

Benefits of Seed Treatment Products in Soybeans

Wet, poorly drained soils can be typical during spring planting and crop emergence. These characteristics favor development of the fungal pathogens that cause soybean seedling diseases which can slow germination and plant growth. Early season insect pests may also damage soybean seeds and seedlings causing adverse affects on plant growth. Therefore, it is important to take steps that may prevent diseases and insect damage. Seed treatments can help protect seed and seedlings from pests, resulting in more uniform plant stands, better yield potential and ultimately increase return on the investment.

Acceleron® Seed Treatment Products

Acceleron® seed treatment products have been selected to compliment Genuity® Roundup Ready 2 Yield® and Roundup Ready® soybeans by helping to protect soybean seeds and seedlings from disease and insect damage.

In the past, most seed treatments consisted of one or two active ingredients which primarily controlled seedling diseases. Acceleron® seed treatment products contain advancements in seed treatment technology. Examples of these advancements include: multiple modes of action, broad spectrum control of insects and diseases and increased length of protection.

Benefits of Acceleron® Seed Treatment Products

For 2011, Acceleron® seed treatment products offer a broad control spectrum for both diseases and insects

Table 1. Key pests controlled by Acceleron® seed treatment products.

Key Diseases	Key Insect Pests
<i>Pythium</i>	Bean leaf beetle
<i>Phytophthora</i>	Soybean aphid
<i>Fusarium</i>	Grape colaspis
<i>Rhizoctonia</i>	Seedcorn maggots
	Wireworms

(Table 1). In addition, growers are given multiple options for Acceleron® seed treatment products consisting of:

- Insecticide, disease protection and plant health
- Disease and plant health only
- Single container option, as a custom blend

Disease and Plant Health Benefits

Acceleron® seed treatment products contain an exclusive fungicide combination, active ingredients pyraclostrobin and metalaxyl, that provide excellent protection against seed and soil borne diseases. The fungicides protect against these key diseases: *Pythium*, *Phytophthora*, *Fusarium* and *Rhizoctonia* (Figures 1-3). In addition, the fungicide combination also demonstrates plant health benefits through more rapid and increased seedling emergence under certain cold conditions.

These disease and plant health benefits take place due to the unique mode of action found in pyraclostrobin, one of active ingredients found in Acceleron® seed treatment products. As the fungicide binds to a specific site in the mitochondria it stops electron transfer which stops energy production of the fungus and causes it to die. As a plant



Figure 1. Soft, wet rot of hypocotyls and root tissues on soybean plants infected with *Phytophthora* (left) and *Pythium* (right).



Figure 2. Soybean roots that have been infected with *Pythium* and are showing symptoms of damping off.



Figure 3. Light brown lesions on the lateral roots of a soybean plant infected by *Fusarium*.

Benefits of Seed Treatment Products in Soybeans (cont'd)

health agent, the fungicide causes long term changes in the metabolism and growth of the treated plants. This is accomplished first by causing a decrease of the CO₂ compensation in the plant which leads to more efficient photosynthesis. Second, it increases the amount of chlorophyll. Third, it causes changes in phytohormones which contribute to intensified growth.

Insecticide Benefits

The insecticide product in Acceleron® seed treatment products is Imidacloprid, a neonicotinoid pesticide that was modeled after the natural insecticide nicotine. Imidacloprid provides both above and below ground insect protection. Above ground protection includes: early season control of bean leaf beetles and aphids, with suppression of early soybean aphids. Below ground protection consists of: seed corn maggot, wireworm and white grub.

Length of Protection

Acceleron® seed treatment products can protect seeds from disease and insect damage for up to 30 days. This time frame is longer than many other seed

treatments and is typically an adequate window of protection. In ideal conditions, soybean emergence may take as little as 7 to 14 days. However, environmental conditions can increase the time needed for soybeans to emerge. Some factors that may influence emergence are: soil compaction, soil moisture, and air and soil temperatures.

Monitoring growing degree units (GDU's) can be a more accurate way for grower's to track, or estimate, the time needed for soybeans to emerge. In the past, few paid attention to the number of GDU's required for soybean emergence. However, earlier planting dates, decreased seeding rates and increased seed costs have sparked grower interest in tracking GDU's in an attempt to protect yield potential. Preliminary research from the University of Wisconsin indicated that multiple soybean varieties had similar emergence times with 50% emergence occurring within a range of 130 to 140 GDU's and 90% emergence occurring within a range of 134 to 178 GDU's. Table 2 gives an example of how GDU's can be used to calculate the number of days it takes for soybeans to emerge.

Acceleron® Seed Treatment Products Performance

A three year summary (2008-2010) of field data with varying levels of disease and insect pressure indicated soybeans treated with Acceleron® fungicide/insecticide seed treatment products had performance gain wins 73% of the time compared to untreated soybeans. In addition, data from the same trials indicated that Acceleron® seed treatment products improved soybean stand

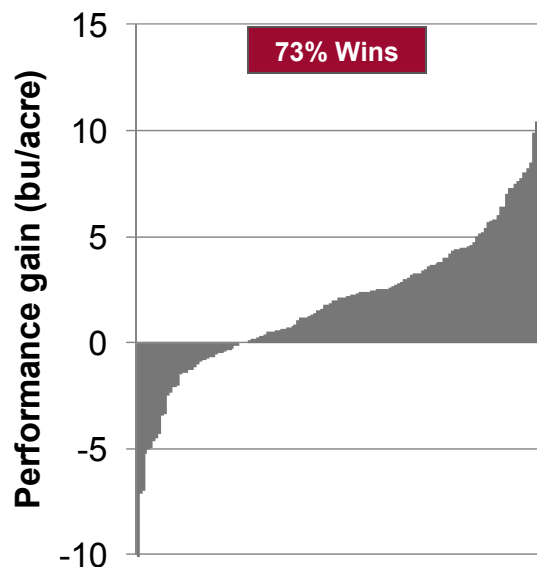


Figure 4. Performance gain (bu/acre) of Acceleron® fungicide/insecticide seed treatment products versus untreated soybeans. Acceleron® seed treatment products won 73% of the time when compared to untreated soybeans in the 2008-2010 Monsanto Small Plot and Strip Plot Trials which included Acceleron® DX-109, DX-309, and IX-409 seed treatment products.

and vigor (Figure 5 and 6). Figures 7- 9 show visual comparisons of the insect protection that the Acceleron® insecticide seed treatment products provides against bean leaf beetle compared to untreated soybean seeds.

Sources: Conley, S.P. and Gaska, J. 2009. *Predicting When Soybeans Will Emerge*. University of Wisconsin Extension. *Cool Bean Advisor*. April 29, 2009; Davis, V. and Bradley, C.A. 2009. *Soybean Development and Considerations After Planting*. University of Illinois Extension. *The Bulletin Issue No. 10, Article 5/ May 29, 2009*; Fishel, F.M. 2009. *Pesticide Toxicity Profile: Neonicotinoid Pesticides*. University of Florida IFAS Extension. *Publication #PI-80*; Munkvold, G et al. 2006. *Seed treatment In: Iowa Commercial pesticide Applicator Manual*. Iowa State University; Ohio State University. 1998. *Seed Treatment for Agronomic Crops*. Ohio State University Extension Bulletin. *Publication No.: 639-98*; Pedersen, P. and A. Robertson. 2007. *Fungicide seed treatments in soybean*. Iowa State University Extension. *Integrated Crop Management*. ICM>2007>IC-498 (3) – March 26, 2007; Sweets, L. 2009. *Soybean Seed: To Treat or Not to Treat*. *Integrated Pest & Crop Management*. April 13, 2009. Volume 19, Number 6.

Table 2. Example calculation of days required for soybean emergence, using growing degree units (GDU's).

Average GDU accumulation per day¹ = 9

Estimated GDU requirement to reach 90% emergence² = 178

178 GDU's required for emergence/
9 GDU accumulation per day

~ 19.8 days for 90% emergence

¹ Average GDU accumulation in Rochelle, IL from April 15th – May 15th in 2001-2008 was 9 GDU's per day, Midwest Regional Climate Center.

² Upper end of estimated soybean GDU requirement to reach 90% emergence, University of Wisconsin.

Benefits of Seed Treatment Products in Soybeans (cont'd)

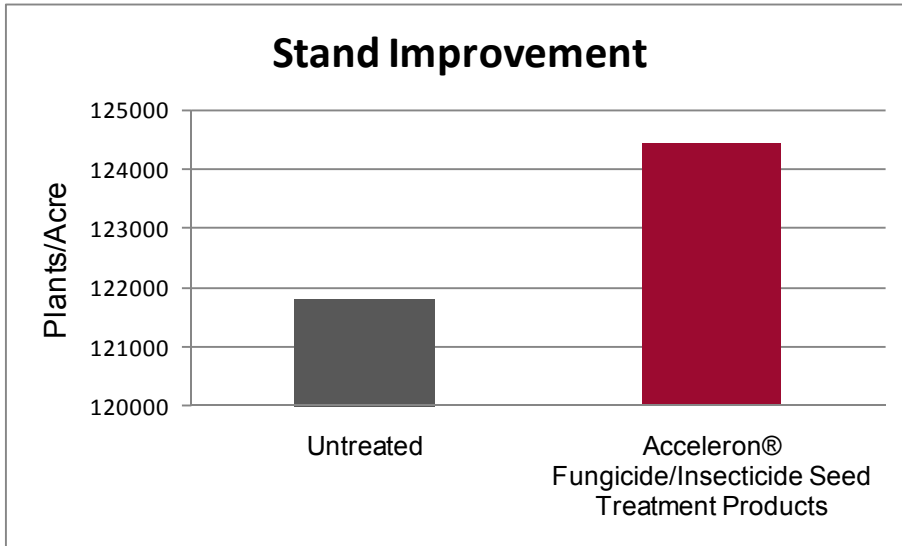


Figure 5. Stand improvement of soybeans treated with Acceleron® seed treatment products compared to untreated soybeans in the 2008-2010 Monsanto Small Plot and Strip Plot Trials which included Acceleron® DX-109, DX-309, and IX-409 seed treatment products.

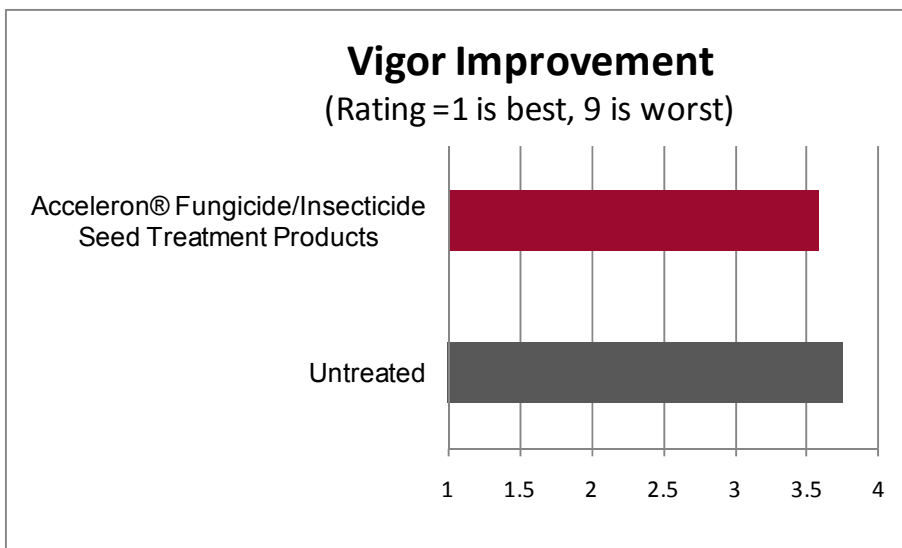


Figure 6. Vigor improvement of soybeans treated with Acceleron® seed treatment products compared to untreated soybeans in the 2008-2010 Monsanto Small Plot and Strip Plot Trials which included Acceleron® DX-109, DX-309, and IX-409 seed treatment products.



◀ Figure 7. Bean leaf beetle damage in soybean plots with no Acceleron® insecticide seed treatment products, 2010 Atlantic Iowa.



◀ Figure 8. Bean leaf beetle damage in soybean plots with a competitive standard, 2010 Atlantic Iowa.



◀ Figure 9. A soybean plant with no bean leaf beetle damage in the plots treated with Acceleron® insecticide seed treatment products, 2010 Atlantic Iowa.

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