

# INNOVATION CONTINUES FOR SEED TREATMENTS

CROP PROTECTION BEGINS WITH PROTECTING THE SEED ITSELF, AND SEED TREATMENTS ARE INCREASINGLY INNOVATIVE. BY: JULIENNE ISAACS

Syngenta side-by-side trials in canola show the impact of flea beetle protection.



**S**eed treatments are a key element of growers' crop protection portfolios in Canada and around the world, offering a range of early-season boosts to the seed, from growth promoters to fertilizers to insecticides. It's a fast-growing market that offers alternative to broad-spectrum foliar application of pesticides, herbicides, and fungicides.

It's a field that's only expanding as new research and development continues to emerge from leading crop protection companies.

According to Nathan Klages, Product Lead for Seedcare and Inoculants with Syngenta Canada, seed treatments are essential to protect seed and seedlings, ensuring that plants get off to a healthy start, and ultimately leading to yield and quality improvements.

"This protection is key to agricultural production, as damaging pests have been documented in all growing regions of the country," he says.

The number and function of seed treatments continues to increase, but in general terms there are three basic categories — inoculants, functional (or traditional) chemical coatings, and biologicals. Here's a summary of what's in the pipeline for each category over the next few years.

## CHEMICAL SEED TREATMENTS

Traditional chemical seed treatments can include fungicides and insecticides — and sometimes one product includes both.

According to Lisa Power, DuPont's Market Segment Manager for Seed Treatments in Canada, seed treatment chemistries available to growers have unique properties.

**"THE FUTURE FOR SEED TREATMENTS IN THE CANADIAN MARKETPLACE LOOKS VERY BRIGHT."**

**— NATHAN KLAGES**

"Ultimately, it is about putting the best combination of chemistries together that provide growers with the most consistent levels of protection against key damaging insect pests and diseases," Power says. "DuPont is committed to work with growers and seed company customers to develop those best combinations."

Lumiderm, an insecticide seed treatment on canola that provides control of cutworms, improved protection against flea beetles (striped and crucifer), and

increased vigour and biomass of canola seedlings, is the first seed treatment from DuPont available in Canada.

"Data generated from more than 110 grower-seeded demo sites in Western Canada have demonstrated an overall reduction of almost 30 per cent in flea beetle feeding damage," Power says. "This increased protection under low-to-moderate flea beetle pressures resulted in a 1.5 bushel per acre increase with Lumiderm. For growers facing high or extreme flea beetle pressures, the benefits of Lumiderm translated into a 3.5 bushel per acre increase in yield."

In addition, Lumiderm offers growers a new mode of action in insecticide seed treatments — a huge boon to growers' integrated pest management toolbox.

Power says DuPont is bringing two new seed treatments to market in the next couple of years. "We have registration of two fungicide seed treatments from Group 7 and Group 11, and they are both registered on canola, mustard, corn, and soybean crops in Canada," she says. These fungicides work together to control a variety of diseases, including blackleg, alternaria, and seedling diseases caused by pythium, fusarium, and rhizoctonia.

"We also have an insecticide seed treatment for corn that is currently under regulatory review with the PMRA for a control of a number of key insect pests affecting corn growers," says Power.

Syngenta offers a comprehensive lineup of seed treatment products that cover major crops in Canada, including pulses, beans, cereals, corn, canola, soybeans, and potatoes.

Syngenta Canada recently announced the registration of Fortenza, a new alternative class of insecticide chemistry in corn

that provides early-season insect control of European chafer, wireworm, and cutworm, according to Klages. Combined with Maxim Quattro seed treatment, Fortenza provides control of several seed- and soil-borne pathogens, including fusarium, pythium, and rhizoctonia, aspergillus, and penicillium fungi.

Bayer CropScience has launched several seed treatment product lines in the last three years. Along with a range of fungicide for cereals, pulses, soybeans, and canola, Bayer also offers Stress Shield, an insecticide seed treatment which can be applied with its fungicide products.

"Stress Shield has the flexibility to be used in cereals, pulses, and soybeans to help protect against a number of key insects and has the added benefit of positively affecting the health of a plant," says Graham Hastie, Canada's Portfolio Manager for Cereal SeedGrowth at Bayer CropScience.

Hastie says seed treatments offer obvious benefits to crops for control of disease and insects, with long-term positive impacts on germination and crop vigour.

He cites research showing that its fungicidal seed treatment Raxil PRO is highly effective on all major diseases in Canada, especially fusarium and smut. "We have also seen that under stress conditions, Raxil PRO Shield increased the crop yield by seven per cent over untreated seed in dry conditions," he says.

In internal research trials on pulses infected with rhizoctonia, Bayer's fungicide Trilex EverGol has shown a 13 per cent increase in yield over untreated crops, and a 25 per cent yield increase in fusarium trials.

"Bayer CropScience is an innovative, research driven company and seed enhancements are a key area of focus," Hastie says. "There are many exciting things in the works, so stay tuned."

### INOCULANTS

Legume inoculation involves treating legume seed with specific rhizobia bacterial strains to promote nitrogen fixation in the soil.

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"Research has shown that inoculants are an integral part of pulse production, and BASF inoculants have been shown to be some of the most effective strains and formulations on the market today," says Russell Trischuk, Technical Marketing Specialist in Functional Crop Care for BASF.

BASF has been granted a label from the PMRA for suppression of both rhizoctonia and fusarium, which has added an additional tool to soybean growers for the management of seed and soil-borne disease. "The biofertility agents have been shown to increase both above- and below-ground plant growth leading to quicker canopy closure and enhanced yield," says Trischuk.

New seed treatment innovations from BASF include Pulse, a new fungicide-based seed treatment that will be registered on all pulses and flax grown in Western Canada in 2016. "Pulse is a soybean inoculant that has 225 days on seed survival, which is nearly two times longer survival than any competitor on the market," says Trischuk.

### BIOLOGICALS

Biological seed treatments are a growing segment of the seed treatment market. Biologicals utilize bacterial, fungal, and other microbials — living micro-organisms — to surround the seed with active protection prior to and during emergence.

"Agri-retailers need to know that biologicals, although [they are] doing the same job as traditional chemistries, are living organisms and require special handling and use to maximize efficacy," says Trischuk.

BASF offers biofungicides for the suppression of common seed and seedling diseases, and which increase biofertility to enhance root growth and development, according to Trischuk.

In the next few years, BASF will also offer several new strains of both biofertility and biofungicide biologicals which will expand outside the pulse acre, as well as several new functional coatings, and a range of products that will combine several of the seed enhancements (biological, inoculant, and functional coating) in a single offering — the first of its kind in the Canadian marketplace.

In mid-June, Syngenta announced the registration and launch of Clariva pn seed treatment, a biological seed treatment that adds to growers' toolbox in battling soybean cyst nematode (SCN) in soybean.

Clariva pn contains the *Pasteuria nishizawae* bacteria as its active ingredient. When Clariva pn treated seed is planted, the *P. nishizawae* spores are released into the soil and establish a protective zone around the young soybean plant's roots, according to Syngenta.

Clariva pn is compatible with Syngenta's Cruiser Maxx Vibrance Beans and Vibrance Maxx seed treatments. "Growers will be able to order Clariva pn on seed treated with either of these treatments from select companies and downstream treaters," Klages says.

Klages notes that seed treatments offer many other benefits alongside early season protection: they optimize seeding rates due to improved plant stand, minimize the need for replants, extend the application window for in-season pesticide applications, support earlier planting practices which helps to maximize labour and production efficiency, and complement trait technology to manage pests.



Treating seeds with biological substances is a growing segment of the seed treatment market.



Seed enhancements are one of the fastest growing areas of crop protection.

“We have other new technologies in development too, so the future for seed treatments in the Canadian marketplace looks very bright,” he says.

### JOINING FORCES FOR CROP NUTRITION

Early-season crop protection does not stop at chemical seed treatments, biologicals and inoculants.

Omex Canada, a crop nutrition company, offers a range of seed-applied packages of macro- and micronutrients called primers. According to Abdel El Hadrami, Research and Development Director for Omex Agriculture based in Manitoba, primers are formulated to be used alone or mixed with commonly used seed treatments, biological, and inoculants.

“They are meant to balance the nutrient density of the seed and correct any deficiencies that could impair germination and vigour, especially under early-season cold and wet conditions,” says El Hadrami.

Omex’s seed dressings are calcium-, phosphorus-, potassium-, and zinc-based products that are formulated using a proprietary primer gel rheology technology that allows a uniform application onto the seed.

According to El Hadrami, primers are highly concentrated and thus can be applied at small rates that vary from three to nine milliliters per kilogram of seed, depending on the crop and size of the seed. They are designed to trigger early and even emergence, even under stress conditions, and help the crop form extensive root systems.

“An early and even emergence allows the seedlings to be more competitive with weeds and vigorous to fight diseases and pests,” El Hadrami says. ♦

## NEONICOTINOIDS AND BEE HEALTH

Even though seed treatments are often considered a more eco-friendly choice than broad-spectrum foliar-applied insecticides, they’ve come under the gun in recent years.

In the European Union, three pesticides (clothianidin, imidacloprid, and thiametoxam) in the neonicotinoid family were under a two-year suspension for their suspected role in pollinator population decreases. Neonicotinoids are a class of neuro-active insecticides applied as a seed enhancement to corn, canola, cotton, sorghum, and soybeans.

The measure was taken in response to a report by the European Food Safety Authority that identified “high acute risks” for bees in contact with crop dust.

In Canada, the Ontario government has made changes to its Pesticides Act with the goal of reducing, by 80 per cent, the number of hectares planted to neonicotinoid-treated corn and soybean seed by 2017.

“The Pest Management Regulatory Agency has determined that neonicotinoids present in dust generated during planting of treated corn and soybean seeds contributed to the majority of the reported Ontario bee mortalities coinciding with corn and soybean planting,” says Andre Gagnon, Media Relations Officer for the PMRA. “The PMRA has put mitigation measures in place to reduce exposure to dust generated during planting of corn and soy, and continues to work with stakeholders to further reduce pollinator exposure to dust,” he says.

According to Gagnon, following the implementation of mitigation measures, the number and severity of incident reports associated with neonicotinoid pesticide use during the corn and soy planting period in 2015 have been 80 per cent lower in 2015 than in 2013, while in 2014, there was a 70 per cent reduction compared to 2013.

However, industry experts say neonicotinoids have been subject to a high level of testing for many years, and the results have shown a “spectrum” of results. “Insects are the target organisms for use of neonicotinoid insecticides, and their use as a seed treatment with quantified systemic activity results in exposure risk to honeybees and other pollinators via pollen, nectar, and guttation fluid,” says Curtis Rempel, Vice-President of Crop Production and Innovation at the Canola Council of Canada. “Because of this, assessment of impact on pollinator health is a component of product registration and has been a major focus of research for the past 15 years.”

Rempel says several laboratory studies have shown that neonicotinoid exposure resulted in acute and chronic effects while many studies showed no effect.

During the two-year European suspension, the EU has seen declines in oilseed rape planted acres, reduced yields and increased application of foliar insecticides resulting in reduced profitability, according to Rempel. Presently, the UK has temporarily lifted the ban on neonics for emergency use in the hope of helping farmers manage flea beetle pressures in oilseed rape.

Likewise, Ontario farmers may take a serious economic hit from the neonicotinoid restrictions imposed there. “The Conference Board of Canada has estimated that the restriction of neonicotinoid use on corn and soy may reduce farm income by \$630 million per year based upon lost yields and increased pest control costs,” Rempel says. “What is still uncertain is the increased risk to bees posed by use of foliar insecticides needed to manage insect pests as opposed to a targeted in-furrow application when neonicotinoids are used as seed treatments.”

Rempel says canola growers and beekeepers understand the mutually beneficial relationship between the crop and pollinators, and neonicotinoids have been endorsed by both canola growers and the Canadian Honey Council.

“Given the importance of neonicotinoids to canola growers in Western Canada, the economic impacts would be much higher in Western Canada,” he says.