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). 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

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

<table>
<thead>
<tr>
<th>Key Diseases</th>
<th>Key Insect Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pythium</td>
<td>Bean leaf beetle</td>
</tr>
<tr>
<td>Phytophthora</td>
<td>Soybean aphid</td>
</tr>
<tr>
<td>Fusarium</td>
<td>Grape colaspis</td>
</tr>
<tr>
<td>Rhizoctonia</td>
<td>Seedcorn maggots</td>
</tr>
<tr>
<td></td>
<td>Wireworms</td>
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</tbody>
</table>

**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

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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 blight 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 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.

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

| Average GDU accumulation per day1 | Estimated GDU requirement to reach 90% emergence2 | 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.

Figure 4. Performance gain (bu/acre) of Acceleron® fungicide/insecticide seed treatment products verses 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.

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.