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Action against corn pests

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Study proposes new action level for bedbugs in the Anticipate system

Two stink bugs per meter emerge as a preliminary limit for managing *Diceraeus melacanthus* in corn

02.10.2026 | 07:24 (UTC -3)

Cultivar Magazine



Photo: Fábio Luis dos Santos / iNaturalist - CC by-nc 40

Researchers propose the preliminary adoption of two adult *Diceraeus melacanthus* per meter as a control level for corn grown in the Antecipe system. This value aims to reduce the risk of losses caused by the stink bug during corn emergence. The study recorded significant damage at all pest densities tested and reduced productivity at the highest density. The work also points to the need for validation of the limit in commercial crops, different regions, and corn hybrids (doi 10.1007/s13744-026-01439-x).

The Anticipate system allows corn to be sown between the rows of soybeans while they are still in the reproductive phase. Planting occurs between 15 and 20 days before the oilseed harvest. This strategy

can reduce the soybean-corn system cycle by up to 20 days. Anticipating planting widens the planting window for the second corn crop and reduces the crop's exposure to drought and frost at the end of the cycle.

Green bridge

However, the overlap of the two crops also maintains a green bridge for phytophagous insects. In this scenario, *Diceraeus melacanthus* finds host plants during the transition between soybean and corn. The simultaneous presence of the crops may favor the population's persistence in the agroecosystem during the period of greatest vulnerability of corn seedlings.

The study evaluated the pest's preference between senescent soybeans and newly emerged corn. It also measured damage and productivity under four infestation densities. The experiments took place in Londrina, Paraná, between 2024 and 2025.

Preference trial

In the preference assay, ten adult *Diceraeus melacanthus* were released into cages with a soybean plant and a corn plant. The corn was at the VE stage. Evaluations took place over three days, at 8:30 am, 12:30 pm, and 16:30 pm.

The insects remained in greater numbers on the soybeans in most of the

evaluations. The result is noteworthy because *Diceraeus melacanthus* is usually described as a species associated with grasses, especially corn. The researchers believe that the diet used in the laboratory rearing may have influenced the choice. The nymphs were fed soybean grains, which may condition the dietary preference of the adults.

The distribution also varied throughout the day. At 8:30 am, the cooler period, the stink bugs appeared more evenly distributed between the two crops. From 12:30 pm onwards, the soybean crop concentrated a greater number of individuals.

Microclimate differences

Researchers associate this daily variation with microclimate differences between plants. Soybeans at the R7 stage have a taller and denser canopy compared to corn seedlings. This structure may offer greater humidity and lower temperatures during warmer periods.

The increased presence of the pest in soybeans did not eliminate the risk to corn. The data indicated activity of *Diceraeus melacanthus* on the cereal, with a tendency for greater presence in the early morning. According to the researchers, soybeans can act as a supporting host and keep the pest close to the corn during

emergence.

The field experiment evaluated densities of zero, one, two, and four adults per meter.

The treatments were housed in six-by-four-meter cages. Infestation occurred when the corn reached the VE stage. Damage assessments began six days later and continued ten and thirteen days after infestation.

Intensity of the injuries

The presence of bed bugs increased the intensity of the injuries. The average damage was close to zero in the treatment without bed bugs. Densities of one, two, and four insects per meter reached averages of 2,0, 2,4, and 2,5, respectively,

on a scale of zero to four, with no statistical difference between them. Even the lowest density caused significant damage.

The damage also progressed over time. Ten days after the infestation, all treatments with bed bugs exceeded an average score of 2,0. At 13 days, the lowest density, with one insect per meter, reached a score of 2,75. This score was close to the results found in the larger populations.

Productivity responded to pest density. The treatment without infestation produced 9.108,9 kilograms per hectare. A density of four stink bugs per meter resulted in 7.615 kilograms per hectare. The difference corresponded to a reduction of 1.494

kilograms per hectare, or 16,4%.

Two bed bugs per meter

Treatment with two stink bugs per meter produced 7.979,6 kilograms per hectare. This result occupied an intermediate position and showed no statistical difference compared to lower densities or the higher population. Researchers interpret this point as a possible transition between plant tolerance and the ability to compensate for damage.

Based on these results, the study proposes two adult *Diceraeus melacanthus* per meter as the most conservative control level for the Antecipe

system. The previous reference cited in the work indicates three stink bugs per meter for second-crop corn grown after soybeans, without considering the overlap between crops.

Management in the Anticipate program also needs to consider the mechanical damage caused by soybean harvesting to corn seedlings. This factor was not evaluated in the experiments. Studies cited by the researchers indicate that this stress can reduce leaf area and the plants' recovery capacity. The association between mechanical injuries and feeding by *Diceraeus melacanthus* can amplify the impact on the initial development of the cereal.

limited scope

Control strategies applied at the end of the soybean cycle also have limited reach. A previous study cited in this work showed that insecticide applications at this stage and pre-harvest desiccation did not reduce subsequent infestations in corn. For the researchers, the risk is mainly linked to the continuity of host plants in time and space. This condition is intensified in the Anticipate program and reduces the margin for decision-making in management.

The use of the new limit still requires caution. The infestation experiments were conducted in cages. Researchers recommend validation under open field

conditions, under different climatic conditions and with other corn varieties. The study also highlights frequent and early monitoring, respecting the insecticide safety interval before soybean harvest, seed treatment, and the use of more tolerant corn cultivars as components of integrated pest management.

The study was conducted by scientists Weidson Plauter Sutil, Letícia Carolina Chiampi Munhoz, and Adeney de Freitas Bueno.

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Corteva details crop protection performance after desiccation

The document shows US\$3,851 billion in sales for the first half of the year and US\$861 million in Latin America

02.10.2026 | 06:11 (UTC -3)

Cultivar Magazine



CORTEVATM
agriscience

Corteva reported net sales of US\$3,851 billion in its crop protection business during the first half of 2026. Operating EBITDA reached US\$815 million, with a margin of 21,2%. Herbicides accounted for

US\$1,959 billion. Latin America generated US\$861 million in sales. The new data is included in the report presented by the company after its separation from Vylor.

Performance surpasses sales of US\$3,731 billion recorded in the first half of 2025. In the same period of the previous year, operating EBITDA totaled US\$731 million and the margin reached 19,6%. Corteva presents operating EBITDA as a financial measure not based on US accounting principles.

Profit from continuing operations after tax fell from \$318 million to \$211 million between the two periods. The company recorded \$229 million in significant pre-tax items in the first half of 2026. This amount included \$108 million in restructuring and

asset expenses and \$121 million in estimated settlements in lawsuits related to an investigation by the U.S. Federal Trade Commission (FTC).

Recipe composition

The data also shows the composition of the new Corteva's revenues. Herbicide sales fell from US\$1,855 billion to US\$1,959 billion between the first halves of 2025 and 2026. Insecticides remained relatively stable, at US\$772 million in 2025 and US\$776 million in 2026. Fungicides decreased from US\$646 million to US\$597 million. Biologicals fell from US\$181 million to US\$156 million. Other products increased from US\$277 million to US\$363 million.

Latin America expanded its sales and share of the business. Regional sales increased from US\$818 million to US\$861 million during the period, and the region's share of the total rose from 21,9% to 22,4%. Europe, the Middle East, and Africa advanced from US\$1,146 billion to US\$1,211 billion. Asia-Pacific increased from US\$450 million to US\$481 million. North America declined from US\$1,317 billion to US\$1,298 billion.

Latin America's weight is also evident in the annual figures. The region accounted for US\$2,426 billion of crop protection sales in 2025. In 2024, the value reached US\$2,289 billion. North America led in 2025, with US\$2,866 billion. Europe, the Middle East, and Africa totaled US\$1,662

billion. Asia-Pacific accounted for US\$886 million.

Consolidated figures for 2025

In 2025, the crop protection operation generated US\$7,840 billion in revenue. This surpassed the US\$7,553 billion of 2024, but remained below the US\$8,070 billion of 2023. Net income attributable to the new Corteva reached US\$560 million. In 2024, the business had recorded a loss of US\$35 million. Research and development expenses totaled US\$479 million in 2025.

Operating EBITDA for 2025 reached US\$1,486 billion. The margin was 19%. In

2024, the indicator had reached US\$1,316 billion, with a margin of 17,4%. In 2023, it totaled US\$1,465 billion and a margin of 18,2%.

Accounting peculiarity

The document also clarifies a particular accounting aspect of the separation. Vylor was treated as the accounting successor of the former Corteva, despite being a separate company in terms of its legal operation. Therefore, the historical consolidated financial statements of the former Corteva became part of Vylor's financial history. The financial statements of the new Corteva, dedicated to crop protection, were prepared using the historical accounting records of the former

Corteva. Because they use different accounting bases, these figures differ from the results previously released for the segment.

This methodology requires caution when comparing the numbers. The crop protection business operated as a segment of Corteva before the spin-off.

The combined financial statements include revenues and costs attributable to the activity and corporate expense allocations.

The company itself acknowledges the possibility of differences compared to the costs of an independent operation. The future structure will have its own expenses for functions such as senior management, finance, information technology, legal, benefits administration, treasury, risk

management, and purchasing.

Historical relationship

The documentation also quantifies the historical relationship between crop protection and seeds. In the first half of 2026, the new Corteva sold US\$122 million in seed treatment products to the seed segment of the former company. In the same period of 2025, these sales totaled US\$102 million. After the split, commercial agreements will govern part of this relationship between Corteva and Vylor.

The pro forma financial structure shows another relevant change. The exercise considers US\$3,058 billion in cash and

cash equivalents after separation adjustments. Short-term loans would fall from US\$3,092 billion in the historical balance sheet as of June 30 to US\$70 million. Long-term debt would stand at US\$943 million. Total assets would reach US\$21,135 billion and total equity, US\$12,921 billion. These figures are for illustrative purposes only and do not represent a forecast of future results.

The financial reorganization took into account the receipt of US\$3,499 billion from Vylor. The operation also involved the planned repayment of US\$2,422 billion in commercial paper and US\$600 million used in a 364-day revolving credit facility. EIDP, a subsidiary of the new Corteva, also issued US\$700 million in bonds

maturing in 2036.

Restructuring programs

The new Corteva still maintains two restructuring programs. One of them, approved in March 2026, involves staff reductions in commercial and support areas. The company recorded US\$45 million in related expenses in the first half of the year. The program anticipates total charges between US\$40 million and US\$50 million. Completion remains scheduled for December 2026.

Another program targets the crop protection production network. The plan includes ceasing production activities in Pittsburgh, California, as well as closing selected lines in other units. In June 2026,

Corteva added its intention to end production activities in Asturias, Spain. This measure is contingent upon consultation with worker representatives. The company estimates accumulated charges between US\$720 million and US\$783 million. By the end of the second quarter of 2026, it had already recognized US\$646 million. The program's actions are expected to continue until the end of 2028.

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Agricultural Market - October 3, 2026

Harvest in the United States puts pressure on soybeans and corn

02.10.2026 | 06:10 (UTC -3)

Vlamir Brandalitze - @brandalitzeconsulting



Harvest progress in the United States and China's absence from negotiations during

the Golden Week holiday are putting pressure on agricultural prices in Chicago. Soybeans and corn are registering losses, while the market is monitoring a North American crop with no significant signs of short-term weather problems. In Brazil, exports, marketing, and planting for the new season remain the focus of attention.

Soybean situation

In the United States, the soybean harvest has reached approximately 22% of the area. Some farms have already surpassed 30%. More than 80% of the crops have reached maturity. The forecast indicates favorable conditions for machinery work in the next ten days.

Initial productivity data indicates results that are within or exceed expectations. The most optimistic projections cited in the market point to production of up to 125 million tons in the United States.

China also influences prices. The country has entered a long holiday period, with reduced commercial activity and port operations. Furthermore, soybeans remained off the list of products exempt from additional tariffs in the Chinese market.

This set of factors reduced support for prices in Chicago. The nearest positions lost the \$13 level. The July 2027 contract, previously trading above \$13,50, approached \$13. For November, indications appear close to \$12,70, with

the possibility of approaching \$12,50 within the presented scenario.

In Brazil, the exchange rate is limiting some of the external pressure. The dollar reached 5,23 reais. At the ports, the price indications for soybeans between October and December range from 160 to 166 reais per sack.

The marketing of the new crop shows that 39% of the production has been negotiated. In the previous cycle, the rate reached 39,4%. The average is 40,1%. In volume, 72,2 million tons have already been negotiated, compared to 71,1 million tons in the previous year.

Soybean planting is also gaining momentum in Brazil. Sowing has reached

7% of the national area, with more than 3,9 million hectares planted. Paraná leads with 35%. Mato Grosso exceeds 10%, Mato Grosso do Sul reaches 6%, and Goiás reaches 3%. Paraguay shows progress between 50% and 60% of the planned area, according to the information presented.

Corn situation

In the corn market, international pressure increased after the release of US stock figures. The survey indicated 53,2 million tons on September 1st. The market had expected around 48,5 million tons. The difference of nearly five million tons caused prices to fall in Chicago.

The corn harvest in the United States has reached approximately 25%. More than 80% of the crops have reached maturity or are ready for harvest. The advancement of machinery is expected to maintain a high supply in the short term.

In Brazil, corn shipments are expected to close September near six million tons. In September of the previous year, they exceeded 7,5 million tons. From January to September, the country shipped just over 20 million tons, compared to more than 22,5 million tons in the same period of the previous cycle.

Brazil's second crop reaches approximately 112 million tons. Total production, including the first, second, and third crops, exceeds 144 million tons.

Domestic consumption could reach around 100 million tons, driven by the animal feed and ethanol sectors. Export projections reach 42 million tons.

Sorghum situation

Regarding sorghum, the situation of North American crops opens up opportunities to pay attention to the Brazilian product.

Approximately 35% of the US crop has been harvested. Only 26% of the crops received a good or excellent rating, compared to 64% the previous year. The estimate presented indicates production of less than seven million tons, compared to domestic consumption close to six million tons.

This scenario limits the export potential of the United States. In Brazil, sorghum shipments were approaching one million tons at the end of September.

Wheat situation

Wheat is also being influenced by lower Chinese activity and the progress of harvests. In the Brazilian market, attention is focused on excessive rainfall. Paraná already has an advanced harvest.

Producers with better quality product maintain expectations of firm prices.

Brazilian wheat exports totaled 1,0869 million tons between January and September. In the same period of the previous year, they reached 1,5285 million

tons. Imports totaled just over 4,3 million tons, compared to more than 5,1 million tons a year earlier.

Rice situation

In the rice sector, planting is progressing in Rio Grande do Sul, Santa Catarina, and Tocantins. Prices in Rio Grande do Sul range from 81 to 90 reais per sack, depending on the region. The market awaits the resumption of shipments after operational problems caused by storms at the ports.

Bean situation

In the bean market, reduced supply is supporting prices. High-quality carioca

beans are reaching prices between 305 and 315 reais per sack in Goiás and Minas Gerais. In São Paulo, prices range from 330 to 350 reais.

Black beans are also experiencing limited supply. Prices range from 260 to 290 reais per sack, while sellers are seeking prices starting at 300 reais. The market is also monitoring the risk of rain affecting crops nearing harvest in the Center-South region.

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Valtra launches sixth generation of the T Series with up to 245 hp

Tractors receive CORE75 engine, new transmissions, SmartTouch Gen2 and FarmENGAGE connectivity

01.10.2026 | 14:55 (UTC -3)

Cultivar Magazine, based on information from Jussi Valkonen



Valtra has unveiled the sixth generation of the T Series, with power ranging from 170 hp to 245 hp, a new AGCO Power CORE75 engine, two transmission options, and updated operating systems, automation, and digital agriculture features. The manufacturer is targeting the tractors at professional producers and service providers.

The new generation adopts a platform developed to integrate tractors, implements, and farm management. The line also receives the SmartTouch Gen2 system and factory preparation for the PTx FarmENGAGE platform.

CORE75 engine

The AGCO Power CORE75 engine uses six cylinders and has a displacement of 7,5 liters. In the T236 model, it delivers up to 245 hp and a maximum torque of 1.184 newton-meters.

The system works with Smart Power Management. This system adjusts engine and transmission behavior according to the operation and the operator's selected preference. The strategy aims to combine traction capacity and fuel consumption.

According to AGCO Power laboratory tests, the CORE75 showed up to a 5% reduction in specific fuel consumption at the point of best efficiency compared to the previous generation AGCO Power 74HD engine. The company expects to complete independent validation tests by the end of

2026.

The operator can select Eco, Normal, or Power modes. The engine also operates with a wide torque range at low RPMs.

According to the manufacturer, this feature helps maintain performance during load changes.

Two transmission options

The sixth generation offers two transmission options. One uses the AGCO ML 180 continuously variable transmission. The second employs a new ten-step powershift transmission.

The settings allow for transport speeds of 40, 50, or 57 kilometers per hour,

depending on the specification and local traffic regulations.

The platform utilizes a wheelbase of 2.950 millimeters, a ground clearance of up to 575 millimeters, and a turning radius of 4,9 meters. The hydraulic system provides a flow rate of up to 200 liters per minute. The maximum permitted gross weight reaches 14 kilograms.

SmartTouch Gen2

The new T Series incorporates SmartTouch Gen2. The interface uses a 12-inch touchscreen and offers ten times the processing power of the previous generation, according to Valtra.

The system has a startup time of 22 seconds. The operator can configure work screens with up to 16 quadrants and create specific profiles for operators, tasks, and implements.

The SmartTouch Gen2 offers up to 12 configurable buttons. The interface integrates guidance features, ISOBUS, and implement management. A help function provides additional information and QR codes for reference.

The manufacturer also offers the new Active Gen2 armrest. The solution uses dedicated controls and configurable functions. SmartTouch Gen2 and Active Gen2 synchronize information with the screen installed on the A-pillar of the cabin.

Adjustments during operations

The sixth generation incorporates automation features focused on controlling the tractor and implements. The list includes Tractor Implement Management, Ground Speed ??Hydraulics, and Front Linkage Control.

Ground Speed ??Hydraulics links hydraulic functions to travel speed. Other features allow for programming controls and managing implements. The strategy aims to reduce repetitive adjustments during operations.

The line also maintains the Valtra Unlimited program, designed for factory

customization. The manufacturer anticipates configurations for agriculture, livestock farming, service provision, forestry activities, and municipal applications.

Connected machines

The tractors leave the factory ready for PTx FarmENGAGE. The platform allows for managing machine data, planning, and communication between the office and the field.

The system allows for the transfer of tasks, documentation, and agronomic information. Valtra also anticipates the use of FarmENGAGE in fleets comprised of equipment from different manufacturers.

According to Johan Grotell, product marketing manager at Valtra EME, the integration between machine, implement, management and data expands the use of embedded technologies in different operations.

Matti Tiitinen, vice president of sales and marketing at Valtra EME, states that the new generation sought to meet demands presented by farmers and service providers. Among the points mentioned are performance, operating costs, connectivity, customization, and ease of operation.

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Ascribe Bioscience expands operations in Brazil with an investment of R\$ 61 million

North American Agtech company establishes local partnerships to formulate and distribute bio-inputs for the 2026/27 crop season

01.10.2026 | 14:53 (UTC -3)

Paula Boracini



Edison Hidalgo, Research and Development Manager at Ascribe in Brazil, and Gabriel Wilmoth, Chief Operating Officer (COO) of Ascribe.

The US agtech company Ascribe Bioscience has begun its plan to nationalize its operations by establishing an industrial and logistics structure in Brazil. This move marks the practical execution phase of the US\$12 million (R\$61 million) global investment raised by the company — whose investors include the venture capital arms of Corteva (Corteva Catalyst) and Syngenta Group Ventures, as well as the Acre Venture Partners fund.

To make the operation viable and meet the demand already projected for the 2026/2027 harvest, the company has established partnerships with local formulators and distributors. In the business model adopted, the synthesis of the active ingredient remains in the United

States, while the formulation, bottling, and commercial distribution stages are carried out in Brazilian territory.

Brazil's selection to debut the technology reflects the country's leading role as a global strategic platform for validating and scaling up bio-inputs.

"Brazil has ceased to be merely a consumer market and has become a global validation platform where new agribusiness technologies need to prove their economic and operational value," says Gabriel Wilmoth, Chief Operating Officer (COO) of Ascribe. "The launch of Phytalix brings to the Brazilian farmer a powerful and sustainable new tool to increase plant defense against the main diseases of soybeans and corn, inserting

this new class of technology into the routine machinery and logistics that the producer is already accustomed to."

Soil science applied to crop immunity and regulatory validation

Ascribe's entry into the Brazilian market follows the completion of the joint regulatory approval cycle by the Ministry of Agriculture and Livestock (Mapa), Anvisa, and Ibama, which culminated in the commercial registration of Phytalix.

Unlike traditional chemical and microbiological pesticides that directly combat pathogens, this technology acts preventively. The input uses an

ascaroside—a compound from the soil microbiome synthesized in the laboratory—capable of inducing metabolic pathways and preparing the crop's immune system for an immediate and efficient response. The actual activation of these barriers only occurs when the plant detects the presence of the invader, preventing unnecessary energy expenditure and protecting the crop against severe economic damage.

Due to its unique molecular mechanism, Phytalix has received its own resistance classification from FRAC (Fungicide Resistance Action Committee). This seal consolidates the product as a novel molecule, aiding integrated pest management and rotation of mechanisms

of action in the field.

Operational profile, productivity gains, and field testing

The decision to invest in the local ecosystem was backed by a rigorous five-year validation program: more than 450 field trials were conducted in strategic regions such as Mato Grosso, Mato Grosso do Sul, Paraná, Rio Grande do Sul, São Paulo, Bahia, Goiás, and Minas Gerais. The tests proved the technology's effectiveness in reducing high-impact diseases such as brown spot, target spot, and Asian soybean rust, as well as white spot and *bipolaris* leaf spot in corn. Data

indicates a significant productivity gain that will be confirmed by farmers in this 26/27 harvest, with positive results also observed in rice, coffee, and cotton crops.

One of the key differentiators of the technology to attract global investors is overcoming the historical logistical bottlenecks of biological products. The asset offers shelf stability, resistance to temperature variations (heat and cold) and UV radiation, eliminating the need for refrigerated transport and integrating with fleets and machinery already used on agricultural properties.

“Phytalix is ??the result of global science independently attested by renowned researchers in Brazil and worldwide. Its versatility allows for direct integration into

resistance management, reducing phytotoxicity and enhancing phytosanitary control with each application,” highlights Edison Hidalgo, Research and Development Manager at Ascribe in Brazil. “The investment thesis that attracts international funds is the ability to combine advanced science with simple and safe operational application for producers, rural workers, consumers, pollinators, and soil biology.”

Founded in 2017 based on research developed at the Boyce Thompson Institute, Cornell University (USA), by scientists Frank Schroeder and Jay Farmer, Ascribe is now structuring its commercial and technical team in São Paulo to support the growth of its operations in Latin America.

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CONECTE-SE AO NOVO



Habrobracon hebetor demonstrates action against corn pests

Study identifies groups with distinct parasitism profiles against corn pests and reinforces selection according to the target

01.10.2026 | 10:52 (UTC -3)

Cultivar Magazine



Photo: Anton Gjeldum / iNaturalist - CC by-nc 4.0

A Russian study on the parasitoid *Habrobracon hebetor* yields results of interest for the management of *Helicoverpa armigera*. This caterpillar was identified in Brazil by Embrapa in February 2013 and attacks more than one hundred plant species, including soybeans, corn, cotton, sorghum, beans, and tomatoes. Researchers from the Federal Research Center for Plant Biological Protection in Krasnodar compared two local groups of *Habrobracon hebetor* collected from cornfields. The two groups differed significantly in their ability to parasitize *Lepidoptera* caterpillars.

The group collected in the central Krasnodar region is the one of most interest to the Brazilian scenario. In the

laboratory, it paralyzed all the species tested and generated offspring in *Helicoverpa armigera*, with 87% parasitism. It also developed in *Ostrinia nubilalis* (91%) and in *Etiella zinckenella* (55,6%) (doi 10.3390/insects17101012).

Field observations

In field observations of corn, researchers performed two releases, at a dose of approximately 1.400 parasitoids per hectare. They also hung cassettes containing caterpillars on the plants to support parasitoid reproduction. Damage caused by *Helicoverpa armigera* reached 13% of the ears in the area with releases and 65% in the control area. In the cassettes, 87% of the caterpillars were

parasitized.

The timing of the release influences the outcome. This group did not attack young *Helicoverpa armigera* caterpillars. In intermediate and advanced age caterpillars, the emergence of adult parasitoids was 54,5% and 78,1%, respectively.

Scientists recommend synchronizing releases with the predominance of these stages in the pest population. This suggests a complementary role to that of natural enemies that act on eggs. There is work indicating that releases combined with egg parasitoids of the genus *Trichogramma* delayed cotton infestation by 12 to 20 days.

Different group

The other group, collected in the Temryuk district, showed a different profile. It parasitized *Ostrinia nubilalis*, *Etiella zinckenella*, and moths of the Tortricidae family, but did not develop on *Helicoverpa armigera*. Within the same species and the same region, one population was effective against the caterpillar and the other was not.

Therefore, scientists recommend testing each population before mass rearing. They also warn that prolonged rearing on alternative hosts can alter the parasitoid's host range. As a precaution, they suggest renewing colonies with field material once or twice a year.

The field results are preliminary. Each comparison used only one treated plot and one control plot, with three sampling units per plot and no independent replicates. The laboratory assays were also performed with a single sample. The researchers do not yet have genetic data showing whether the two groups are lineages of the same species or part of a species complex.

* * *

Further information

- The team offered 13 pest species from four families to the parasitoid *Habrobracon hebetor*. The four most paralyzed were *Diatraea saccharalis*,

Agrotis ipsilon, *Spodoptera cosmioides*, and *Anagasta kuehniella*. *Habrobracon hebetor* did not complete its life cycle on *Agrotis ipsilon*, and the researchers concluded that paralysis is a weak criterion for host selection. Viability and attack rate were higher on *Diatraea saccharalis*. The parasitoid contaminates *Anagasta kuehniella* colonies in laboratories (doi 10.1007/s10526-022-10165-3).

- Researchers conducted releases between 2016 and 2018 in tobacco farmers' sheds in Rio Grande do Sul and in industry warehouses: (a) in tobacco farmers' sheds (70 m²), four releases of one thousand parasitoids; (b) in industry warehouses (8.000 m²), five releases of 30. From the third to

the fifth week, captures of *Epehestia* spp. moths were significantly lower where releases occurred, and remained so until the end (doi 10.1590/1678-4324-2023220278).

- Female *Habrobracon hebetor* paralyzed and killed *Spodoptera frugiperda* caterpillars from the 3rd to the 6th instar, but only laid eggs in the 5th and 6th instars. They preferred the rearing host, *Corcyra cephalonica*, and performed worse when they developed on the pest. Even so, scientists consider it a possible complementary agent, as it is easy to rear (doi 10.1007/s42690-025-01448-0).

- The study used *Helicoverpa armigera* caterpillars fed on chickpeas treated with three concentrations of the bacteria. The conclusion was that *Habrobracon hebetor* and *Bacillus thuringiensis* are compatible for combined use (doi 10.1093/jisesa/ieaa129).

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Corteva completes seed splitting and crop protection

Vylor will operate as an independent seed company; Corteva will retain its crop protection business

01.10.2026 | 09:22 (UTC -3)

Cultivar Magazine



Corteva recently announced the completion of the spin-off of its seed business. The operation made Vylor Inc. an independent company, whose shares

are expected to begin trading today on the New York Stock Exchange. The new company brings together the seed business, while Corteva remains linked to crop protection operations. Vylor has adopted the ticker symbol VYLR for trading its shares.

The separation occurred through the proportional distribution of all Vylor's common shares to Corteva's shareholders. The transaction considered investors registered at the end of the day on September 24, 2026. After the distribution, Vylor ceased to be a wholly owned subsidiary and began operating as an independent publicly traded company.

The move concludes the process announced by Corteva to split its

operations into two publicly traded companies. According to documents filed with the Securities and Exchange Commission, the resulting structure separates the current crop protection business from the seed business. The latter will now belong to Vylor.

Corteva's situation

With the split, Corteva will now present itself as a global company dedicated exclusively to crop protection, under the leadership of Luke Kissam, former chairman and CEO of Albemarle. "This is a new day for Corteva, and we couldn't be more excited to move forward with greater focus, agility, and a renewed commitment to innovation and operational excellence,"

Kissam said in a statement.

According to the company, revenue from its crop protection business grew by more than US\$1 billion between 2020 and 2025, while the segment's operating EBITDA margin increased by approximately 2,5 percentage points. Differentiated technologies, including a platform of biologicals and natural products, now account for about 65% of sales. The company has nearly 9 employees and serves growers in approximately 110 countries.

Vylor's situation

Headquartered in Johnston, Iowa, Vylor will now be led by Chuck Magro, formerly CEO of Corteva. "Our ambition is to work

with farmers of all sizes to solve some of the world's toughest challenges, from food security to energy security," Magro said in a statement. The company projects net sales between US\$11,2 billion and US\$11,9 billion in 2029, representing annual growth of 3% to 4% over the period, and operating EBITDA between US\$3,3 billion and US\$3,7 billion. In 2025, the seed business totaled US\$9,9 billion in net sales.

Vylor anticipates launching 12 technology platforms for corn, soybeans, and wheat in the next decade. Among them is a soybean platform for Latin America that, according to the company, will offer the broadest spectrum of insect control on the market. For corn, launches begin in 2028

and include a trait aimed at increasing crop productivity and stability. In field tests conducted by the company in the Americas, the average gain was three bushels per acre, approximately three sacks per hectare. The company also expects to generate more than US\$500 million in gross licensing revenue by 2027, a figure that should exceed US\$1 billion by 2035 and approach US\$2 billion by 2040.

Financial transaction

The reorganization also involved a financial transaction related to the debts of EIDP, a wholly-owned subsidiary of Corteva. Prior to the completion of the separation, Vylor conducted private offers to exchange three series of senior bonds

issued by EIDP. The company also solicited consent from the holders for changes to contracts related to these bonds. The offer deadline was 17 p.m. New York time on September 30.

In the series maturing in 2030 with an interest rate of 2,300% per year, investors submitted bonds for exchange with a principal of US\$434,841 million. This amount corresponded to 86,97% of the US\$500 million in circulation. In the series maturing in 2032 with an interest rate of 5,125%, subscriptions reached US\$476,214 million, equivalent to 95,24% of the US\$500 million in circulation. For the bonds maturing in 2033 with an interest rate of 4,800%, the volume delivered reached US\$527,584 million. This value

represented 87,93% of the US\$600 million in circulation.

Payment dates

The new Vylor bonds maintain the same interest payment dates, fees, and maturities as the corresponding series issued by EIDP. Eligible investors with valid enrollment by the early deadline, which ended on August 19, receive an equal principal amount in Vylor bonds and a cash portion. This portion amounts to approximately US\$2,90 for every US\$1.000 in the 2030 series, US\$2,67 in the 2032 series, and US\$2,86 in the 2033 series.

Holders who opt in after the early deadline and up to September 30th will receive

\$970 in Vylor bond principal for every \$1.000 in principal of the corresponding EIDP bonds. This group will not receive the additional cash portion. Accepted bondholders will also receive accrued and unpaid interest between the last applicable payment date and the settlement date, excluding the settlement date itself.

The exchange of securities depended, among other conditions, on the completion of the separation between the businesses. At the close of the offers, all conditions had already been met, except for the completion of the corporate reorganization. The document estimated that the settlement of the financial transaction would occur almost simultaneously with the separation, scheduled for October 1st.

Corteva informed the SEC of the formal completion of the transaction in a report filed on October 1st. The document records the distribution of Vylor's shares and the expected commencement of regular trading of the new company's shares on the New York Stock Exchange on the same date.



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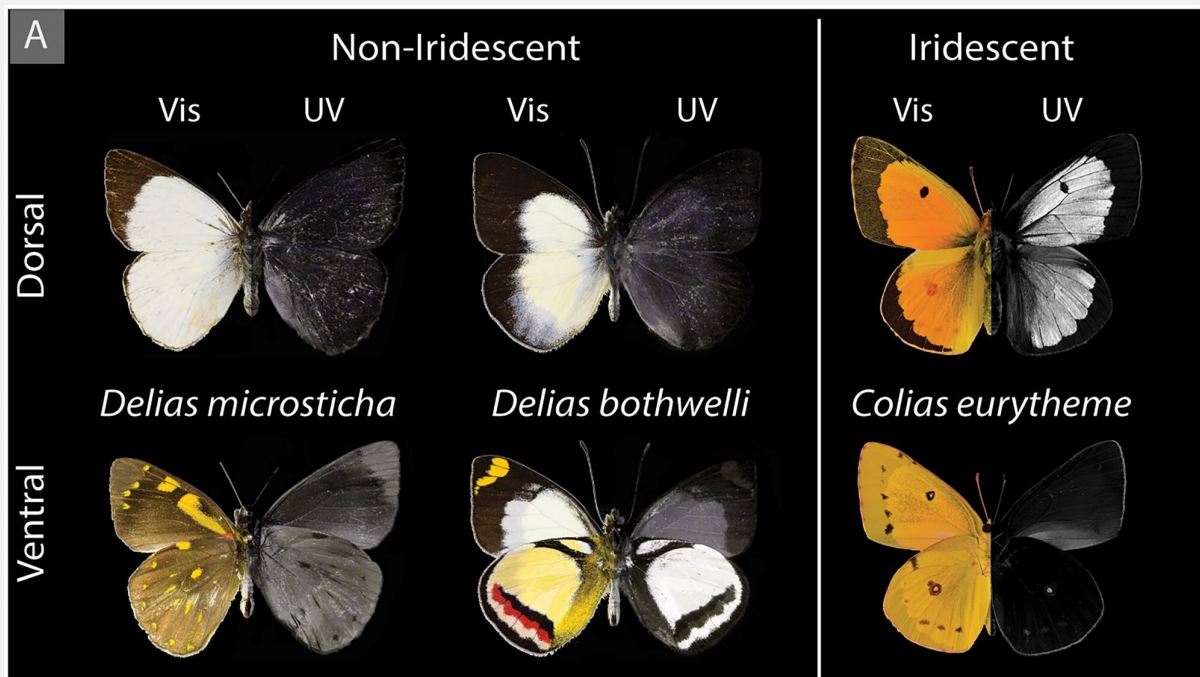


Aposematic butterflies exhibit ultraviolet reflection on their wings

Study links UV signal to reduction of pterin pigments in pierid species

01.10.2026 | 07:15 (UTC -3)

Cultivar Magazine



doi 10.1093/jisesa/ieag061

Researchers have identified ultraviolet reflection integrated into the aposematic

patterns on the ventral surface of butterfly wings of the genus *Delias* (family Pieridae). The survey evaluated 29 species and found UV signals in different color patterns. The study records this visual component in the genus for the first time.

Reflection occurred primarily on the ventral surface, sometimes overlapping with visibly white or yellow regions. Species such as *Delias dixeyi*, *Delias bakeri*, *Delias arabuana*, and *Delias albertisi* showed more defined signals. On the hindwing of *Delias dixeyi*, the UV regions reflected sharply between 300 and 400 nanometers. This reflection is part of a broadband profile, which also extends to longer wavelengths.

The researchers combined reflectance spectroscopy, chemical pigment removal, absorbance measurements, and microscopy. The application of ammonium hydroxide removed pterin pigments and increased reflection at short wavelengths. The depigmented areas then exhibited a UV response similar to that observed in naturally reflective regions.

Microscopy revealed a lower presence of pigment granules in the scales with UV reflection. At the examined magnification of 10.000 times, the analyses did not detect highly ordered multilayered structures. In other pierids, these structures are associated with iridescent ultraviolet reflection.

The results indicate a relationship between the absence or reduction of pterins and the

reflection of the epicuticle of the scales. The researchers have not yet determined whether this signal participates in aposematic defense against predators. The work points to this function as a hypothesis for future studies. The authors also consider the possibility that UV light is merely a byproduct of selection on pigmentation, without its own function (doi 10.1093/jisesa/ieag061).

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UV-B activates cold tolerance mechanism in cucumber.

Radiation stimulates flavonoids via CsUVR8-CsPIF3 and reduces cold damage in seedlings.

01.10.2026 | 05:57 (UTC -3)

Cultivar Magazine



Photo: Stephen Ausmus / USDA ARS

Supplementation with UV-B radiation increased cold tolerance in cucumber seedlings without significantly reducing biomass under the evaluated conditions. The effect depends on the CsUVR8 photoreceptor and involves greater flavonoid accumulation and increased antioxidant capacity.

Researchers exposed seedlings to different light spectra for seven days. Then, they subjected them to 4 degrees Celsius for two days. Blue and red lights also increased cold tolerance, but blue light reduced the fresh and dry mass of the plants. UV-B reduced the area of ??leaves damaged by cold and shortened the hypocotyl, a characteristic that the authors consider desirable in seedlings. High

doses caused damage and increased mortality. The selected protocol applied 20 microwatts per square centimeter for 20 minutes every two hours, over a 16-hour day.

Protein expression

In tobacco leaves (*Nicotiana benthamiana*) expressing cucumber protein, UV-B radiation promoted the conversion of CsUVR8 from the dimeric to the monomeric form and favored its accumulation in the core. Cucumber plants with CsUVR8 inactivated by CRISPR-Cas9 had a compromised response to UV-B: in them, the radiation did not increase flavonoids or cold tolerance.

Transcriptomic and metabolomic analyses pointed to flavonoid biosynthesis as a central pathway of the response.

Application of the flavonoid hesperetin to the leaves attenuated cold damage, although with a smaller effect than UV-B. In mutants lacking functional CsUVR8, hesperetin partially restored cold tolerance, which UV-B failed to do.

CsUVR8 interacts with the transcription factor CsPIF3, and UV-B radiation intensifies this interaction. Activated by radiation, CsUVR8 promotes the degradation of CsPIF3. CsPIF3 represses genes linked to flavonoid production, including CsCHS, CsCHI-L, and CsF3H. The reduction of CsPIF3 releases the expression of these genes.

Mutants lacking CsPIF3 exhibited higher flavonoid content and greater cold tolerance. Individual silencing of CsCHS, CsCHI-L, and CsF3H in these mutants reduced this effect.

In melon and watermelon, the proteins equivalent to UVR8 and PIF3 also interacted with each other. In these species, treatment with UV-B increased the flavonoid content and cold tolerance. The results are indicative of conservation of the mechanism among cucurbits, although mutants in these species have not been tested (doi 10.1093/hr/uhag411).

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Revenue from agricultural machinery fell 22,4% through August, according to Abimaq

Domestic sales fall 25,7%; exports advance 12,7% in the accumulated period of 2026

30.09.2026 | 14:10 (UTC -3)

Cultivar Magazine



The Brazilian agricultural machinery and implements industry experienced a 22,4% drop in total net revenue between January and August 2026, compared to the same period in 2025. Revenue reached R\$ 36,30 billion. The contraction was particularly strong in the domestic market, where domestic revenue fell 25,7% during the period, totaling R\$ 30,37 billion.

In August, total net revenue for the agricultural segment reached R\$ 4,79 billion. This result was 1,7% lower than July and 22,8% lower than August 2025. Sales destined for the Brazilian market generated R\$ 4,10 billion in the month. There was a decrease of 1,1% compared to the previous month and 24,9% compared to the same month last year.

The figures are part of a survey conducted by the Brazilian Association of Machinery and Equipment Industries (Abimaq). The organization points to the agricultural sector as one of the segments with the worst performance in the acquisition of machinery produced in the country in 2026. The high interest rate environment has made credit and debt servicing more expensive. This scenario has reduced productive investments and put pressure on domestic demand for capital goods.

Agricultural contraction

The agricultural downturn surpasses the overall performance of the machinery and equipment industry. Across the sector, total net revenue fell 13,2% between

January and August. Domestic revenue decreased by 15,5%. Apparent consumption of machinery and equipment declined by 11,6% during the same period. Abimaq identifies more intense impacts from reduced investment in agricultural activities and the manufacturing industry.

Exports helped offset some of the decline in the agricultural sector. External sales of agricultural machinery and implements totaled US\$1,15 billion between January and August. This represents a 12,7% increase over the same period in 2025. In August, shipments reached US\$133,44 million. This represents a 5,5% decrease compared to July and a 1,1% decrease compared to August of last year.

Agricultural imports

Agricultural imports followed a different trend in the accumulated figures. External purchases totaled US\$ 810,89 million in the first eight months of 2026, a decrease of 4%. In August, they reached US\$ 90,25 million. The amount fell 4,6% compared to July, but exceeded August 2025 by 4,9%.

In the overall machinery and equipment industry, the increase in imports has broadened the share of foreign products in national consumption. Imported equipment accounted for 47,6% of apparent consumption between January and August, compared to 45,3% in the same period of 2025. China accounted for 36% of Brazilian imports in the sector,

generating US\$8 billion during the period. Purchases of Chinese origin grew by 18,8%. Among the Chinese products that stand out are equipment destined for agriculture, logistics, civil construction, and the manufacturing industry.

Data on tractors also shows a slowdown in the Brazilian market. Factory sales accumulated a 22% decline through August. Sales to end users fell 15%. Exports advanced 30% in the period. In August, 3.324 tractors reached end users, compared to 2.790 units in July. The volume represents a monthly growth of 19,1%, but a 25,5% drop compared to August 2025.

Factories sold 3.440 tractors in August. The volume decreased by 2,6% compared

to July and by 34,1% year-on-year.

Exports reached 488 units in the month.

There was a reduction of 26,1% compared to July and an increase of 6,6% compared to August 2025.

The combine harvester market is experiencing a more intense contraction.

Factory sales have accumulated a 60,5% drop between January and August.

Deliveries to end users have decreased by 39,6%. During the same period, exports grew by 14,9%. In August, sales to end users totaled 112 machines, compared to 197 units in the same month of 2025.

Factories registered 141 units in the month, compared to 214 in August of last year.

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Syngenta reinforces global leadership in vegetable seeds

Massimo Enzo will assume the vice-head of Marketing position on October 1st

30.09.2026 | 13:48 (UTC -3)

Cultivar Magazine



Syngenta has appointed Massimo Enzo (pictured) as Global Vice Head of Marketing for Vegetable Seeds. He will assume the role on October 1st and will

work from Venice, Italy.

In his new role, Enzo will collaborate with teams and partners from different regions to support innovation initiatives, expand the company's commercial presence, and accelerate the development of its vegetable seed portfolio in strategic markets.

With over 30 years of experience in the vegetable seed industry, the executive built most of his career at Syngenta, where he held various leadership positions.

Prior to his new role, Enzo served as Marketing Leader for Vegetable Seeds in the EAME region (Europe, Africa, and the Middle East). In this position, he participated in the development and implementation of the regional strategy,

integrating different areas of the company and seeking growth opportunities through acquisitions, mergers, and strategic partnerships.

The role also involved initiatives focused on the organic growth of the business, as well as contributing to discussions and policies related to the sector and to business development projects.

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DLG creates committee to expand agricultural dialogue in North America

A group brings together producers and experts from Germany, the USA, and Canada to discuss innovation, management, and resilience

29.09.2026 | 13:24 (UTC -3)

Cultivar Magazine, based on information from Malene Conlong



The German Agricultural Society (DLG) has created the North American Regional Expert Committee to expand technical exchange between Europe, the United States, and Canada. The group brings together producers, agribusiness representatives, and experts in marketing and digitalization.

The initiative seeks to identify agricultural trends on both continents and develop proposals focused on the productivity, sustainability, and resilience of farms.

Konrad Harbort, a consultant in agricultural digitalization, chairs the group. Erik Guttulsröd, Head of Agricultural Management at DLG's Center of Competence in Agriculture and Food, and Ulrike Schmidt-Machinek, Managing

Director of DLG Markets North America, support the work.

The committee discussed, at a meeting held in Chicago, the impacts of geopolitical instability on rural properties and companies in the sector. The debate addressed increased costs of inputs, energy, and agricultural machinery, as well as disruptions in supply chains and changes in market conditions.

Participants pointed to the more efficient use of fertilizers and pesticides as key solutions to current challenges. The group also highlighted digital technologies, artificial intelligence, and precision agriculture as ways to improve farm management.

The next meeting will take place during EuroTier 2026, from November 10-13, in Hannover, Germany. The meeting will discuss applications of artificial intelligence in animal production in North America and Europe.

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Lufenuron and chlorfenapyr show a low risk of resistance

A study of *Spodoptera frugiperda* in China evaluated field populations and ten generations under selection

29.09.2026 | 07:17 (UTC -3)

Cultivar Magazine



Photo: Flash8585 / iNaturalist - CC BY-NC 4.0

Chinese populations of *Spodoptera frugiperda* showed a low risk of evolving resistance to lufenuron and chlorfenapyr. The study evaluated insects collected in four provinces and subjected a susceptible laboratory strain to ten generations of continuous selection. Resistance increased slowly for both active ingredients.

Researchers analyzed populations from Jiangsu, Guangxi, Guizhou, and Yunnan. All maintained a resistance ratio of less than five for lufenuron and chlorfenapyr. For lufenuron, the values ??ranged from 1,13 to 2,84. For chlorfenapyr, they ranged from 1,06 to 3,68.

After ten generations, the median lethal concentration of lufenuron increased from

45,83 to 132,47 milligrams per liter. The resistance ratio reached 2,89. For chlorfenapyr, the median lethal concentration rose from 5,84 to 19,84 milligrams per liter, with a resistance ratio of 3,40.

Cross-resistance

The selected strains also showed low cross-resistance to emamectin benzoate, chlorantraniliprole, and spinetoram. All ratios were below 2,3.

Resistance brought biological costs. The strain selected with lufenuron showed lower larval survival, lower pupal weight, reduced fecundity, and lower adult longevity. The relative fitness dropped to

0,66. In the strain selected with chlorfenapyr, the index dropped to 0,73.

The study also detected moderate resistance to chlorantraniliprole in populations from Guangxi and Guizhou, with ratios of 8,42 and 5,34, respectively. The researchers highlight the need for regional monitoring of diamide resistance and rotation between insecticides with different modes of action (doi 10.3390/insects17100994).

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Home compost bins provide shelter for *Drosophila suzukii* during the winter

A study in France records the development of the pest throughout the year and its protection against lethal temperatures

29.09.2026 | 06:51 (UTC -3)

Cultivar Magazine



Home compost bins can act as breeding grounds for *Drosophila suzukii* during the winter in temperate climates. Researchers at the University of Rennes, France, recorded the emergence of the pest throughout the year, including during the colder months. The internal environment of the containers likely reduced exposure to the lethal cold.

The study monitored nine experimental composting systems installed in Rennes, Brittany. Monitoring took place between November 2022 and March 2024, with no collections between July and September 2023. Emergency traps captured 95.322 fruit flies. Of this total, 7.377 individuals belonged to the species *Drosophila*

suzukii, with 3.809 males and 3.568 females.

Peaks outside of summer

Emergence showed two peaks outside of summer. The first occurred in May 2023. The second appeared between December 2023 and January 2024. Newly emerged adults, with folded wings and incomplete pigmentation, also appeared in winter. The result indicates the development of immature forms within the compound during the cold period.

The composters mitigated extreme temperatures. In winter, the interior reached temperatures up to four degrees

Celsius higher than the air temperature. The internal temperature did not fall below two degrees Celsius. Outside, the minimum temperature reached -3,8 degrees Celsius.

Minimum temperature

The minimum temperature during sampling was the variable that best explained the abundance of the pest. For every 4,3 degree Celsius increase in this variable, the number of emerged adults increased by approximately 43%.

The composition of the waste also influenced abundance. Even so, all treatments maintained populations during the winter. Researchers point to composting as habitats capable of favoring

the persistence of the pest and the recolonization of nearby agricultural areas. The management of organic waste can integrate strategies for managing the species (doi 10.1002/ps.71321).

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Study identifies promising phage against citrus canker bacteria

Analysis characterized 72 bacteriophages and points to potential for biocontrol of *Xanthomonas citri*

29.09.2026 | 06:05 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Fundecitrus

The bacteriophage P27 reduced citrus canker lesion formation by 60% in orange trees grown in greenhouses. This result is part of a study involving 72 bacteriophages capable of infecting *Xanthomonas citri*, the bacterium responsible for the disease. The research also identified proteins with potential action on bacterial structures and evaluated factors that could limit the use of viruses in the field, particularly their sensitivity to ultraviolet radiation.

The study brought together researchers from São Paulo State University (Unesp), Manchester Metropolitan University, the University of Florida, and the Citrus Defense Fund (Fundecitrus) (doi 10.1099/mgen.0.001821). Among the 72 bacteriophages analyzed, 65 correspond

to previously uncharacterized isolates obtained from orchards in the State of São Paulo. Samples were collected from leaves showing symptoms of citrus canker from 12 orchards between 2018 and 2021.

Bacterial infection

Bacteriophages infect bacteria in a specific way. After recognizing the host cell, the virus invades the bacterium, multiplies inside it, and causes cell lysis, which releases new viral particles. This specificity supports the interest in using these organisms in biocontrol programs, as it limits the effects on other components of the microbiota associated with plants.

Researchers evaluated 72 phages against 122 strains of *Xanthomonas citri*. One hundred strains showed susceptibility to lysis caused by all phages. Another 21 showed complete resistance. One strain showed a variable response depending on the bacteriophage used. The team relates the high proportion of susceptible isolates to the low genetic diversity and clonal structure of the bacterial population present in the sampled region.

Genomic analysis

Genomic analysis found low diversity among most of the viruses. Seventy isolates shared approximately 95% DNA similarity and showed genetic proximity to bacteriophage CP2, described in Japan.

Most belonged to the Autographiviridae family. The XacP77 isolate belonged to the Schitoviridae family. The group presented 40 distinct genomic signatures. Within the main Autographiviridae group, functional analysis identified 18 genomic profiles. In this population structure, a predominant clonal complex stands out, with 33 isolates, represented by P27 and LeafA.

Infection assays detailed the P27 lifecycle. Half of the viral particles adhered to bacterial cells in about ten minutes. After 30 minutes, almost all particles were adsorbed. The latent period lasted about 90 minutes. The complete growth cycle occurred between 195 and 210 minutes. Each infected cell released, on average, 20 viral particles.

Stability tests were performed with four phages: CP1, CP2, XacP77, and P27. Survival exceeded 70% between pH 4 and pH 11. The range between pH 7,4 and pH 9 showed the best performance. Viability remained relatively constant between -80 degrees Celsius and 50 degrees Celsius. A sharp drop occurred at 55 degrees Celsius. One hour at 60 degrees Celsius caused complete inactivation.

Ultraviolet radiation

Ultraviolet radiation emerged as one of the main limitations for agricultural application. Exposure reduced the viability of phages exponentially. After 160 seconds, total inactivation occurred under the assay conditions. The team intends to develop

formulations that protect phages on the leaf surface. The researchers also plan to test natural substances that hinder the emergence of bacterial resistance.

In the biocontrol trial, *Citrus sinensis* orange tree seedlings of the Pera cultivar received P27 at a concentration of 100 million plate-forming units per milliliter. Another treatment received copper oxychloride at a concentration of 1,2 grams per liter. The control received a buffer solution. After 24 hours, the researchers inoculated a susceptible strain of *Xanthomonas citri*. The evaluation took place 45 days later.

Plants by treatment

The experiment used five plants per treatment and evaluated 156 leaves. Treatment P27 reduced lesion production by 60% compared to the untreated control. The analysis showed a significant overall effect between treatments. However, in the direct comparison between P27 and the control, Dunn's statistical adjustment resulted in a p-value of 0,23. The analysis without adjustment showed a p-value of 0,077. Both values ??are above 0,05, the conventional limit for statistical significance. Copper oxychloride reduced lesions in a statistically significant way.

Scientists acknowledge that the effectiveness of P27 was lower than that obtained with the bactericide. Considering the three groups together, the treatments accounted for approximately 51% of the

variation in disease severity. According to the researchers, the data indicate the biological potential of P27. The results, however, are still derived from greenhouse trials.

The study also identified genes in the tail fibers with a possible function as exopolysaccharide depolymerases.

Structural modeling showed similarity to modules capable of interacting with carbohydrates. The researchers propose that these proteins participate in the degradation of xanthan gum present in the bacterial capsule. This mechanism could facilitate the bacteriophage's access to the surface of *Xanthomonas citri* during infection. This function remains a hypothesis based on genomic and structural analyses.

The team considers P27 a candidate for the development of biocontrol formulations within the integrated management of citrus canker. Another possibility involves combining phages with lower concentrations of copper, with the aim of reducing the dependence on this bactericide in orchards.

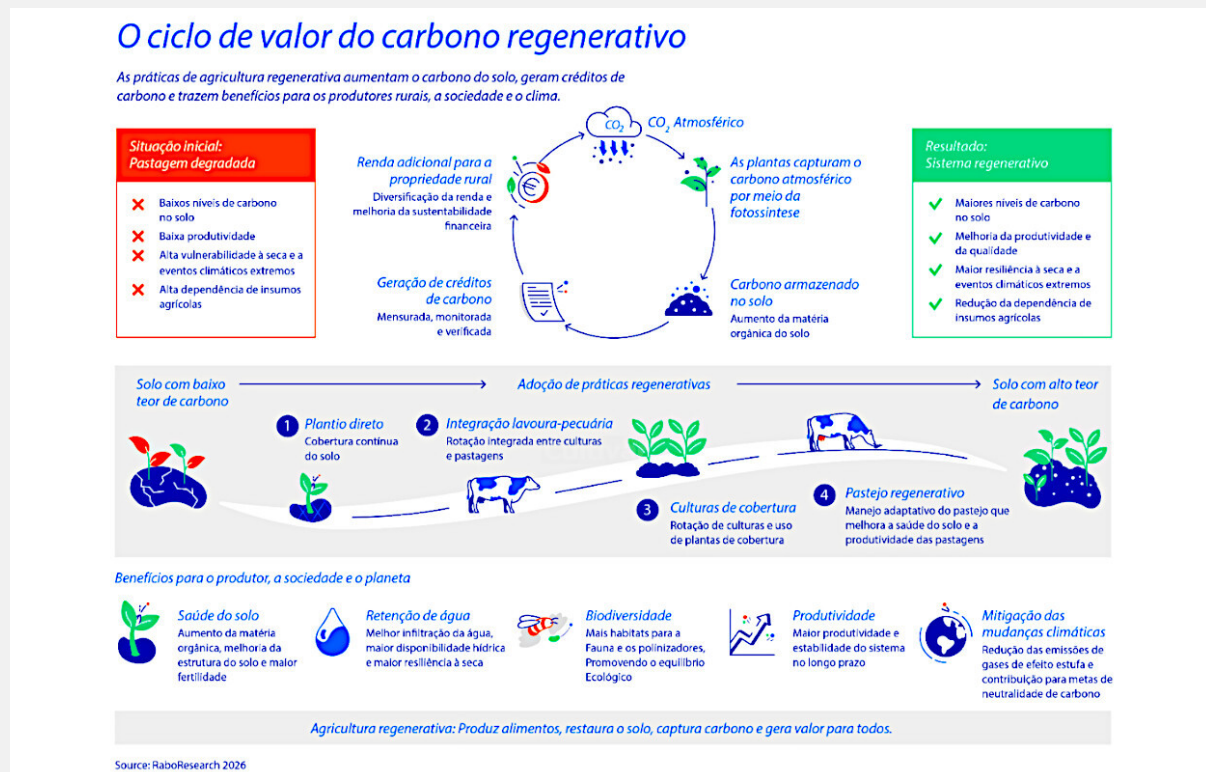
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Brazil advances in soil carbon projects

RaboResearch identifies 20 projects with VM0042 code and a pipeline exceeding 10 million credits per year

29.09.2026 | 04:55 (UTC -3)

Cultivar Magazine



Brazil has 20 agricultural carbon and soil management projects developed using Verra's VM0042 methodology. This volume

represents approximately 8% of the 264 such projects registered in the certifier's global database. The national pipeline exceeds 10 million potential carbon credits per year. This information is included in a report by RaboResearch.

The scale of Brazilian agriculture expands the potential of this market. According to data presented by RaboResearch, based on Embrapa, the country has 177 million hectares of pastureland. Of this total, approximately 28 million hectares, or 15%, show some level of degradation. These areas could undergo recovery processes using regenerative practices.

The proposal links improved management practices to increased carbon stocks in the soil. Among the practices mentioned are

no-till farming, cover crops, crop rotation, crop-livestock integration, regenerative pasture management, reduced soil disturbance, and optimized use of inputs.

Agronomic effects

The process can also generate agronomic effects. The report cites increased organic matter, greater water retention, reduced erosion, improved fertility, productivity gains, and greater resilience to droughts and extreme weather events. However, adoption requires initial investment, operational changes, and an adaptation period.

Carbon credits can function as an additional source of remuneration in this

process. The producer adopts practices capable of increasing carbon stocks. The project measures and monitors the results. An independent entity performs the validation and verification. After this stage, the certification standard can issue the credits.

The VM0042 methodology, called Improved Agricultural Land Management, encompasses a large portion of the analyzed projects. Verra's public database included 264 agricultural carbon and soil management projects at the time considered by the study. Asia accounted for 119 projects, Europe 45, Latin America 40, and Africa 26. Brazil represented 20 initiatives, half of the Latin American total.

Most Brazilian projects are still in pre-issuance phases. The report identified seven projects in the approved pipeline, four in the requested pipeline, one in the requested pipeline already under validation, three in validation, two in the registration and verification process, two awaiting registration, and only one registered project with issued credits. The situation indicates a market still in consolidation.

Long-term steps

The inclusion of a property in a pooled soil carbon project begins with an eligibility analysis. The process considers land use history, management practices, location, data availability, and carbon removal

potential.

After joining the project, a property assessment is conducted. This assessment establishes the baseline. The baseline brings together the productive conditions and carbon stocks that existed before the implementation of the new practices.

The project then defines the management plan. During the accreditation period, the producer must maintain the agreed practices and provide operational data. They must also allow audits and participate in monitoring.

This monitoring may involve management records, satellite imagery, soil analyses, field visits, and scientific models. The developer consolidates the data.

Independent entities perform the validation and verification.

After the removals are confirmed, the applicable standard issues the credits. The sale generates revenue. The producer receives a share according to the conditions stipulated in the contract.

RaboResearch emphasizes the long-term horizon of these projects. The implementation of practices, monitoring, verification, and issuance of credits occur over several years. Financial returns are not immediate.

Scale in the field

Among the initiatives mentioned is ReTerra, a partnership between Rabobank

Brazil, Ruuts by Ovis 21, and Anthesis Group. The project aims to expand crop-livestock integration and adaptive regenerative grazing. The goal involves at least 350 hectares over the next five years.

The report also presents the South American Regenerative Agriculture Program, known as SARA. The initiative concluded its first issuance in February 2026. 210 credits were generated under the VM0042 methodology for the monitoring period from 2019 to 2023.

More than a quarter of that volume had already been traded by the date of the report. Revenue reached approximately \$1,2 million. This value implies an average price of approximately \$21,80 per ton of carbon dioxide equivalent. The program

serves more than 130 farms across 150 hectares in Argentina, Chile, and Paraguay. The goal is to reach 500 hectares and exceed one million tons of carbon dioxide equivalent in annual removals starting in 2028, contingent on verifications and expansion of the program.

Another initiative brings together AMAGGI and NaturAll Carbon in Rondônia. The first phase covers approximately 25 hectares at Fazenda Carolinas. The planned management includes no-till farming, crop rotation, cover crops, and increased use of biological inputs. The project aims for certification using the VM0042 methodology.

Credit credibility

Quantifying carbon emissions is one of the main challenges. Projects need to demonstrate measurable removals associated with management changes. They also need to prove that these gains are maintained over the defined period.

The report points to the need for robust monitoring, sampling, and verification systems. The results may still be influenced by climate variability, extreme weather events, credit prices, and buyer demand.

Brazilian regulation is also part of this scenario. Law number 15.042, of 2024, established the Brazilian Emissions Trading System. The report considers the

implementation of this system a relevant component for increasing market predictability.

Brazil's climate target for 2035 foresees a net reduction of 59% to 67% in greenhouse gas emissions compared to 2005, according to the Nationally Determined Contribution presented by the country. In this context, RaboResearch evaluates soil carbon as a possible source of funding to expand the adoption of regenerative agriculture, provided that projects maintain criteria of integrity, monitoring, and verification.

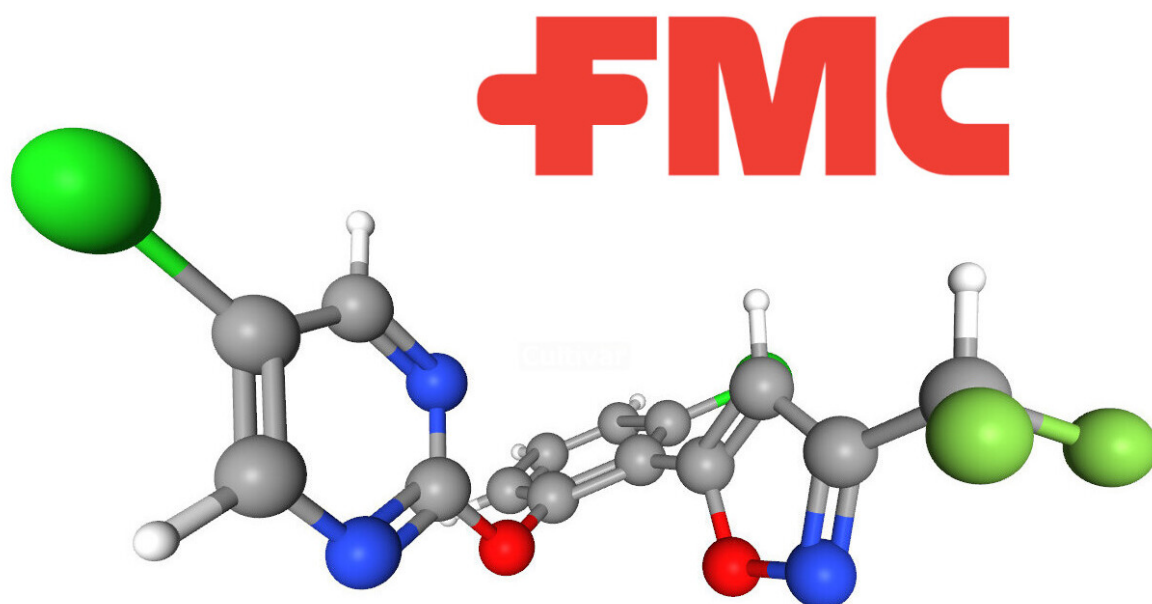
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FMC applies for registration of the herbicide rimisoxafen in Brazil

The active ingredient acts on Groups 12 and 32 and targets resistant weeds in soybeans and corn

28.09.2026 | 17:56 (UTC -3)

Cultivar Magazine, based on information from FMC



FMC Corporation has announced that it has filed the regulatory dossier and

requested registration of the rimisoxafen molecule with Brazilian authorities. This is the second global regulatory submission for the active ingredient. The company had previously submitted the documentation to the United States Environmental Protection Agency (EPA) in July 2026. The herbicide is not yet registered for sale or use in Brazil or other countries.

Rimisoxafen exhibits two modes of action in a single molecule. The Herbicide Resistance Action Committee (HRAC) has classified the ingredient in Groups 12 and 32. The classification involves the simultaneous inhibition of phytoene desaturase (PDS) and solanesyl diphosphate synthase (SDPS). The committee granted the classification in February 2026.

The Brazilian submission directs the technology towards one of the world's main soybean and corn markets. Data presented by FMC indicates approximately fifty million hectares cultivated with soybeans and more than twenty million hectares with corn in the country. The company links the development of the molecule to the increasing resistance of broadleaf weeds in these crops.

Targets mentioned

Among the cited targets are *Amaranthus hybridus* and *Amaranthus palmeri*. According to FMC, populations of *Amaranthus hybridus* have developed resistance to glyphosate and acetolactate synthase (ALS) inhibitors. The company

also highlights *Amaranthus palmeri*, a regulated quarantine weed in Brazil, as a growing threat to agricultural productivity. Field trials conducted by the company indicated the activity of rimsoxafen against small-seeded weeds and against populations resistant to other herbicides.

The mechanism involves two distinct metabolic processes. Phytoene desaturase participates in carotenoid biosynthesis. Solanesyl diphosphate synthase is part of the ubiquinone synthesis pathway. Cultivar Magazine reports confirmation of this mechanism through in vitro enzymatic assays, plant studies, and experiments with mutagenesis and transgenic lines. The technical position considers rimsoxafen a

tool for integrated resistance management, with residual use and applications in pre-emergence or early post-emergence.

New ingredients

Rimisoxafen is part of a series of new herbicide ingredients submitted by FMC for regulatory review in Brazil. The company had already made progress in the country with isoflex and dodhylex. According to the company, applications for commercial formulations of rimisoxafen will follow the progress of the regulatory evaluation. Timelines and results depend on the analysis and approvals of the competent authorities.

FMC also maintains a co-exclusive supply and licensing agreement with Corteva for rimisoxafen technology in the North and South American corn and soybean markets. The agreement, announced in June 2026, provides for the development and commercialization of proprietary formulations by each company. FMC retains ownership rights to the molecule and supplies the active ingredient to Corteva.

[Learn more about rimisoxafen by clicking here.](#)

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Cardboard packaging can reduce strawberry waste

Technology using carvacrol has tripled the shelf life of fruit and is emerging as an alternative to plastic packaging

28.09.2026 | 15:08 (UTC -3)

Joana Silva, Cultivar Magazine edition



A corrugated cardboard packaging that uses carvacrol – a natural compound found in oregano – to delay the spoilage of

strawberries has been developed by researchers from Brazil and France. The controlled-release compound, incorporated into a multilayer cardboard structure, tripled the shelf life of the fruit from three to nine days under refrigeration, showed antimicrobial action, and paves the way for the replacement of plastic packaging and the reduction of food waste.

The study involved scientists from Embrapa Instrumentation, the University of São Paulo (USP), the Federal University of São Carlos (UFSCar), the São Paulo State University (Unesp), and the Grenoble Alpes University (UGA) in France.

The initiative, based on biodegradable and recyclable cellulosic material, is related to the discussion about food loss and waste,

a topic that gains prominence on the International Day of Awareness of Food Loss and Waste, established by the United Nations General Assembly in 2019 and celebrated on September 29.

Operating mechanism

Leading the year-long study at Embrapa Instrumentation, researcher Marcos David Ferreira explains that the development of the technology consisted of combining different coating papers on the external and internal surfaces of the box, with the impregnation of the intermediate layer of the corrugated cardboard with carvacrol.

The technology was evaluated on San Andreas cultivar strawberries produced in

Bom Repouso (MG). The fruits, totaling 120, were placed in activated cardboard trays and stored for nine days at approximately 10 °C.

Research challenge

The innovation lay not only in the use of carvacrol, but also in the way it was incorporated into the cardboard, and in controlling the speed at which the compound left the multilayer structure and reached the environment surrounding the strawberries.

In addition to testing the antifungal activity in the laboratory, the researchers state that the technology was evaluated under fruit storage conditions, combining

microbiological and physicochemical analyses and using cluster analysis to observe, in an integrated manner, the evolution of strawberry quality during the nine days of the experiment.

Antimicrobial effect in strawberries

According to Ferreira, one of the main challenges in preserving strawberries is the growth of fungi, such as *Rhizopus stolonifer*, the agent that causes soft rot.

Antimicrobial results from in vitro laboratory studies showed that cardboard containing carvacrol was able to inhibit the growth of this fungus. Furthermore, this effect was observed even after 14 days of

outdoor storage at room temperature.

According to the researchers, the analyses confirmed that strawberries kept in active packaging better maintained the vibrancy of their red color, the firmness of the pulp, and the parameters of acidity and soluble solids, slowing down the natural aging process of the fruit tissue.

“The best settings delay the release enough to remain effective during storage, helping to delay fungal rot and preserve the essential quality characteristics of the fruit,” says Ramon Peres Brexó, a postdoctoral researcher on Ferreira’s team.

The main conclusion of the study is that multilayer packaging with carvacrol

functions as an active packaging for strawberries, with the coating structure determining the durability of the antimicrobial effect.

An alternative for reducing waste

Ferreira explains that strawberries are among the fruits most susceptible to deterioration after harvesting due to fresh consumption and high perishability. “Their high metabolic activity, sensitivity to damage during transport, and especially the development of fungi contribute to reducing their shelf life. This process represents a challenge for the production and distribution chain and can increase

food waste,” says the researcher.

The practical experiment with cardboard packaging, that is, a proof of concept, paves the way for fruit and vegetable producers and distributors to significantly reduce food waste throughout the entire logistics chain, ensuring fresher and safer products for the end consumer.

New legislation

Traditional plastic packaging in the European Union has been subject to new rules since August of this year, with the entry into force of the new Packaging and Packaging Waste Regulation (PPWR). The measure foresees the gradual elimination of plastic packaging for fruits and

vegetables, with the aim of reducing waste generation.

Replacing plastic packaging with cardboard packaging is emerging as an alternative for some products. In Brazil, this regulation does not yet exist, but considering exports, countries should follow the importer's rules, and this is a trend that should occur in other countries as well.

The results open new perspectives for the use of activated corrugated cardboard in the post-harvest preservation of strawberries. The next stage of the research involves further studies on the release and diffusion of carvacrol in the material, contributing to the improvement of the technology.

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Corteva and Inari celebrate agreement in dispute over seed patents

Inari plans to destroy Corteva's materials, relinquish intellectual property, and negotiate licensing agreements following a lawsuit in the US

28.09.2026 | 14:49 (UTC -3)

Cultivar Magazine



Corteva and Inari have reached a confidential agreement to end a legal dispute involving seed patents in the United States. The lawsuit has been pending in the United States District Court for the District of Delaware since September 2023. Under the agreement, Inari will destroy Corteva's biological materials in its possession or control. The company will also transfer to Corteva intellectual property related to edited versions of the company's events. The two companies also agreed to negotiate certain licensing agreements.

The agreement was reached during the trial. The hearing had begun on September 23, 2026. Corteva and Inari formalized the confidential agreement on September 27.

Today, the companies announced the settlement.

Destruction of materials

The documentation submitted to the court details the obligation to destroy the materials. The measure covers Corteva germplasm, events, derived materials, derived events, seeds, plants, plant parts, tissue cultures, DNA samples, other biological materials and their derivatives. The obligation extends to items held by Inari, affiliated companies, or third parties acting on its behalf.

The joint request submitted to the court stipulates a 30-day deadline after the court order is issued for the destruction of the

material. Inari must also deliver to Corteva, within 45 days of the order, a declaration signed by authorized representatives of Inari Agriculture in the United States and Inari Agriculture NV in Belgium. The document must confirm the disposal of the materials and will serve as a declaration under penalty of perjury.

Transfer of intellectual property

The agreement also provides for the transfer to Corteva of intellectual property related to edited versions of Corteva events developed by Inari. Corteva and Inari also indicated their intention to negotiate certain licensing arrangements.

The remaining terms remain confidential. The released documents do not disclose the financial details of the agreement.

Corteva had sued Inari in 2023. The lawsuit accused the company of illegally obtaining and copying patented corn and soybean seeds. Inari denied the accusations and contested the validity of the patents.

Closure of the process

The parties requested the termination of the proceedings with prejudice, a modality provided for in the American judicial system in which the covered claims cannot be re-litigated in a new action. The document also provides for the

maintenance of the court's jurisdiction for the application of the agreement and the order. Each company will be responsible for its own litigation expenses, including attorneys' fees, expert fees, and other costs related to the case.

The lawsuit involves Corteva Agriscience LLC, Pioneer Hi-Bred International, Inc., and Agrigenetics, Inc. as plaintiffs. Inari Agriculture, Inc. and Inari Agriculture NV are named as defendants. The case is being heard under number 23-1059 in the United States District Court for the District of Delaware.

* * *

Understand the case

To patent a seed in the US, the company needs to deposit samples in a recognized seed bank. In this case, it was the ATCC (American Type Culture Collection).

Corteva claims it made these deposits when applying for the patents. The ATCC is a non-profit organization that stores and distributes biological materials, including seeds, for research purposes. According to Corteva, the seeds were available for inspection, but it was prohibited to use them commercially or transfer them outside the purchasing organization.

In December 2022, Corteva reportedly discovered that Inari had obtained hundreds of varieties of its ATCC-protected seeds and exported them to Belgium. According to the court's description, the alleged scheme had four

stages:

- Inari's Belgian branch purchased the seeds from ATCC.
- They were sent to Belgium.
- There, supposedly beyond the reach of American intellectual property, they were multiplied and used to create their own modified strains.
- Finally, Inari reportedly tried to pressure Corteva into closing a commercial deal.

Regarding this final step, the lawsuit recounts a video conference in which Inari allegedly proposed a trade: it would not sell corn containing two unlicensed genetically modified events from Corteva if Corteva collaborated on Inari's soy

products. The lawsuit was filed on September 27, 2023, in the Federal Court of Delaware.

The reasons on each side

Corteva: The company argued that it needed to protect a heavy investment. It said it spends nearly \$4 million a day on R&D, and that a single biotechnological feature can take about 16 years to reach the market. In its view, Inari would be illegally "piggybacking" on a market that Corteva took decades and billions of dollars to build.

Inari: The startup claims that all samples were legally purchased through the

ATCC's public deposit system. Their arguments are:

- Corteva itself promised in the patents that the seeds would be publicly available after the granting of the patent.
- American law and the Budapest Treaty require unrestricted access after a patent is granted.
- Corteva itself has already purchased thousands of samples from competitors at ATCC.
- Inari claims to have informed Corteva, between September 2021 and December 2022, that it had purchased seeds from ATCC and was conducting research outside the U.S.

Inari also counterattacked. It challenged the validity of five Corteva genetically modified crop patents, including events related to Qrome corn, Enlist soybeans, and Herculex corn. It also challenged more than 230 plant variety protection certificates linked to Pioneer corn genetics. According to Inari, the case involved a giant using the courts to stifle an emerging competitor.

How the case escalated

2024: The process began with one patent. A year later, Corteva added four more patents and hundreds of cultivar certificates. In August, the court denied Inari's request to dismiss the lawsuit.

May 2025: The judge rejected some of Inari's claims, such as bad faith litigation and patent abuse.

May 2026: The Department of Justice (DOJ) got involved in the case. It highlighted the concentration in the seed industry and said that reasonable access to patented seeds could be important for new entrants, but it did not take sides.

September 2026: The jury trial began. Corteva was seeking over \$446 million for patent infringement, plus \$877 million for unfair competition and breach of contract. The settlement was signed on the 27th, while the trial was still underway.

Why did the case matter?

The process could define what third parties can do with seeds deposited to obtain patents. It also touched on the debate about whether varieties obtained through genome editing are new cultivars, essentially derived varieties, or the same variety. A final ruling could have significantly changed access to protected biological material. With the agreement, the current situation is likely to continue.

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Syngenta strengthens its global change management team

Paola Sciencia do Prado will now work in the area of change management and adoption on a global scale

28.09.2026 | 08:20 (UTC -3)



Executive Paola Sciencia do Prado assumed the role of Global Change Management & Adoption Lead at Syngenta in September. Prior to her new

position, she led the Excellence P&S area in Brazil. She took on this role in September 2025. She has been with Syngenta since November 2022, where she also served as Business Improvement Manager.

During this period, he led initiatives focused on operational excellence, continuous improvement, and transformation at P&S Brasil. Among his responsibilities, he led the regional Lean Six Sigma program and projects aimed at productivity and resource optimization.

Paola also worked at SIG Combibloc, where she held management positions in technical support and back office. Prior to that, she developed her career at DuPont, working in planning, processes, and PMO.

The executive holds a degree in production engineering from FEI, an executive MBA in business management from the Fundação Instituto de Administração, and training in international management from Grenoble IAE in France.

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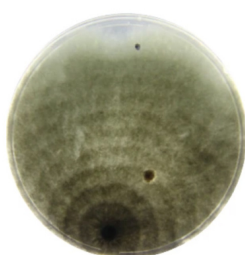
Bacteria reduce wheat root rot by about 60%

Inoculation reorganized the rhizosphere microbiome and expanded functions related to plant defense and growth

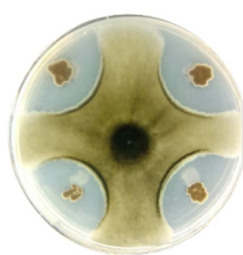
28.09.2026 | 07:37 (UTC -3)

Cultivar Magazine

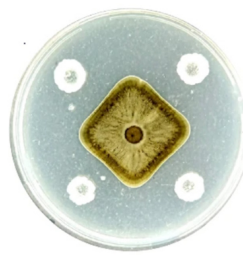
TESTE DE ANTAGONISMO IN VITRO DE TRÊS CEPAS BACTERIANAS



B. sorokiniana
cepa controle



Streptomyces virginiae
cepa CMAA1738 (Sv)



Paenibacillus ottowii
cepa CMAA1739 (Po)



Pseudomonas inefficax
cepa CMAA1741 (Pi)

Images: Caroline Sayuri Nishisaka / Embrapa

Researchers from Embrapa and the University of São Paulo have identified three bacteria capable of reducing the severity of wheat root rot caused by *Bipolaris sorokiniana* by approximately 60%. The tests were conducted in pots

under controlled conditions. *Streptomyces virginiae*, *Paenibacillus ottowii*, and *Pseudomonas inefficax* were applied to the seeds, with a booster dose at the base of the stem. The bacteria modified the rhizosphere microbiome and promoted plant protection.

The effect occurred without a consistent reduction in the amount of pathogen in the soil. Inoculation altered the composition of the bacterial community and was the main factor associated with disease severity.

The results suggest a microbiome-mediated resistance mechanism, rather than simple elimination of the fungus.

Greater effect

Among the three species, *Pseudomonas inefficax* showed the greatest effect on root biomass. The bacterium also concentrated the largest number of genetic characteristics associated with growth promotion, such as nitrogen acquisition, phosphorus solubilization, iron absorption, tolerance to abiotic stresses, and biofilm formation.

In treatments with *Streptomyces virginiae* and *Pseudomonas inefficax*, the rhizosphere microbiome maintained the diversity of genes linked to plant growth promotion at levels similar to the control. It also developed more groups of biosynthetic genes associated with metabolite production than in plants exposed only to the fungus. With *Paenibacillus ottowii*, the diversity of these

genes decreased.

The strains are part of Embrapa's asset portfolio and can serve as a basis for future inoculants aimed at managing wheat diseases, but they still need to be evaluated in other soils and in the field.

Researchers are now investigating which metabolites produced by the plants support the beneficial bacteria and which metabolic pathways are activated in this interaction (doi 10.1038/s41522-026-01021-8).

The work is being carried out by scientists Caroline Sayuri Nishisaka, Hélio Danilo Quevedo, Thierry Alexandre Pellegrinetti, Fernanda de Almeida Godoy, Maike Rossmann, Lucas William Mendes, and Rodrigo Mendes.

Read also: [Microbial diversity affects biological control in wheat](#)

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Alkaloids from *Aconitum carmichaelii* show activity against aphids

The lateral root fraction showed greater oral toxicity and altered neural pathways in *Acyrtosiphon pisum*

28.09.2026 | 05:52 (UTC -3)

Cultivar Magazine



Photo: Shipher Wu and Gee-way Lin / National Taiwan University - CC BY 2.5

Alkaloids extracted from the lateral roots of *Aconitum carmichaelii* showed insecticidal activity against *Acyrtosiphon pisum* in laboratory tests. The total alkaloid fraction reached a median lethal concentration of 0,82 micrograms per milliliter after 24 hours of ingestion. By contact, the value reached 16,47 micrograms per milliliter. The result indicates greater toxicity via the oral route under the evaluated conditions.

LC-MS/MS analysis identified 422 compounds in the fraction. Diterpenoid alkaloids formed the largest group, with 148 compounds, or 35,07%. The researchers isolated seven previously known diterpenoid alkaloids. In a preliminary screening with a single concentration of 100 micrograms per

milliliter, neoline and isotalatizidine showed the highest mortalities: 63,3% and 60,0%, respectively. Even so, these two compounds were less active than the complete fraction. For the authors, this suggests that insecticidal activity may result from the combined action of several alkaloids, and not from a single substance.

Biochemical assays

Biochemical assays showed reduced glutamate decarboxylase and $\text{Ca}^{2+}/\text{Mg}^{2+}$ -ATPase activity at all tested concentrations. The decrease in acetylcholinesterase activity and the accumulation of acetylcholine were significant only at the two highest concentrations. Transcriptomic and

metabolomic analyses indicated alterations in neural signaling, ionic homeostasis, detoxification responses, and metabolism. However, these analyses were only performed on aphids that survived the exposure, which may represent a more tolerant group.

Molecular docking predicted possible interactions of neolin and isotalatizidine with neurotoxicity-related protein models. These models come from other species (human, snail, fruit fly, and bee), and not from the aphid itself. The study treated these interactions as hypotheses, without confirmation of the molecular target. The researchers indicate the need for dose-response tests, functional validation, fraction standardization, formulation studies, and greenhouse and field

evaluations. They also recommend safety and selectivity studies for non-target organisms (doi 10.1016/j.pestbp.2026.107363).

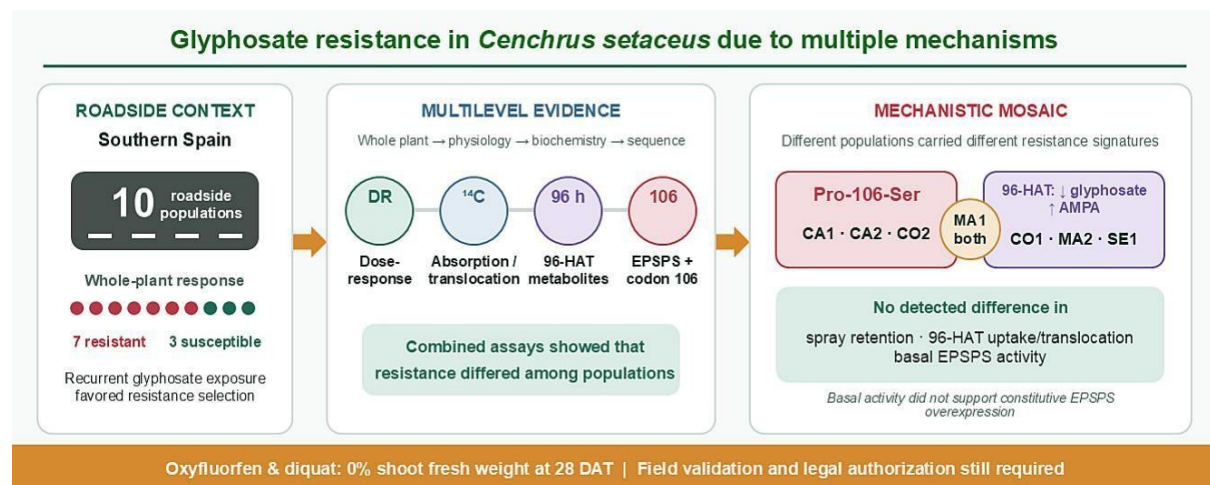
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Seven populations of *Cenchrus setaceus* resist glyphosate

Study in Spain identifies mutation in EPSPS and alteration in the metabolite profile of the herbicide

27.09.2026 | 15:50 (UTC -3)

Cultivar Magazine



doi 10.1016/j.pestbp.2026.107367

Researchers have confirmed glyphosate resistance in seven out of ten populations of *Cenchrus setaceus* collected in southern Spain. The resistant populations showed resistance factors between 20,3

and 28,0. The results indicate distinct patterns of resistance among the populations.

The study analyzed ten populations from Andalusia, nine of which were collected along roadsides. Seven came from areas with a long history of glyphosate application. Three susceptible populations required doses to reduce fresh mass by 50% between 35,1 and 39,6 grams of acid equivalent per hectare. In the resistant populations, these values ??ranged from 804,0 to 1.108,6 grams of acid equivalent per hectare.

Four populations — CA1, CA2, CO2, and MA1 — presented, in the EPSPS gene, the mutation that results in the Pro-106-Ser substitution. The group also showed a

strong reduction in the enzyme's sensitivity to glyphosate. Basal EPSPS activity remained similar among the populations. The result did not support constitutive overexpression of the enzyme as the main mechanism.

Different pattern

Another pattern emerged in CO1, MA1, MA2, and SE1. After 96 hours of application, these populations showed less glyphosate and more aminomethylphosphonic acid (AMPA) than the susceptible populations. The experimental design evaluated only one time point after treatment. Therefore, the data indicate a higher net conversion of the herbicide up to 96 hours, without

measuring the rate of metabolism.

The MA1 population combined the Pro-106-Ser mutation and the altered metabolite profile. However, the assays used different plants. Thus, the study does not prove that the two characteristics occur in the same individual nor that they act additively.

Spray retention, absorption, and glyphosate distribution did not differ between populations after 96 hours. The researchers advocate for diversified management practices and warn against the repeated use of a single mechanism of action (doi 10.1016/j.pestbp.2026.107367).

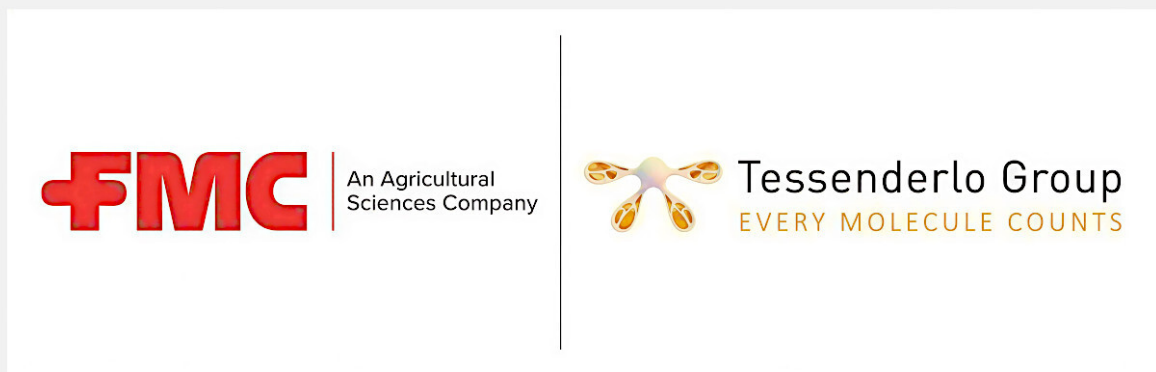
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Tessengerlo details financing for the US\$403 million investment in FMC

The group used €225 million in loans and credit lines and intends to preserve its 20% stake in FMC

25.09.2026 | 17:37 (UTC -3)

Schubert Peter, Cultivar Magazine



The Tessengerlo Group financed the purchase of 30.319.166 shares of FMC Corporation with loans from three European banks, in addition to already

available credit lines. The three loans total €225 million and have maturities between five and seven years. This information was released today.

New information has been released following the completion of the US\$403,24 million investment. Cultivar Magazine reported on September 24th the purchase of shares for US\$13,30 each, increasing Tessenderlo's stake to approximately 20% of FMC's capital. The transaction was conducted via private placement and closed on September 23rd.

The three loans have principal amounts of €100 million, €50 million, and €75 million. Tessenderlo also used resources from existing credit lines. Prior to the private placement, the Belgian group already held

790 FMC shares. The purchase of these shares used Tessenderlo's working capital.

Number of shares

With the completion of the transaction, Tessenderlo now holds 31.109.166 shares of FMC. This volume corresponds to 20% of the 155.552.366 shares issued and in circulation as of September 23. This data details the stake reported as approximately 20% in the closing announcement.

There was also a record of Tessenderlo's intention to exercise top-up rights. These mechanisms allow for additional purchases in situations foreseen in the agreement to offset the effects of certain FMC issuances. The contract limits

Tessengerlo's stake to 20%. The existence of these rights was already included in the information released about the transaction. The expression of intent to use them is new.

Governance update

Another piece of news is an update on FMC's governance. The board of directors has expanded its composition by one seat. Tessenderlo has nominated Luc Tack to fill the position. The previous news reported the expected expansion of the board after the closing and the nomination of Tack.

The new disclosure also identifies Miguel de Potter as an observer appointed by Tessenderlo. The agreement grants the

group the right to maintain a non-voting observer on the board as long as its holding is at least 10% of the outstanding shares. The same limit applies to the right to appoint a board member. The previous disclosure mentioned the observer right but did not name the appointee.

Investment purposes

Tessenderlo declared that he acquired the shares for investment purposes. At the time of the document, the group and Luc Tack had no other plans or proposals related to the corporate structures outlined, beyond those already described in the form itself. The declarants also stated that they maintain continuous review of the investment and reserved the right to buy or

sell shares, within contractual and legal limits.

There is also the possibility of discussions between the declarants, including Tessenderlo's nominee to the board and the observer, with FMC administrators, other shareholders, and third parties. The topics listed include operations, performance, management, investments, acquisitions, divestments, product development, cooperation, joint ventures, and commercial agreements. The document does not announce specific negotiations in these areas.

The statement further details the controlling relationship involving Luc Tack. He controls Oostiep Group, the holding company of Tessenderlo, and serves as CEO of both companies. Due to this

structure, Tack can be considered a joint beneficial owner of the 31.109.166 shares held by Tessenderlo.

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Multitrophic networks enhance control over biological invasions

Study integrates three ecological hypotheses and proposes a new model for evaluating and planning biological control

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Cultivar Magazine



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Scientists propose expanding the analysis of biological invasions and biological control beyond the direct relationship between plant, herbivore, and natural enemy. Their work recommends an approach based on multitrophic networks. The model includes plants, herbivorous insects, parasitoids, predators, microorganisms, and soil organisms. It also incorporates indirect effects and changes caused by climate. The proposal prioritizes the maintenance of local food webs, the complementary use of natural enemies, and a risk assessment capable of detecting hidden effects on non-target organisms.

Researchers Qinchun Li, Fanping Xu, Wenzhi Cheng, Chengmei Qi, and

Xiaowen Liu reviewed three classic explanations for the success of invasive species. Their study addresses the natural enemy release hypothesis, known by the acronym ERH; the new weapons hypothesis, or NWH; and the evolution of enhanced competitive ability hypothesis, called EICA.

Without a single explanation

The synthesis indicates the absence of a single explanation for the invasion processes. The mechanisms can act simultaneously. Their importance varies according to the invasive species, the stage of invasion, the community of

organisms, and the environmental conditions.

The natural enemy release hypothesis attributes part of the invasion's success to the loss of co-evolved and specialized natural enemies in the species' area of origin, especially herbivorous insects and pathogens. Reducing this pressure can free up resources for growth and reproduction.

Studies compiled by scientists support this mechanism in different situations. Invasive plants showed less leaf damage from herbivores and less investment in structural defenses. The comparison was made with native or non-invasive exotic species present in the same locations. Another study showed a reduction of

nearly sixty percent in the establishment of *Bromus tectorum* seedlings caused by granivorous rodents in the area of ??origin. The effect did not appear in the invaded region studied.

But there are limitations to this hypothesis. Invasive species can acquire new enemies after introduction. Generalist herbivores can consume invasive plants or alter competition between plants. In an eight-year experiment with *Solidago canadensis*, herbivorous insects above and below ground favored the invasive species. The effect occurred because the insects preferentially fed on competing native plants.

Chemical compounds

The second line of analysis involves chemical compounds produced by invasive plants. The new weapons hypothesis predicts a competitive advantage when native species lack an evolutionary history of exposure to certain allelochemicals. These compounds can affect plants, insects, decomposers, and soil microorganisms.

Extracts from invasive Asteraceae plants caused mass loss, reduced respiration, and oxidative damage in *Eisenia fetida*. Other experiments showed effects of *Rhus typhina* extracts on plant growth and soil microbial activity. Species such as *Tithonia diversifolia* and *Lantana camara* also produce compounds associated with defense and activity against other organisms.

Researchers warn of a significant challenge in this area. Many assays use high concentrations of extracts in the laboratory. These values ??may not reproduce the exposure present in the field. Soil properties, microbial community, and tolerance of the recipient species also modify the response. For this reason, the work advocates for more rigorous field experiments. These tests should manipulate concentrations under natural conditions and include biotic and abiotic factors.

Evolutionary component

The hypothesis of the evolution of enhanced competitive ability (EICA) adds an evolutionary component. Reduced pressure from specialized enemies may favor genotypes with less investment in defense and greater allocation of resources to growth and reproduction. A meta-analysis cited by the researchers shows consistently higher productivity in invasive populations than in native populations of the same species. However, the predicted reduction in defenses and the trade-off between defense and competitive ability do not appear consistently across species.

The three processes can interact. An invasive plant can lose specialized enemies, modify resource allocation, and

produce chemical compounds with effects on competitors or herbivores. The combination depends on the environment and the community present in each location.

Food network

The scientists' main proposal involves changing the unit of analysis. Instead of evaluating only pairs of species, the researchers advocate studying the ecological network. An invasion can modify relationships between organisms above and below ground. Changes in the abundance of a species can also reach other trophic levels.

This process appears in systems with parasitoids. The introduction of a natural enemy can directly reduce the population of a pest, but it can also create new relationships with native hosts. Some effects go unnoticed when the assessment only considers the emergence of the parasitoid's offspring.

One example involves *Trissolcus japonicus*, a parasitoid introduced to control the stink bug *Halyomorpha halys*. Molecular methods identified additional mortality in eggs, without complete parasitoid development. A study cited by the scientists found hidden mortality between 5,4% and 43,2% in eggs of non-target local stink bugs. The researchers advocate for the inclusion of this type of effect in risk analyses.

The functional diversity of natural enemies also gains importance in the model.

Researchers argue in favor of agents with complementary functions, rather than dependence on a single control organism. The proposal also includes the recruitment of resident antagonists and the conservation of the complexity of the food web.

The system formed by cassava, mealybug, and parasitoid illustrates the potential of this approach. The introduction of *Anagyrus lopezi* against *Phenacoccus manihoti* in Southeast Asia achieved parasitism rates between fifty and ninety percent, or more, in large areas of the region. Control restored productivity by up to ten tons per hectare, according to

studies.

DNA and models

Molecular tools occupy a central position in the proposed model. DNA metabarcoding can identify hosts, parasitoids, and hyperparasitoids present in the same sample. The technique also allows the detection of relationships that are difficult to observe using conventional rearing.

In a network formed by aphids, parasitoids, and hyperparasitoids in pecan trees, the method identified up to eight species of hyperparasitoids associated with a single parasitoid. According to the researchers, relationships of this type help explain failures in programs based on only one

agent.

Ecological niche and population dynamics models complete the strategy. Tools such as MaxEnt and CLIMEX can estimate spatial overlap between an invasive species and its natural enemies.

Physiologically based demographic models incorporate climate and host plant dynamics. Spatial population dynamics models assess release timing, initial density, and spatial aggregation of agents. In one of these studies, earlier releases and greater predator preference for the invasive species resulted in better control.

Climate projections also factor into this assessment. Increased temperatures can alter the synchronization between pests and parasitoids. Heat also alters volatile

compounds produced by plants. In potatoes, one cited study recorded changes in the volatile profile under heat stress, with less attraction of a pest and greater attraction of its parasitoids.

Researchers point to another gap: a lack of long-term studies under field conditions. Some ecological responses only appear several years after the start of the invasion. They recommend observation networks for periods of at least five to ten years. Monitoring should track the establishment and dispersal of natural enemies, recovery of the invasive population, secondary invasions, and reorganization of food webs.

The final proposal combines ecology, evolution, molecular biology, and modeling. The goal is to anticipate effects

before the release of agents, measure impacts on non-target species, and adjust management as the ecological network changes over time (doi 10.3390/insects17100989).

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