water starts the physiological processes that allow the seed to break dormancy and germinate. One way to speed the process of germination after planting is by priming the seed before planting. Seed priming is defined as “pretreatment of seeds by various methods in order to improve seed germination rate, percentage germination, and improve uniformity of seedling emergence by controlling the water available in the seed.”<sup>1</sup> Typically seeds are soaked in a water solution to start the germination process, but then they are dried before they actually sprout. Once planted, primed seed emerge more quickly and more uniformly than non-primed seed. However, priming usually shortens the shelf-life of the seed, so seed should be planted within six to twelve months of priming.

During the priming process, proteins and sugars that protect seed from damage during dormancy are broken down, as they would no longer be needed if the seed were to continue to germinate. When seed are dried before sprouting, they no longer contain most of these protective proteins and sugars. Post-priming enhancement is a process initiated after priming but before re-drying. It is intended to promote the reforming of these proteins and sugars to help protect the seed after priming.

Because onion seed are fairly small and irregularly shaped, they can be difficult to plant mechanically. The application of seed coatings can improve handling and planting by making the seed more uniform and spherical. Coatings can also help applied seed treatment products remain on the seed.

Figure 1. Onion seed with various seed coatings



There are three basic types of seed coatings (Figure 1). Film-coats are very thin and do not change the shape, size, or weight of the seed, and they can help reduce water loss.<sup>2</sup> Encrustments are somewhat thicker, making the seed more uniform in shape, more spherical, and slightly heavier. Encrusted seed are easier to plant than non-coated seed when using a vacuum seeder. Pelleted seed have the thickest coatings, are more uniform in size and shape, and are heavier. Pelleted seed are easier to handle and plant in operations using belt- or vacuum-seeders. Growers can choose to have a seed treatment applied, and Seminis offers a three coating types for onion with and without seed treatment. Encrustments and pellets have the added advantage of being able to physically separate seed treatment products from the seed. It has been shown that some insecticides can be phytotoxic, and may result in lower viability and germination if applied directly to the seed. The added layer of material between the seed and product can reduce this problem.

(Continued on page 2)





# SEED TREATMENT OPTIONS FOR ONION PRODUCTS

(Continued from page 1)

## SEED TREATMENTS

Seed treatment products are applied to the seed to protect seeds and seedlings from insect pests and seed/soilborne pathogens. Seed treatment products are usually applied at very low rates directly to the seed, and they are very cost effective with minimal environmental impact.

Onions planted in the muck soils of the eastern United States and Canada tend to have more problems with soilborne diseases and insects than do onions planted in the more mineral soils of the western states because the conditions for survival and infection are more favorable in these eastern locations. As a result, different seed treatment products are typically used in different planting areas.

The cool wet conditions in the eastern U. S. and Canada promote the development of damping-off diseases caused by pathogens such as species of *Pythium*, *Fusarium*, and *Rhizoctonia*. These pathogens reside in the soil and attack seeds and seedlings, both before and after emergence. Seed rots can also result from fungi, such as *Aspergillus*, *Botrytis*, and *Penicillium* species, which are on or in the seed prior to planting, and these fungi colonize and rot the seed when moisture becomes available. Both seed rots and damping-off result in poor stand establishment and reductions in yield.

In the drier growing regions of the western U. S., damping-off and seedling blight caused by the fungus *Rhizoctonia solani* tend to be the biggest problems, although, the seed rot and other damping-off pathogens can cause disease under certain circumstances in these areas as well.<sup>3</sup>

Onion smut is another disease caused by a soilborne fungus. Spores of the fungus infect the leaves of onion seedlings shortly after emergence, and seedlings can be killed within three to five weeks. For seedlings that survive, the fungus will progress from the leaves down to the bulbs, causing brown to black lesions (Figure 2).<sup>4</sup>

Onion maggot and seedcorn maggot are both insects that feed on and damage onion plants. The insects overwinter as pupae in the soil. Adults emerge in the spring and lay eggs in the soil near onion plants. Larvae burrow into the basal plate of the plant and begin to feed on bulb tissue. Damaged seedlings wilt and can eventually die. Two more generations of the onion maggot insect develop during the season. Seed treatments can protect seedlings from feeding by the first generation larvae, and this can reduce the number of subsequent generations that develop in the field.<sup>5</sup>

Figure 2. Symptoms of onion smut. Howard F. Schwartz, Colorado State University, Bugwood.org



In eastern areas of the U. S., where disease and insect pressures are high, treatment with FarMore® FI500 can be useful. FarMore® FI500 contains the same mix of fungicides found in FarMore® 300 plus the insecticides Regard® and Cruiser®. These insecticides are especially helpful in areas where the insects have developed resistance to previously used insecticides. Cruiser®, in particular, is useful because it can systemically control additional pests, such as aphids, onion thrips, and wireworms. Please note that this seed treatment combination is currently only available in the U. S. and cannot be sold to growers and customers in Canada.

### Sources:

- <sup>1</sup> National Agricultural Thesaurus and Glossary. <http://agclass.nal.usda.gov/>.
- <sup>2</sup> Taylor, A. G., Hoepfing, C. A., Nault, B. A., Lorbeer, J. W., and McDonald, M. R. 2008. Onion seed treatment and coating technologies. *Acta Hort.* 782, 129-134.
- <sup>3</sup> du Toit, L., Holms, B., Twomey, M., Gatch E. 2008. Evaluation of seed treatments for soilborne damping-off pathogens and seedborne fungi of onion. PDMR 3:ST021.
- <sup>4</sup> Delahaut, K. and Stenenson, W. 2004. Onion disorder: Smut. A3796. University of Wisconsin Cooperative Extension.
- <sup>5</sup> Smith, E. and Nault, B. 2014. Onion maggot *Delia antiqua*. Cornell University, NYS IPM Fact sheets for vegetables.

Web sources verified 03/23/16.

**For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development & Agronomy by Monsanto.**

**Individual results may vary**, and performance may vary from location to location and from year to year. The information provided in this communication may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. The recommendations in this article are based upon information obtained from the cited sources and should be used as a quick reference for information about growing onions. The content of this article should not be substituted for the professional opinion of a producer, grower, agronomist, pathologist and similar professional dealing with this specific crop

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