

Chemical Control/New Products

MESSENGER®: A NEW TOOL FOR IPM

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The active ingredient in Messenger® is Harpin Ea, a naturally occurring protein derived from *Erwinia amylovora*, a causing agent of fire blight. When Messenger is applied to a plant, the harpin Ea protein binds to the plant foliar receptors. The receptors recognize the presence of harpin Ea, sending a signal that a pathogen is present, in effect “tricking” the plant into thinking it is under attack. This binding process triggers a cascade of responses affecting a global change of gene expressions, stimulating several distinct biochemical pathways within the plant. These pathways, responsible for growth and disease and insect resistance, include the salicylic acid dependent pathway, jasmonic acid/ethylene induced pathway and the plant growth pathways. The harpin Ea-induced gene expression also stimulates nutrient uptake and photosynthesis, resulting in an overall healthier and hardier plant.

While this natural process occurs nearly every day in almost all plants, Messenger allows growers to harness and utilize the process to enhance the health and growth of plants and to protect crops from a broad array of insects and diseases. Once a plant is treated, activation is generally initiated within 5 to 10 minutes and full response generally occurs within 3 to 5 days. The effects may continue for several weeks or throughout the growing season, depending on the crop.

Utilizing the proprietary Harpin protein technology, EDEN has developed its first product, Messenger®, which simultaneously enhances a plant’s own growth systems and natural defense mechanisms to ward off attacks by insects, common diseases and environmental stresses. Messenger exhibits a high degree of environmental safety and, once applied, degrades rapidly and leaves no detectable residue. Messenger has been granted a registration by the Environmental Protection Agency (EPA), allowing for its sale in the United States and is currently registered for use in most states. Features of Messenger include:

- Simultaneous activation of natural plant systems to:
- Enhance plant growth, crop yield and quality.
- Protect against a broad array of viral, fungal and bacterial diseases, including some for which no effective treatment is currently available.
- Enhance resistance to attacks by insects, decreasing potential for damage.
- Effectiveness across a wide array of crops.
- Improved food safety.
- Reduced risk of environmental damage.
- Increased worker safety.

Messenger is a new tool to serve as the foundation of an Integrated Pest Management (IPM) program. When plants are healthy, they are better prepared to resist attacks by diseases, insects and environmental stresses, resulting in a more effective and judicious use of pesticides for enhanced crop protection. In addition, Messenger does not disrupt natural or introduced populations of beneficial predators and parasites that are often an integral component of an IPM program. Messenger can be used throughout the growing season as a tool that not only enhances disease and insect resistance but also promotes growth and optimal plant health.

EDEN's current research and development efforts are focused, in part, on expanding Messenger® to a number of different crops and different countries worldwide. A large part of our development occurs in the field. We spend significant amounts of time and money conducting field trials in an effort to determine optimal timing, rates and application methods that fit within current agricultural practices and IPM programs and in as many different crops and countries as possible.

In addition to thousands of greenhouse and university studies, Messenger has been extensively tested in hundreds of field trials in four countries and on more than 40 crops including citrus, cotton, strawberries, tomatoes, peppers, melons, wheat, rice, peanuts, tobacco, grapes and others. These field trial programs are conducted for each individual crop to collect the information needed to ensure that the product is ready for commercialization in that particular crop in that specific country.

As with any new product, we have a lot more to learn about Messenger and how it can integrate with current agricultural practices to enhance crop production throughout the world. Field development is key to that understanding. EDEN is committed to the continuous development of new crop applications in new countries and with new products.

Some of the expanded areas that EDEN is currently exploring include:

- Finding entirely new harpin proteins and studying individual harpin pieces.
- Better understanding the plant receptor system that "receives" the message sent by the harpin protein.
- Dissecting harpin and harpin receptor-mediated signal transduction pathways that lead to increased resistance, growth and yield.
- Tailor-making harpins for specific crops or crop groups.
- Developing new formulations for specific crops or uses, such as seed treatments for small grains.

The scope of this new technology is immense, and our field development efforts will never end. As we continue to test new ideas, we will share with you these products and technologies and ask for your opinions. It is important for us to understand your needs and deliver products that help make our world a little better.