

Aug 8, 2026

N ° 91

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**Blue light
against
Spodoptera**

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Blue light reduces mating in fall armyworms

Study points to changes in the sexual call, pheromones, and reproductive success of *Spodoptera frugiperda*

07.08.2026 | 05:48 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Rebekah D Wallace / University of Georgia - Bugwood

Artificial blue lighting during nighttime reduced the probability of *Spodoptera frugiperda* mating by 39% under semi-field conditions. The wavelength also delayed the calling behavior of females and modified the composition of the sex pheromone. The results indicate potential for the use of blue light as a non-chemical component of integrated management of the fall armyworm.

Researchers evaluated blue, green, and red LEDs, as well as a treatment without lighting (doi 10.3390/insects17080809). The blue light showed a peak of 460 nanometers. The green light operated at 520 nanometers. The red light showed 620 nanometers.

In the laboratory

In laboratory trials, virgin females aged two to three days remained exposed to the treatments throughout the scotophase.

Calling activity began in the first few hours under light and red light. The peak occurred at the sixth hour. Blue light shifted the peak to the seventh hour.

Green light delayed the peak to the eighth hour and maintained low activity during the first five hours.

Light treatment, duration, and the interaction between the two influenced calling frequency. Blue and green lights delayed and reduced calling behavior compared to darkness and red light.

Analysis of pheromone gland extracts identified three compounds: (Z)-7-dodecenyl acetate, (Z)-9-tetradecenyl acetate, and (Z)-11-hexadecenyl acetate. (Z)-9-tetradecenyl acetate remained the predominant component in all treatments.

Blue light

Blue light reduced the production of (Z)-9-tetradecenyl acetate compared to darkness and red light. It also increased the production of (Z)-11-hexadecenyl acetate. The alteration changed the specific ratio of the sex pheromone compounds.

The production of (Z)-7-dodecenyl acetate showed a tendency to decrease under

blue light. However, the difference did not reach statistical significance in the evaluation performed at the peak of the call.

Temporal dynamics

The temporal dynamics showed another effect. Under dark and red light, the females produced detectable amounts of (Z)-7-dodecenyl acetate from the second hour. The peak occurred at the sixth hour. Under blue and green light, the compound appeared only from the sixth hour onwards.

(Z)-9-tetradecenyl acetate accumulated from the second hour in both dark and red treatments. The concentration reached

approximately 38 nanograms per female by the eighth hour. Under blue light, no detectable production was observed before the sixth hour.

Mating success also varied among the laboratory treatments. Darkness showed the highest rate, followed by red light, green light, and blue light. No pairs mated in the first few hours under blue illumination. The first mating records occurred in the fourth hour.

Semi-field rehearsal

The semi-field trial took place in a cornfield in Henan province, China. Researchers installed fabric cages measuring 130 centimeters long, 130 centimeters wide,

and 130 centimeters high. Each treatment received ten virgin females and ten virgin males per replicate. The study had five replicates on independent nights.

The average proportion of mated females reached 0,82 in the dark, 0,76 under red light, 0,68 under green light, and 0,50 under blue light. Only blue light significantly reduced mating compared to darkness. The difference corresponded to a 39% reduction in the probability of copulation.

Green light affected mating in the laboratory, but showed no significant difference in the semi-field assay. Red light produced responses similar to those observed in the dark in the parameters evaluated.

Study limitation

The researchers point out a limitation. The light intensities used in the semi-field tests ranged from 1.005 to 1.440 lux. These values ??exceed common levels of ambient light pollution, which are generally less than a few lux at ground level. The results represent exposures close to light traps and LED installations, and not a simulation of diffuse nighttime lighting.

The study also did not separate the effects of light on males and females. The drop in mating may result from changes in the signal emitted by females, changes in the response of males, or a combination of both mechanisms.

The data support further evaluations with different intensities, exposure times, and open field conditions. The researchers also recommend testing the antennal responses of males to extracts from females exposed to light.

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Bianca Guimarães strengthens Corteva's team of biologists

Agronomist will now be responsible for market development and marketing strategy for the biological product portfolio in Minas Gerais

06.08.2026 | 11:08 (UTC -3)

Cultivar Magazine



Corteva Agriscience has appointed agricultural engineer Bianca Guimarães as Market Development Leader – Biologicals.

Based in Uberaba (MG), she will be responsible for developing the market for the company's portfolio of biological products in Minas Gerais.

Their responsibilities include defining the marketing strategy for the biologicals area, positioning and managing the product lifecycle, developing market access strategies, identifying opportunities for portfolio expansion, and building relationships with strategic partners. They will also be responsible for representing the company at technical events and forums.

Bianca joins Corteva after a stint at Vitales Brasil, where she served as Marketing and R&D Coordinator. At the company, she participated in the strategic review of the

biologicals portfolio, conducting investment analyses, portfolio planning, pricing, demand forecasting, procurement, and regulatory processes.

The executive began her professional career at Juliagro, working as a researcher in nematology and soil phytopathology, focusing on field and laboratory trials for the registration of chemical pesticides and biological products.

She holds a degree in Agronomy from the Federal University of Uberlândia (UFU) and also completed a master's degree in Agronomy at the same institution, with an emphasis on agricultural nematology.

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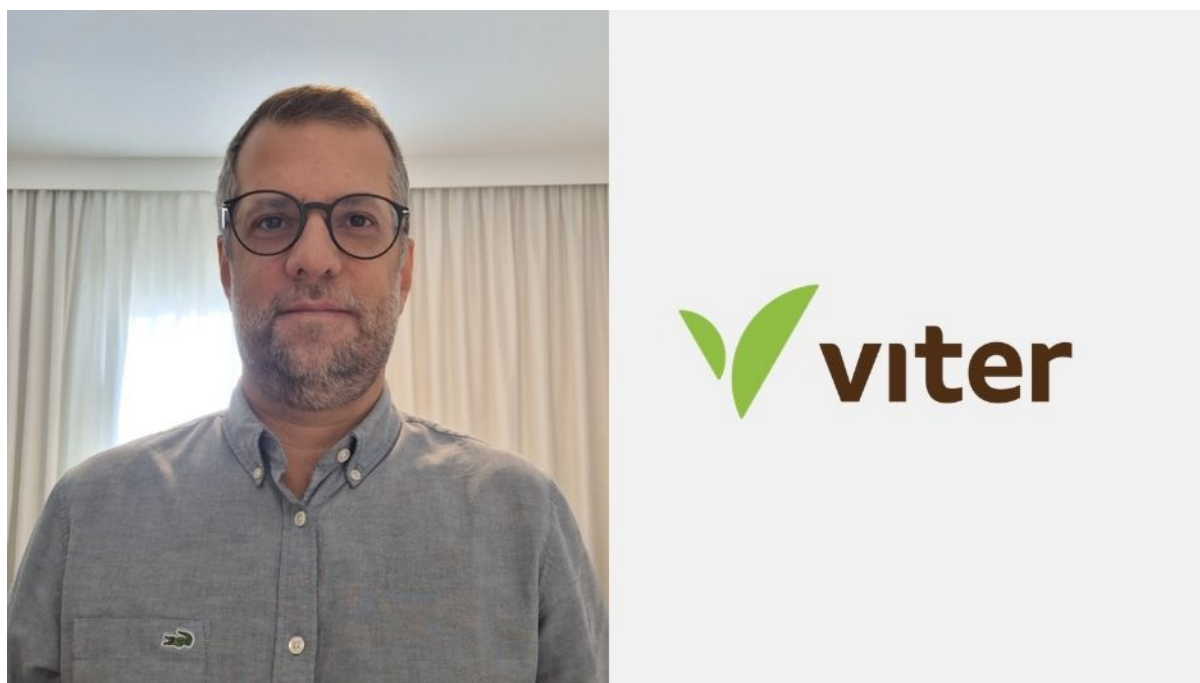
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Golmar Beppler Neto takes over marketing at Viter

Manager leaves BASF after eight years and will now lead the Marketing, Market Development and Portfolio areas

06.08.2026 | 08:22 (UTC -3)

Cultivar Magazine



Agricultural engineer Golmar Beppler Neto (pictured) has assumed the position of Marketing, Market Development and

Portfolio Manager at Viter, an agricultural inputs brand of Votorantim Cimentos.

The manager is leaving BASF, where he worked for eight years. Since February 2022, he held the position of Country Sales Manager, leading the company's commercial operations in Brazil.

In announcing the change, Beppler stated that he is beginning a new professional cycle with the challenge of leading the marketing, market development, and portfolio areas at Viter. According to him, he joins the company with the purpose of "building value, together with the client and the team," in addition to contributing to the work already developed by the team.

With over 20 years of experience in agribusiness, Golmar has built a career in

sales, marketing, and market development, working throughout the Americas. Throughout his career, he has led multicultural teams and projects focused on integrating research, production, and the market, especially in the vegetable seed segment.

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ADM announces Luiz Rebellato as commercial director in Brazil

Executive takes over Grains and Inputs strategy, focusing on growth, profitability and market expansion

05.08.2026 | 10:36 (UTC -3)

Cultivar Magazine, based on information from Nicole Kloeble



ADM announced Luiz Rebellato as the new commercial director for Grains and Inputs in Brazil. The executive assumes the position this month and will lead the commercial strategy for the area, focusing on sustainable growth, profitability, and value creation.

Rebellato will lead the origination, commercialization, and market development operations. The role includes managing the business portfolio, identifying expansion opportunities, and strengthening the company's competitiveness.

The executive will also be responsible for relationships with clients, producers, cooperatives, trading companies, and other participants in the agribusiness

chain. Responsibilities include team alignment, talent development, and fostering a results-oriented culture.

Holding a degree in Business Administration and an MBA in Financial Management, Rebellato returns to ADM after a stint with the company between 2011 and 2021. During that period, he held various positions, including purchasing manager.

The professional also worked at Gavilon, Três Tentos, and FS Bioenergia. At the latter company, he held the position of head of trading and origination.

According to ADM, the hiring is part of a strategy to strengthen its Grains and Inputs operations. The company intends to expand its service to clients and partners

through integrated solutions between agricultural production and the markets.

“It is a pleasure to return to ADM and take on this new challenge. The company has a solid track record in Brazilian agribusiness, and I believe in strengthening the Grains and Inputs operations together with the teams and partners,” says Rebellato.

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BORN TO **FARM**

AGCO changes PTx leadership and appoints new CFO.

Damon Audia takes over PTx and corporate strategy; Indira Agarwal becomes head of finance.

03.08.2026 | 13:59 (UTC -3)

Cultivar Magazine



Damon Audia and Indira Agarwal

AGCO announced changes in its executive leadership. Damon Audia assumed the presidency of PTx and the corporate

strategy area. Indira Agarwal became senior vice president and chief financial officer.

Audia previously served as senior vice president and chief financial officer. In his new role, he will lead the precision agriculture business, as well as the company's strategy and transformation teams. He also chairs the board of the PTx Trimble joint venture.

PTx brings together AGCO's precision agriculture solutions. The company considers the unit one of its main growth drivers and intends to expand value creation for producers through smart agriculture technologies.

Brian Sorbe, former president of PTx, left the company to pursue other personal and

professional priorities.

Agarwal joined AGCO in 2024 as vice president and chief accounting officer.

According to the company, she strengthened financial disclosure processes, internal controls, and initiatives focused on efficiency, structural profitability, and mergers and acquisitions.

The executive will also maintain leadership of the accounting area during the search for a successor. Agarwal has over 20 years of experience in corporate accounting, financial reporting, business integration, controls, and regulatory compliance.

Audia had held the position of Chief Financial Officer since 2022. During that time, she led areas such as accounting,

taxes, treasury, mergers and acquisitions,
financial planning, investor relations,
auditing, strategy, and communications.

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BORN TO **FARM**

Syngenta promotes professionals to marketing management positions

Júlia Loss Ribas and Bruno Provedel Fernandes assume Marketing Execution roles in Paraná and Mato Grosso

02.08.2026 | 08:24 (UTC -3)

Cultivar Magazine



Syngenta has made changes in its marketing department. Júlia Loss Ribas has been promoted to Marketing Execution Manager in Londrina, Paraná. Bruno Provedel Fernandes has assumed the same role in Primavera do Leste, Mato Grosso.

Júlia joined Syngenta in June 2022 as a technical sales assistant, through Unicampo, in Cruz Alta, Rio Grande do Sul. In August 2023, she began working in Agricultural Field Marketing in Londrina. She remained in that position until August 2026.

Prior to Syngenta, she worked as a demand generation agent at ICL South America. She also completed an internship at Cotrijal Agricultural and Industrial

Cooperative.

Júlia holds a degree in Agronomy from the Federal Institute of Education, Science and Technology of Rio Grande do Sul, Sertão campus.

Fernandes has worked at Syngenta since 2016. He began his career as a Market Intelligence intern in Londrina. Later, he held positions in Market Access, including junior analyst, senior analyst, coordinator, and senior coordinator for Brazil.

Prior to his new role, he worked as Senior Market Access Coordinator for Brazil between February 2024 and August 2026. Fernandes holds a degree in Economics from the State University of Londrina and a postgraduate degree in Business and Marketing from the Escola Superior de

Propaganda e Marketing (ESPM).

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EPA exempts eCry1Gb.1lg protein from residue limit in corn

The rule applies to field corn, sweet corn, and popcorn with protein incorporated into the plant

07.08.2026 | 15:04 (UTC -3)

Cultivar Magazine



The United States Environmental
Protection Agency (EPA) has established

a tolerance exemption for residues of the eCry1Gb.1Ig protein, derived from *Bacillus thuringiensis*, in field corn, sweet corn, and popcorn. The measure went into effect on August 7, 2026, and eliminates the need for a maximum permitted residue limit for the use of the protein as a plant-incorporated protectant.

Syngenta Seeds has requested an exemption for MZIR260 corn (SYN-ØØ260Ø-3). eCry1Gb.1Ig combines three domains of insecticidal Cry proteins from *Bacillus thuringiensis*. The protein acts against the fall armyworm. According to the EPA, its mechanism involves activation in the insect's gut and binding to receptors on intestinal cells. eCry1Gb.1Ig uses a different receptor than those associated with other Cry proteins, a characteristic

linked to its effectiveness against lepidopterans resistant to traditional Cry proteins.

In its human health risk assessment, the EPA classified the protein as having a low probability of toxicity and low allergenic potential. Acute oral toxicity tests showed no effects in mice after two doses totaling 2 milligrams per kilogram. Bioinformatics analyses also did not identify any biologically relevant match to known toxins or allergens.

The agency waived the mandatory analytical method because it did not set a numerical residue limit. Syngenta developed an immunoassay to detect eCry1Gb.1Ig in MZIR260 corn tissues. The EPA also reported no identified risk to pollinators and low environmental

persistence of the protein in soil and water, according to an ecological assessment linked to the registration process.

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Food scarcity increases predation of *Eriopis connexa*

Study indicates increased predatory activity after prolonged periods without food

07.08.2026 | 14:28 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: André - CC BY 1.0 - curid=116770103

Food scarcity increases the predatory activity of *Eriopis connexa* on the aphid *Myzus persicae*. The effect intensified after prolonged periods of deprivation. Females subjected to 72 hours without food showed the highest intensity of predation. The result indicates a compensatory response from the insect and reinforces its potential for biological control programs in systems with irregular prey supply.

The study was conducted by researchers Lucas Ramos Vieira, Anna Mara Ferreira Maciel, and Wesley Augusto Conde Godoy, from the Department of Entomology and Acarology at the Luiz de Queiroz School of Agriculture, University of São Paulo (doi 10.1111/afe.70079). The work evaluated how different periods of

scarcity alter the foraging dynamics of *Eriopis connexa*, a predator used in integrated pest management due to its ability to consume aphids.

Research format

The researchers worked with adult, mated females that were five days after emergence. The insects underwent four periods of food deprivation: zero, 24, 48, and 72 hours. In the first trial, each ladybug received 40 *Myzus persicae* individuals. The team recorded predation at 15-minute intervals for three consecutive hours.

Aphid survival decreased as the period without food from the predator increased.

The 72-hour deprivation treatment recorded 222 predation events, compared to 132 in the group without deprivation. The average survival time of aphids fell from 175 minutes in the control group to 167,3 minutes after 72 hours of fasting. The 24- and 48-hour treatments showed intermediate results.

Second experiment

A second experiment evaluated the response of *Eriopis connexa* to different prey densities. Each predator received three, five, ten, 30, 50, 70, or 90 aphids. Assessments were conducted after six and 24 hours. The trials used second- and third-instar nymphs of *Myzus persicae*. The researchers excluded adults to

prevent reproduction and the emergence of new nymphs during the experimental period.

Under all conditions, *Eriopis connexa* exhibited a type II functional response. This pattern involves a high initial attack rate followed by saturation in response to increased prey density. Handling time remained similar across treatments. The main change occurred in the attack rate, particularly in the first six hours after longer periods without food.

After six hours of exposure, the attack rate reached 8,81 per hour in the treatment with 72 hours of deprivation. In the control, the value reached 6,11 per hour. After 48 hours without food, the rate reached 7,58 per hour. The results indicate an

intensification of the search and capture of prey, without a consistent change in the time required for the predator to process each aphid.

Joint analysis

The combined analysis of the data confirmed independent effects of the deprivation period and exposure time.

Compared to the control, 24 hours without food increased the chance of predation by 19%. The increase reached 55% after 48 hours and 51% after 72 hours. An assessment after 24 hours of contact with prey increased the chance of predation by approximately 4,46 times compared to the assessment made after six hours. The interaction between deprivation duration

and assessment period did not show statistical significance.

Researchers interpret the increase after long periods without food as a compensatory response. Deprivation can amplify the motivation for searching and capturing prey. After access to prey, the attack rate decreased in longer assessments. The study links this reduction to satiety or the lower availability of aphids after the initial predation.

Handling time showed little variation. For the scientists, this result indicates the maintenance of prey processing efficiency even under different nutritional conditions. Thus, the increase in consumption was mainly due to the greater intensity of searching and capture.

The results broaden the understanding of *Eriopis connexa*'s behavior under conditions of variable food supply.

According to the study, this ability may favor the use of the species in agroecosystems with irregular distribution of aphids in space or time. The researchers also highlight the importance of the predator's nutritional status in evaluating release and management strategies in biological control programs.

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New nematode causes 16,5% loss in irrigated rice in Tocantins

Study records *Tylenchorhynchus annulatus* in flooded rice roots in Brazil for the first time

07.08.2026 | 09:31 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Jonathan D Eisenback / Virginia Polytechnic Institute and State University - Bugwood

Researchers identified *Tylenchorhynchus annulatus* in flood-irrigated rice fields in Formoso do Araguaia, Tocantins. The nematode appeared in areas with low-growing plants and poorly developed roots. The infested plots registered a 16,5% loss in grain productivity. The study represents the first report of the species infecting roots of flood-irrigated rice in Brazil (doi 10.1111/jph.70370).

The survey took place during the 2024/25 growing season. The team evaluated two commercial fields and collected 90 root samples. The nematode appeared in 85 samples. In the rhizosphere of affected plants of the IRGA 424 RI cultivar, the population reached 369 nematodes per 100 cubic centimeters of soil.

Areas with symptomatic plants produced an average of 4.425 kilograms per hectare. Adjacent areas without nematodes and without symptoms reached 5.300 kilograms per hectare.

Species identification

The identification combined morphological characteristics and molecular analysis.

Two 28S ribosomal DNA sequences showed 100% identity with *Tylenchorhynchus annulatus* sequences deposited in GenBank.

The researchers also confirmed pathogenicity in a greenhouse. Plants of the IRGA 424 RI cultivar received two thousand nematodes per pot. After 50

days, the team recovered *T. annulatus* individuals in plants with low growth and chlorosis. The estimated reproduction factor reached 6,0.

Previous records of the species in rice occurred in Asia and Africa. In the Americas, it had been recorded in corn in the United States.

The work was carried out by scientists Flavia Fernandes R. Miranda, Juvenil Enrique Cares, Adalberto C. Café-Filho, Marcos Paz S. Câmara, Ana Gabriele Amaral, Leandro Cardoso Pinto, Luis Viteri Jumbo, and Gil Rodrigues Santos.

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AGORA PRO**

**MAIS TECNOLOGIA EMBARCADA.
MENOS INSUMO DESPERDIÇADO.**



Sergio Chidi is the new strategic marketing manager at UPL

The executive has a background in marketing and market development in companies in the agricultural inputs sector

07.08.2026 | 08:55 (UTC -3)

Cultivar Magazine



UPL has hired Sergio Chidi (pictured) to assume the role of Strategic Marketing Manager in Brazil. The executive will be

responsible for the company's marketing initiatives focused on the crop protection market.

Chidi joins UPL after serving as Fungicides and Soy Manager for Brazil at Sumitomo Chemical Latin America. Previously, he held the position of Marketing Manager at Pilarquim Corp., where he participated in activities related to strategic marketing, market development, and project management.

With over two decades of experience in agribusiness, the executive has built his career in the areas of marketing, product positioning, market development, and business management for companies in the agricultural inputs sector.

Sergio Chidi holds a degree in Agronomy from the São Paulo State University (Unesp), a specialization in Plant Protection and Integrated Pest Management from the Federal University of Viçosa (UFV), and an MBA in Agribusiness Management from the University Center of Patos de Minas (Unipam).

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Economia de até 10% de defensivos agrícolas e menor impacto ambiental. Pressão constante no sistema de pulverização em até 65% de variação na velocidade, o que proporciona menor variação no tamanho da gota.



Agricultural Market - August 7, 2026

Rain in the US puts pressure on soybeans and corn; wheat gains support.

07.08.2026 | 08:20 (UTC -3)

Vlamir Brandalizzi - @brandalizzeconsulting



Rainfall in the United States has reduced pressure on soybean and corn crops following the yield losses observed in July.

The international market has begun to incorporate more favorable moisture and temperature conditions. In Brazil, high premiums are supporting soybean sales, while corn, wheat, rice, sorghum, and beans are following different supply and price trajectories.

In the United States, 92% of soybean crops have reached flowering. The average for this period is slightly below 90%. Pod formation reached 70%, compared to an average of 60%. Rainfall occurred during a crucial phase for yield determination. In total, 63% of US crops are in good or excellent condition. During the same period last year, the rate was 69%.

This scenario put pressure on soybean prices after the levels recorded in July. Contracts began to seek support near \$11,50 per bushel in the shorter positions.

In Brazil, premiums at ports ranged between 150 and 160 positive points. Sales of the current harvest reached 76%. Last year, it reached 77%. The average is also 77%.

Sales for the next harvest have reached 30%. The previous year's figure was 32%, while the average is 35%. The total volume traded is 55,8 million tons. A large part of the transactions involves barter and the acquisition of inputs. Last year, the volume reached 57,6 million tons.

Brazilian producers are also monitoring weather conditions before planting the 2026/27 crop. There is an expectation of further growth in the soybean acreage.

Corn situation

In the corn market, the rains also put pressure on Chicago. The September contract fell below the \$4,50 and \$4,40 per bushel levels. The 2027 positions also dropped below \$5 per bushel.

In the United States, crops classified as good or excellent total 61%. Last year, the index reached 73%. The heat in July reduced the productive potential. The rains in August slowed the rate of these losses.

Europe also influences the market. The drought is estimated to have reduced the European Union's corn production potential by about ten million tons. This reduction could increase European imports.

In Brazil, approximately 70% of the second corn crop had already been harvested. Last year, the figure reached 75%. The average is 80%. The total harvested volume amounts to approximately 77 million tons, compared to 85 million tons in the same period of the previous year.

The planting of summer corn has begun in isolated areas of Rio Grande do Sul. Producers in the Missões region have started the work. Progress will depend on frost forecasts.

Wheat situation

Wheat presents a distinct picture. The Chicago market is seeking support near \$6,50 per bushel. Longer-term contracts, relating to 2027 and 2028, are approaching \$7 per bushel. The conflict between Russia and Ukraine maintains pressure on logistics in the Black Sea.

In the United States, 90% of the winter wheat crop has already been harvested, in line with the average. Spring wheat has reached almost 10% harvest, compared to an average of 12%. About 55% of the spring crops are in good or excellent condition.

In Brazil, the potential wheat production reaches six million tons. This volume represents a reduction of approximately 25% compared to the 7,8 million tons harvested in the previous cycle. National demand could exceed 12 million tons.

Rice situation

In the rice market, few sellers are appearing in Rio Grande do Sul. The lower willingness to sell is keeping prices down. In the Western Border region, prices are starting between 72 and 73 reais per sack.

In Paraguay, cited estimates range between 150 and 180 hectares, compared to a potential of 240 hectares. Argentina and Uruguay also show indications of a

reduction in area. In Brazil, production may fall to around ten million tons. National consumption is estimated between 11 million and 12 million tons.

Bean situation

Bean prices are moving in the opposite direction to rice. The progress of the third harvest has increased supply and put downward pressure on prices. Premium carioca beans, with a grade of nine or higher, are priced between 255 and 290 reais per sack. Black beans vary between 195 and 220 reais per sack, depending on the region and purchasing position.

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28 de Julho - Dia do Agricultor

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DJI launches Agras T55 and dual battery system for T100

New features enhance autonomy, flow rate, solids distribution, and safety resources for agricultural operations

07.08.2026 | 06:49 (UTC -3)

Cultivar Magazine



DJI Agras T55

DJI Agriculture has launched the Agras T55 drone and the Dual Battery Spraying System for the Agras T100 in Brazil. The T55 combines spraying, solids distribution, and load lifting on a platform designed for one-person operation. The new T100 configuration extends flight autonomy and caters to large-area applications, with two batteries operating simultaneously.

The company presented the equipment at an event held in Brazil. According to DJI, the T55 caters to producers and service providers in different growing conditions. The T100 Dual Battery occupies the highest operational capacity range in the line and targets large-scale commercial operations.

The Agras T55 has a 50-liter spray tank and an operating payload of 50 kilograms. The standard configuration uses two centrifugal nozzles and achieves a maximum flow rate of 40 liters per minute. The optional installation of four nozzles increases the maximum flow rate to 50 liters per minute.

The system allows adjusting the droplet size between 50 and 500 micrometers. The effective spray range varies from four to 11 meters, depending on operating conditions. DJI positions the four-nozzle configuration for applications in situations with higher coverage demands, such as fruit growing and crops with dense foliage.

For solids distribution, the T55 uses an 80-liter reservoir and supports an operating

load of 55 kilograms. The system works with a centrifugal disc and auger feed. The maximum discharge rate reaches 400 kilograms per minute with compound fertilizer. The effective distribution width varies from three to ten meters.

The equipment accepts different auger assemblies depending on the product's particle size. Applications foreseen by the manufacturer include fertilizers, seeds, granular pesticides, and animal feed.

Another new feature of the T55 involves the lifting system. The configuration supports an operating load of 40 kilograms and uses a ten-meter cable as standard. The system incorporates automatic balance control and an emergency cable release feature.

The project also received changes focused on transportation and field assembly. The drone has handles on its body and a foldable structure. According to DJI, one person can transport, unload, and prepare the equipment for operation.

New radar

DJI has also updated the T55's obstacle awareness and avoidance capabilities. The suite includes millimeter-wave radar and a vision system with surround-aircraft coverage. According to data presented by the company at the launch, the new radar has increased angular resolution compared to the previous generation.

The safety system has a measuring range of up to 60 meters. The recommended speed for safe obstacle avoidance reaches 13,8 meters per second. The aircraft also uses cameras to provide images to the operator during flight.

The manufacturer states that the sensors are capable of operating in rain and fog, within the limitations foreseen for the equipment. Obstacles identified can be recorded for use in subsequent operations.

The Agras T55 achieves a maximum flight speed of 20 meters per second, equivalent to 72 kilometers per hour. Its maximum configurable flight radius reaches two kilometers. With RTK enabled and a suitable GNSS signal, the accuracy range indicated by the manufacturer reaches ten

centimeters on the horizontal and vertical axes.

Two batteries in the T100

For the Agras T100, DJI introduced the Dual Battery Spraying System in Brazil.

This configuration uses two batteries simultaneously. According to data released by the manufacturer, this feature increases flight time by 50% on the same charge compared to the single-battery version.

Dividing the electrical demand between the two batteries also reduces heating during discharge. DJI developed the solution focusing on extended work shifts and high-temperature conditions found in Brazilian

operations.

According to the T100's technical specifications, the dual-battery spraying system has a 100-liter tank and an operating load capacity of 90 kilograms. The information presented at the launch assumes operation with 90 liters of spray solution. The system can accommodate four nozzles and achieve a flow rate of 40 liters per minute.

Droplet size ranges from 50 to 500 micrometers. The effective spray width is between five and 11 meters. The manufacturer reports a maximum operating capacity of up to 50 hectares per hour for the T100 Dual Battery under specific conditions, with a working speed of up to 20 meters per second.

In addition to spraying, the T100 platform has configurations for solids distribution and cargo transport. The dispersion system offers a 150-liter tank, an operational capacity of up to 100 kilograms, and a maximum discharge rate of 400 kilograms per minute for compound fertilizer.

In the dual-battery lifting configuration, the load capacity reaches 80 kilograms. The system uses a ten-meter cable as standard and incorporates an emergency escape mechanism.

The T100 employs the Safety System 3.0. This system combines radar, sensor perception, and cameras. DJI highlights these features for nighttime operations and obstacle detection in different directions.

The measurement range reaches up to 60 meters.

Brazilian market gains importance

During the launch, Stefan Wang (pictured), Head of DJI Agriculture Brazil, linked the expansion of agricultural drones to the changing profile of work in the field.

According to the executive, aerial mechanization creates new technical activities and expands the participation of service providers in agricultural operations.



DJI Agriculture entered the Brazilian market in 2019. Data presented by the company indicates a growth of over 30 times in demand for equipment between 2021 and 2025. The national network includes more than 400 sales and service points in all 27 states. The company also reports having trained more than 20 pilots

in the country.

A sample survey conducted by DJI Agriculture in 2026, with users from more than 20 states, indicated that over 40% of users were under 30 years old. More than 85% of respondents were under 50 years old. Producers providing services to third parties and professional pilots comprised more than 75% of the sample.

The company points to applications of its drones in crops such as coffee, sugarcane, corn, soybeans, rice, and pastures. The advancement of technology also accompanies the diversification of tasks. In addition to the application of liquid products, the equipment has begun to perform the distribution of solids and aerial transport of cargo.

The Agras T55 has arrived at DJI Agriculture's authorized dealer network in Brazil. According to the company, purchases include training on how to operate the equipment.

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Grain aphid exhibits new mutations linked to resistance

Study detects M918L and L932F variants in *Sitobion avenae* collected in Ireland

06.08.2026 | 09:47 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Paulo Roberto Valle da Silva Pereira / Embrapa

Researchers have identified for the first time the M918L and L932F mutations in the voltage-dependent sodium channel of the grain aphid *Sitobion avenae*. The alterations appeared in samples collected in Ireland between 2022 and 2023. Both had already been associated with reduced sensitivity to pyrethroids in other insect species. The impact on field resistance of *Sitobion avenae* remains unknown (doi 10.1002/ps.71178).

Resistance variant

The M918L mutation corresponds to a resistance variant known as super-kdr. The study found this alteration in three individuals. Two came from a suction tower installed in Carlow in 2022. The third

came from Dublin in 2023. All presented the mutation in heterozygous condition.

The two specimens from Carlow carried an alteration of the ATG codon to CTG. The Dublin individual presented a change from ATG to TTG. Both alterations resulted in the substitution of the amino acid methionine for leucine at position 918.

The L932F mutation appeared in a single specimen collected in Carlow in 2022. The individual also carried the L1014F mutation, already associated with kdr-type resistance. The L932F variant promotes the substitution of leucine for phenylalanine at position 932.

Chain reaction

Scientists confirmed the M918L and L932F mutations using reverse transcription polymerase chain reaction and deep sequencing. The validation used RNA extracted from the four specimens carrying the alterations.

The study analyzed regions of the voltage-gated sodium channel gene. This channel represents the site of action of pyrethroids. Insecticides in this group interfere with the nervous function of insects, causing paralysis and death.

Specimens evaluated

The team examined 539 specimens in the region associated with super-kdr. Sequencing identified 24 haplotypes. One

of them predominated in the analyzed population. The M918L mutation appeared in two distinct haplotypes.

The study also evaluated the L1014F mutation. Researchers were able to determine the presence or absence of this alteration in 366 samples. Sixty-five individuals collected between 2022 and 2024 carried the variant. Resistant specimens occurred in all regions and years evaluated.

The samples came from suction towers installed in Carlow, Dublin, and Castlemartyr, County Cork. The equipment collected aphids in flight at a height of 12.2 meters. The insects underwent taxonomic identification and preservation in ethanol before molecular analysis.

Previous surveys

The frequency of L1014F replacement remained consistent with previous surveys conducted in Ireland and the United Kingdom. The data did not show strong evidence of an increase in kdr frequency, even after the greater reliance on pyrethroids in aphid management in cereals.

Most individuals with L1014F belonged to the same genetic group. This group also included a specimen from the SA3 laboratory strain, considered one of the main resistant strains present in the United Kingdom and Ireland. Other individuals with L1014F emerged outside this group.

Increased resistance

In *Sitobion avenae*, the L1014F mutation in heterozygous conditions has already been linked to an almost forty-fold increase in resistance to lambda-cyhalothrin.

However, researchers highlight the absence of homozygous individuals detected in the field. This limitation prevents a direct assessment of the sensitivity of these genotypes to pyrethroids.

In other aphid species, M918L is associated with high resistance to type one and type two pyrethroids. Studies with *Rhopalosiphum padi* have linked the alteration to a 194,7-fold resistance to lambda-cyhalothrin. The same studies

pointed to biological costs, with reduced longevity and fecundity in the absence of selection pressure.

The occurrence in archived samples prevents the immediate determination of these individuals' response to insecticides. The study recommends new collections in areas near the Carlow and Dublin towers. The scientists also suggest sensitivity bioassays and adaptive cost assessments.

Regular monitoring can reveal the incidence and spread of resistant strains. Suction towers offer surveillance independent of management practices and allow for the early detection of resistance mechanisms. This monitoring gains importance given the limited number of modes of action available for aphid control in cereals.

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Hydroponic systems alter the microbiota of the nutrient solution

Drip irrigation showed a higher bacterial load in a study with five cultivation models

05.08.2026 | 15:24 (UTC -3)

Cultivar Magazine



Auja Bywater and Aline Novaski Seffrin in a greenhouse at University Park with their experiment
- Photo: Penn State

The design of the soilless cultivation system influences the bacterial load and composition of the microbiota present in the nutrient solution. Drip irrigation recorded the highest counts of mesophilic aerobic bacteria among five models evaluated by researchers at Pennsylvania State University in the United States. The production cycle also modified the microbial communities. In bok choy (*Brassica rapa*) leaves, the counts did not show differences between the systems at harvest time (doi 10.1128/aem.01167-26).

The experiment compared deep water cultivation, the Kratky method, the nutrient film technique, flood and drain irrigation, and drip irrigation. The team conducted two cycles of bok choy and analyzed

bacteria in the nutrient solution and on the leaves. The work also used 16S ribosomal RNA gene sequencing to characterize the bacterial composition.

Highest averages

The drip irrigation showed the highest averages in both cycles. In the fall, the count reached 5,9 base-ten logarithms of colony-forming units per milliliter. In the spring, it reached 5,44 base-ten logarithms of colony-forming units per milliliter.

The researchers linked this result to the solution's contact with the peat-based substrate. In drip irrigation, water enters through the surface and passes through the substrate by gravity. This flow can

transport microorganisms associated with the organic material. In flood and drain irrigation, the solution rises from the base and reaches the substrate by capillary action.

Differentiating factor

The type of system represented the main factor associated with differences in bacterial composition. Cultivation cycle, sampling day, and temperature also influenced the community profile. pH showed a negative association with bacterial load. For each increase of one unit, the count decreased by approximately 0,36 base-ten logarithms of colony-forming units per milliliter. Temperature did not alter the concentration but influenced the

composition of the microbiota.

The genus *Acidovorax* appeared in all samples, across all five systems and both cycles. The study does not specify which *Acidovorax* species were detected. The plants did not show any symptoms of disease. Other recurring genera included *Devosia*, *Bdellovibrio*, *Legionella*, *Rhodanobacter*, *Sphingobium*, *Sediminibacterium*, *Massilia*, and *Caulobacter*.

Bacterial loads

The leaves maintained similar bacterial loads. According to the researchers, the limited contact of the aerial parts with the nutrient solution may explain the result.

The study does not allow us to conclude whether systems with a higher microbial load favor the survival of foodborne pathogens.

The data indicate the need for specific microbial management strategies for each production model. Solution flow, substrate contact, oxygenation, and water retention create distinct environments throughout the cycle.

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Economia de até 10% de defensivos agrícolas e menor impacto ambiental. Pressão constante no sistema de pulverização em até 65% de variação na velocidade, o que proporciona menor variação no tamanho da gota.



Nortox launches three products on the Brazilian market

The company announced two exclusive blends — the insecticides Typhoon and Tempus — and the herbicide Raker Top

05.08.2026 | 14:16 (UTC -3)

Leonardo Gottems, Cultivar Magazine edition



Focusing on a new generation of mixtures that combine generic and patented molecules, Nortox announced the launch

of three products for the Brazilian market: the insecticides Tempus and Typhoon and the herbicide Raker Top. The new products were presented during the company's 4th Cooperative Meeting, held at the end of July in Foz do Iguaçu (PR).

According to the company, Tempus offers prolonged action and high efficiency in controlling caterpillars, providing long-lasting protection in different crops. The product combines the knockdown effect of chlorpyrifos with the persistence of chlorantraniliprole.

Typhoon, on the other hand, is indicated for the control of corn leafhoppers and fall armyworms. It is an exclusive Nortox blend with a broad spectrum of action against the main corn pests and an immediate

knockdown effect. Its formulation combines chlorantraniliprole and methomyl in the OD formulation.

For the herbicide segment, Raker Top arrives as a selective and systemic product for post-emergence application, formulated with nicosulfuron and tolpyralate. The herbicide is indicated for weed control in corn crops and features two safeners, which provide greater selectivity to the crop and reduce the risk of phytotoxicity.

João Marcos Ferrari, Commercial Director of Nortox, highlights the company's investment in the development of exclusive blends and states that the strategy marks the beginning of a new phase for the company. "This demonstrates once again that the company has a well-defined

strategy," he adds.

Cooperatives Meeting



The 4th edition of the Cooperative Meeting brought together representatives from 39 cooperatives from the states of Paraná, Santa Catarina, Rio Grande do Sul, Mato Grosso do Sul and São Paulo. The program began on Wednesday (July 29th)

with the reception of the teams, and continued on Thursday (July 30th) with lectures and technical presentations on agribusiness trends and solutions developed by Nortox.

At the opening, the CEO of Nortox, Romeu Stanguerlin, presented the company's trajectory, the results obtained, and the growth prospects projected in the strategic plan until 2030. Following this, João Marcos Ferrari discussed the evolution of the company's portfolio, highlighting investments in research, innovation, product development, plant nutrition, and seeds.

Throughout the meeting, programs aimed at cooperatives, fungicide management strategies, pasture solutions, and

advances in the area of ??herbicides were also presented, in addition to technical discussions that promoted the exchange of experiences between Nortox specialists and cooperative representatives.

The program also included lectures from external guests, such as economist Igor Barreto from Itaú BBA, who presented an analysis of the economic scenario and prospects for agribusiness, and researcher Aroldo Marochi, who addressed the challenges related to crop diseases and fungicide management.

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This guide helps in identifying **Trichogramma species**

Embrapa publication compiles basic taxonomic information for the identification of this important group of parasitoids

05.08.2026 | 13:55 (UTC -3)

Juliana Caldas



Embrapa has made available for download the revised and expanded edition of the Trichogramma Identification Guide for

Brazil. The publication brings together basic taxonomic information for the identification of this important group of parasitoids and is a reference for students, researchers, technicians and companies working in the area of biological control.

The Guide is authored by Ranyse Querino, a researcher at Embrapa Cerrados, and Roberto A. Zucchi, senior professor at the Luiz de Queiroz Higher School of Agriculture (Esalq), in Piracicaba (SP). The work presents information on the Trichogramma species recorded in Brazil, their hosts, and the plants to which they are associated.

“The goal is to provide technical and practical support for the correct identification of Trichogramma and to

highlight its importance in biological control programs,” explained Querino. According to the researcher, the Guide consolidates knowledge about the diversity of the genus in Brazil, the result of more than five decades of taxonomic studies, which have contributed to the advancement of both basic research, especially in taxonomy, and studies applied to biological control.

Since 2011 (1st edition), the Guide has been used in universities, research institutions, biological product companies, and producer associations in Brazil and some South American countries.

"Considering the shortage of specialists in the identification of *Trichogramma*, it is hoped that this Guide will increasingly stimulate the training of taxonomists and technicians in the identification of this

important natural enemy," stated the specialist.

This publication presents, in detail, the different steps necessary for the taxonomic study of Trichogramma, from specimen preparation to preservation. It also defines and illustrates the morphological characters used in species identification.

Do you know what Trichogramma are?

Trichogramma species are tiny parasitoid wasps that feed on insect eggs, widely used worldwide for biological control, especially of lepidopteran pests. Due to their effectiveness, they are among the most studied parasitoids in several

countries, including Brazil. Currently, several species are commercially produced and successfully used in pest management programs both in Brazil and abroad.

The taxonomy of *Trichogramma* has advanced considerably in recent decades, revealing a great diversity of species. Of the 46 currently recorded in South America, 30 occur in Brazil, with 17 known exclusively from the country. Correct identification of species present in agricultural and forestry systems is a basic and fundamental step for the implementation and success of biological control programs.

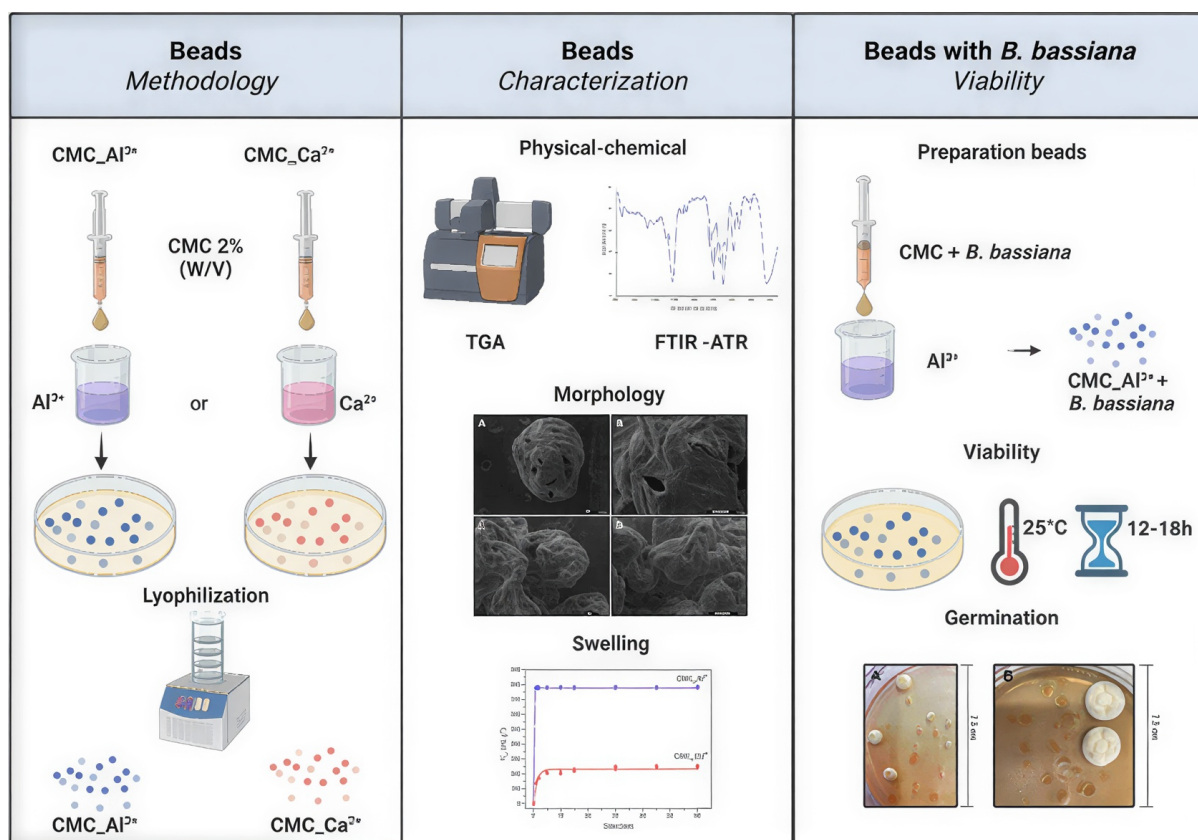
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Microcapsules maintain the viability of *Beauveria bassiana*

Carboxymethylcellulose matrix preserved 85% of fungal germination after five months

05.08.2026 | 10:20 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.1021/acsomega.5c06970

Researchers have developed carboxymethylcellulose microcapsules

capable of preserving propagules of the entomopathogenic fungus *Beauveria bassiana* during storage. The cross-linked system with aluminum ions maintained 85% germination after five months at minus eighteen degrees Celsius. Non-encapsulated conidia, kept under the same conditions, showed 69% viability.

The study compared aluminum and calcium ions as crosslinking agents for carboxymethylcellulose (doi 10.1021/acsomega.5c06970). The team sought a matrix suitable for transporting biological control agents. Aluminum provided more uniform particles, greater water absorption, and better structural stability. The results indicate potential for formulations intended for managing pests

with life stages in the soil.

Polymer networks

Carboxymethylcellulose forms polymeric networks through ionotropic gelation. In this process, metal ions interact with carboxylate and hydroxyl groups present in the polymer. The method requires few steps, is quick to execute, and allows the production of particles capable of protecting active ingredients.

The particles cross-linked with aluminum retained a near-spherical shape after drying. The average diameter reached 1,92 millimeters, with a deviation of 0,11 millimeters in the study summary. The structures produced with calcium

underwent collapse and coalescence. The process resulted in irregular conglomerates with heterogeneous sizes.

Greater positive charge

The researchers linked this difference to the greater positive charge of aluminum. The trivalent ion formed stronger and denser ionic bonds with carboxymethylcellulose. This interaction favored a compact, three-dimensional network resistant to deformation. Calcium, with its divalent charge, produced weaker bonds and a less stable matrix during water loss.

The absorption capacity also differentiated the materials. Particles with aluminum

absorbed a volume of water equivalent to about 780% of their initial mass. Structures with calcium reached approximately 240%. According to the study, the network formed by the aluminum preserved interconnected pores during drying. This architecture facilitated water entry.

Thermal analyses

Thermal analyses showed distinct profiles. Particles containing aluminum exhibited main decomposition stages at 165,76 and 386,71 degrees Celsius. The material containing calcium recorded events at 211,78, 223,22, 309,29, and 368,95 degrees Celsius. The most complex pattern indicated heterogeneous cross-linking in the system with calcium.

After comparison, the team selected aluminum to encapsulate blastospores of the IBCB66 strain of *Beauveria bassiana*. The liquid culture achieved a concentration of two billion blastospores per milliliter. The researchers mixed the culture with a carboxymethylcellulose solution and added surfactant to improve dispersion between the fungus and the polymer.

The inclusion of the microorganism increased the average capsule size to 2,42 millimeters, with a deviation of 0,28 millimeters. The structures presented a thin outer layer and a porous core. The formulation underwent freezing, lyophilization, and storage at minus eighteen degrees Celsius.

After two months, all granules germinated in three to four days. The concentration reached 1,87 million conidia per particle. After five months, germination required seven days and reached 85%. The concentration remained at 1,24 million conidia per particle. The granules maintained a dry and loose appearance throughout the period.

Metabolic dormancy

The researchers interpreted the delayed germination as reversible metabolic dormancy, with no indication of loss of fungal integrity. The carboxymethylcellulose matrix would have reduced stress caused by dehydration and limited oxidative damage during storage.

The IBCB66 strain is part of the "Oldemar Cardim Abreu" collection of entomopathogenic microorganisms, maintained by the Biological Institute in Campinas, São Paulo. The study cites the pathogenicity of this strain against organisms with soil-dwelling phases, including *Ceratitis capitata*, *Pratylenchus brachyurus*, *Spodoptera cosmioidea*, *Chrysomya megacephala*, and *Atta sexdens rubropilosa*.

The results demonstrated, for the first time in the study, a viable method for encapsulating *Beauveria bassiana* blastospores in aluminum-crosslinked carboxymethylcellulose particles. This formulation could support the development of dry products aimed at the biological control of soil pests.

The work was developed by scientists Mayté P. Zaldivar, Jean Carlos F. Machado, Livia C. Massimino, Marcel S. Marques, José Eduardo M. de Almeida, Ana Paula S. Bartels, Ricardo Bortoletto-Santos, and Hernane da S. Barud.

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APHIS concludes regulatory assessment of MON 87429 corn

The decision covers events tolerant to dicamba, glufosinate, quizalofop, 2,4-D, and glyphosate

05.08.2026 | 08:06 (UTC -3)

Cultivar Magazine



Photo: Wenderson Araujo - CNA

The U.S. Animal and Plant Health Inspection Service (APHIS) has removed the genetically modified corn MON 87429 from the regulations provided for in Part 340 of the Code of Federal Regulations. The change took effect today.

The event, developed by Monsanto (Bayer), exhibits resistance to dicamba, glufosinate, quizalofop, and 2,4-dichlorophenoxyacetic acid, known as 2,4-D. The material also has glyphosate resistance with specific tissue expression. This characteristic facilitates the production of hybrid corn seeds.

The agency concluded that there was no phytosanitary risk greater than that observed in conventional corn used as a comparator. The assessment considered

data presented in the petition, available scientific information, plant pest risk analysis, and public comments.

APHIS received the petition in 2020. The initial public consultation remained open for 60 days and gathered 4.112 responses. In 2024, the agency published preliminary versions of the risk analysis and environmental impact study. This process received 9.600 comments on the environmental study and one response on the risk assessment.

In August 2025, APHIS concluded the preparation of the environmental impact study. The final decision maintained the phytosanitary risk analysis as the regulatory basis. The agency made the signed determination, the risk assessment,

and the responses to the comments
available in process APHIS-2020-0021.

Read also [US Agency Announces
Assessment of MON 87429 Herbicide-
Resistant Corn](#)

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Tifluzamide shows distinct action among Rhizoctonia groups

Differences in target binding and cellular transport explain the lower sensitivity of the AG-Bb group

05.08.2026 | 07:30 (UTC -3)

Schubert Peter, Cultivar Magazine

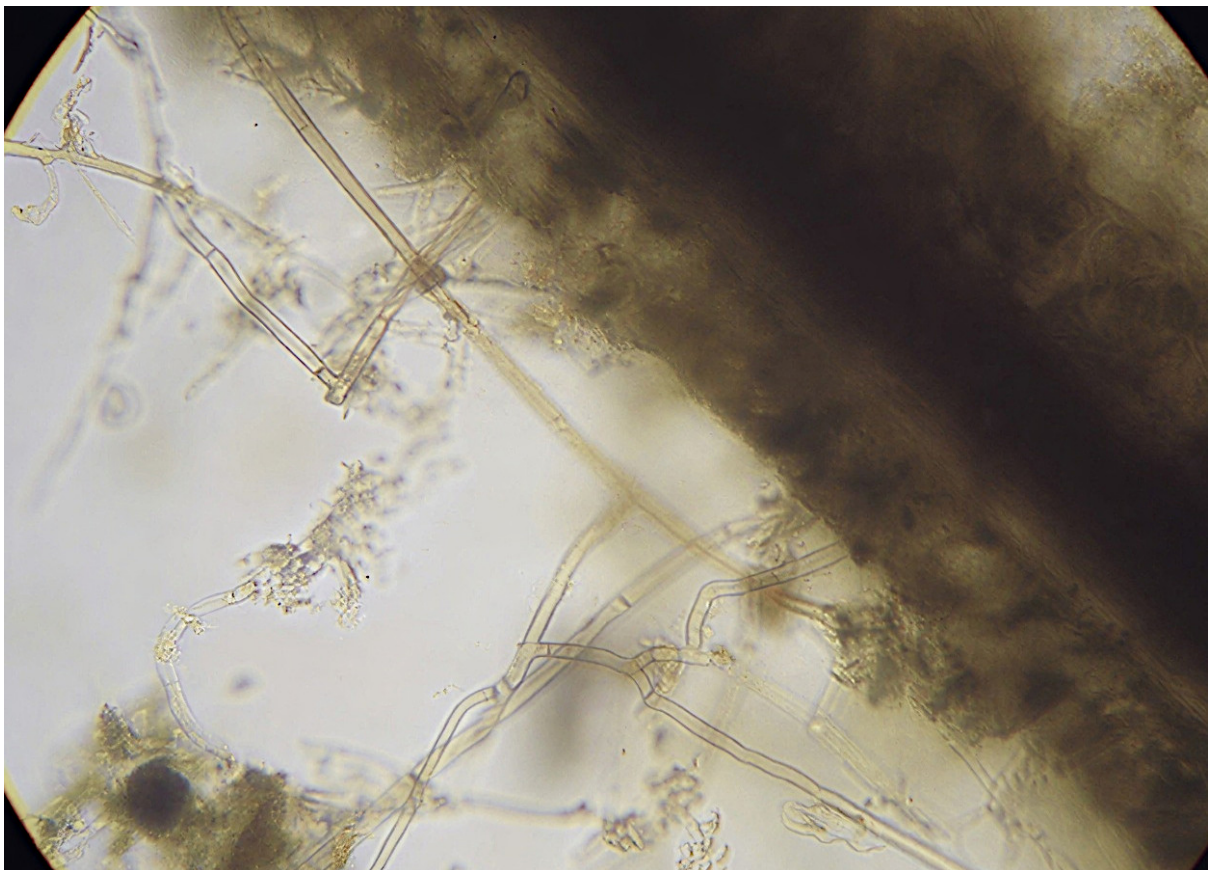


Photo: Lee Miller / University of Missouri, Bugwood

Binucleated isolates of *Rhizoctonia* AG-Bb showed 28,4 times lower sensitivity to tfluzamide compared to *Rhizoctonia solani* AG1-IA. The result indicates intrinsic differences in the response of anastomosis groups to succinate dehydrogenase inhibitor fungicides, known as SDHI (doi 10.1002/ps.71153).

The median effective concentration, or EC50, reached 1,99 milligrams per liter in the AG-Bb isolates. In AG1-IA, the average value was 0,07 milligrams per liter.

The researchers combined sensitivity assays, structural modeling, molecular docking, molecular dynamics simulations, enzyme activity measurements, and transcriptome analysis.

Modeling indicated that tfluzamide bound to the ubiquinone pocket, formed by the SDHB, SDHC, and SDHD subunits of the succinate dehydrogenase complex.

Simulations showed a stronger and more stable interaction at AG1-IA.

The binding free energy reached -36,12 kilocalories per mole in AG1-IA. In the AG-Bb group, the result was -25,76 kilocalories per mole. Tfluzamide also caused greater suppression of succinate dehydrogenase enzyme activity in AG1-IA.

Transcriptomic analysis identified specific enrichment of genes linked to the ABC transporter pathway in AG-Bb. The result suggests a greater efflux capacity, a mechanism capable of reducing the concentration of the fungicide inside the

cell.

The data help explain differences in sensitivity to SDHI among Rhizoctonia groups and may support risk assessments of resistance to this class of fungicides.

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3D Atlas reveals the organization of the kiwi genome

Study links chromatin architecture to gene expression in leaves and fruits

05.08.2026 | 07:02 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Dmitry Demidov / Pexels

Researchers from Zhejiang A&F University and Zhejiang University have constructed a three-dimensional atlas of the kiwi (*Actinidia chinensis*) genome. The work analyzed leaf and fruit tissues and related chromatin organization to epigenetic marks and gene expression.

The team produced in situ Hi-C chromosome conformation capture maps. The experiment pooled three biological repeats per tissue and generated approximately 6,51 billion paired reads. The scientists integrated the data with analyses of chromatin accessibility, DNA methylation, seven histone modifications, and RNA sequencing.

The atlas identified A and B compartments, hierarchical

subcompartments, TAD-like domains, and chromatin loops. Leaves and fruits showed similar overall organization. Differences emerged at smaller scales. Fruits concentrated more short-distance contacts. Leaves recorded a higher proportion of long-distance interactions.

Type B subcompartments occupied approximately 55% to 60% of the genome. These regions concentrated transposable elements, DNA methylation, and markers associated with gene repression. Type A regions showed greater transcriptional activity and markers of active chromatin.

The study identified 68 genes with predominant expression in fruits. Of these, 63 appeared within TAD-like domains in leaves and fruits. More than 60% of these

genes were located in compartment B of the fruit tissue. Only eight coincided with chromatin loop anchoring points.

The results indicate a stronger relationship between fruit-specific expression and the local organization of chromatin domains. Long-distance loops showed a limited association with expression differences between leaves and fruits. The atlas offers a reference for functional and evolutionary studies in perennial fruit trees (doi 10.1093/hr/uhag076).

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ICL increases potassium sales by 22% in the second quarter

Company expands volumes for China, India and Brazil and maintains projection for 2026

05.08.2026 | 06:28 (UTC -3)

Cultivar Magazine, based on information from Peggy Reilly Tharp

Calculation of segment EBITDA | 2Q'26

Industrial Products US\$M	2Q'26	2Q'25
Segment sales	\$414	\$319
Segment operating income	\$115	\$54
Segment operating margin	28%	17%
Depreciation and amortization	\$15	\$15
Segment EBITDA	\$130	\$69
Segment EBITDA margin	31%	22%

Phosphate Solutions ⁽¹⁾ US\$M	2Q'26	2Q'25
Segment sales	\$722	\$637
Segment operating income	\$80	\$90
Segment operating margin	11%	14%
Depreciation and amortization	\$56	\$44
Segment EBITDA	\$136	\$134
Segment EBITDA margin	19%	21%

Potash US\$M	2Q'26	2Q'25
Segment sales	\$468	\$383
Segment operating income	\$85	\$52
Segment operating margin	18%	14%
Depreciation and amortization	\$69	\$63
Segment EBITDA	\$154	\$115
Segment EBITDA margin	33%	30%

Growing Solutions US\$M	2Q'26	2Q'25
Segment sales	\$605	\$540
Segment operating income	\$32	\$35
Segment operating margin	5%	6%
Depreciation and amortization	\$18	\$21
Segment EBITDA	\$50	\$56
Segment EBITDA margin	8%	10%

ICL reported sales of \$468 million in the potash segment in the second quarter of 2026. This represents a 22% increase

compared to the same period in 2025. The business's EBITDA reached \$154 million, a 34% increase.

The volume traded totaled 1,081 million metric tons, an annual increase of 110 metric tons. The company directed the largest additional volumes to China, India, and Brazil. Production reached 1,058 million metric tons, an increase of 101 metric tons.

The average price of potassium reached \$376 per ton, CIF. The indicator rose 13% compared to the second quarter of 2025 and 4% compared to the first three months of 2026.

The Growing Solutions division, focused on specialized plant nutrition, generated \$605 million in revenue. This represents a

12% increase. EBITDA, however, decreased from \$56 million to \$50 million.

In Brazil, higher prices offset reduced volumes and kept sales stable. Gross profit fell due to a less profitable product mix and increased raw material costs. In Europe, higher prices and volumes boosted sales and gross profit. In Asia, increased volumes also supported the result.

ICL maintained its forecast for potash sales between 4,5 million and 4,7 million metric tons in 2026. The company also reiterated its projection for consolidated adjusted EBITDA between \$1,5 billion and \$1,7 billion. In the quarter, the group's total sales grew 17%, reaching \$2,135 billion.

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Mosaic cuts phosphate production after quarterly loss

Sulfur costs put pressure on operations in Brazil and the United States

05.08.2026 | 05:23 (UTC -3)

Cultivar Magazine, based on information from Ben Pratt



Second Quarter 2026 Performance

Consolidated Revenues			Operating Earnings (Loss)		Net Income (Loss)		Adjusted ¹ EBITDA	
\$2,824M			(\$36M)		(\$273M)		\$407M	
Phosphate			Potash			Mosaic Fertilizantes		
\$1,246M	(\$104M)	\$128M	\$650M	\$195M	\$278M	\$1,034M	(\$41M)	\$60M
Net Revenues	Operating Earnings (Loss)	Adjusted ¹ EBITDA	Net Revenues	Operating Earnings	Adjusted ¹ EBITDA	Net Revenues	Operating Earnings (Loss)	Adjusted ¹ EBITDA

Mosaic reported a net loss of \$273 million in the second quarter of 2026. In the same period of 2025, the company had a profit of \$411 million. Revenue totaled \$2,8 billion, while adjusted EBITDA reached \$407

million.

The company attributed the result to lower fertilizer sales and increased raw material costs. The availability and price of sulfur affected the phosphate and Mosaic Fertilizantes segments.

In Brazil, Mosaic Fertilizantes sold 1,5 million tons, compared to 2,2 million tons a year earlier. The segment posted an operating loss of \$41 million. Adjusted EBITDA fell from \$159 million to \$60 million.

The company has begun halting production of basic fertilizers in the country. The animal nutrition unit in Cajati remains operational. The cost of converting phosphates has risen from \$84 to \$141 per ton.

In the United States, Mosaic reduced phosphate production. The Faustina plant halted operations. The Bartow unit is operating at 40% of its planned annual capacity. The segment sold 1,4 million tons and posted an operating loss of \$104 million.

Sulfur contracts for the third quarter reached \$705 per long ton. The effect should appear in the fourth quarter results.

The potash segment sold two million tons. Adjusted EBITDA totaled \$278 million, the same value as the second quarter of 2025. Mosaic projects annual production close to nine million tons.

The company has reduced its investment forecast for 2026 from \$1,25 billion to \$1,2 billion.

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Remanufacturing extends the useful life of agricultural machinery

Massey Ferguson offers original components that reduce costs and maintain performance in the field

04.08.2026 | 15:27 (UTC -3)

Flavia Amarante



The need to keep agricultural machinery operating at maximum efficiency has led

producers to seek alternatives that reduce costs without compromising quality and productivity. To meet this demand, Massey Ferguson offers remanufactured original components that return to the field with the same specifications and quality standards as the factory. This practice allows for the recovery of original agricultural machinery components, extending their lifespan and reducing maintenance costs without compromising performance.

Engines and transmissions undergo a rigorous industrial refurbishment process. Components are disassembled, inspected, and reused by specialized professionals within the factory. Worn parts are replaced with genuine components, while other items undergo refurbishment and technical validation processes. Before returning to

the market, all assemblies are subjected to performance, safety, and quality tests to ensure the same standards required of a new product.

“Remanufacturing is an alternative that combines reliability, availability, and cost savings for the farmer. The process is carried out by the manufacturer itself, following rigorous engineering and quality standards, which guarantees performance equal to that of a new component and the security of using original parts,” says Breno Cavalcanti, Marketing Director of Massey Ferguson.

In addition to preserving machine performance, the solution helps reduce equipment downtime. Since remanufactured components are readily

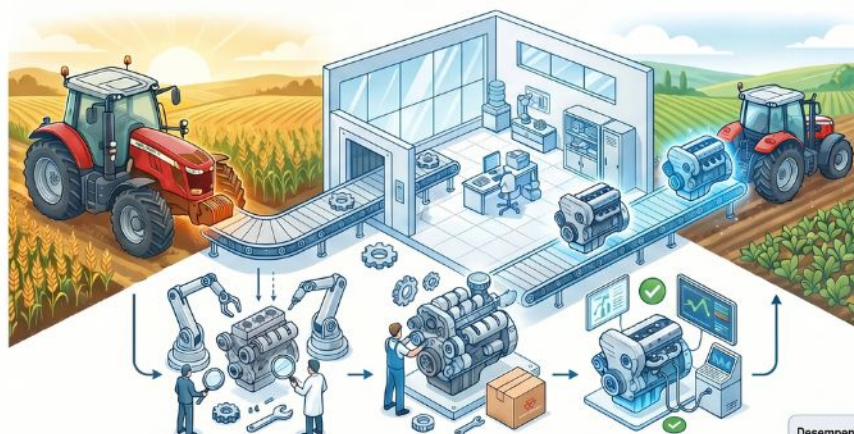
available for replacement, service is faster, allowing producers to quickly resume operations, especially during critical periods like planting and harvesting.

Economy and sustainability

Cost-effectiveness is also a major draw. Remanufactured components can cost, on average, up to 30% less than a new part, while maintaining the same factory warranty period.

Remanufatura no Campo: O Ciclo da Eficiência e Sustentabilidade

A remanufatura da **Massey Ferguson** recupera componentes originais (motores e transmissões), devolvendo-os ao campo com padrões de fábrica. O processo combina rigor técnico industrial com uma proposta de valor focada em redução de custos e menor tempo de máquina parada.



Desmontagem e Inspeção Rigorosa

Componentes são totalmente desmontados e avaliados por profissionais especializados na fábrica.

Reconstrução com Itens Genuínos

Peças desgastadas são substituídas por componentes novos e originais da marca.

Validação e Testes de Performance

Os conjuntos passam por testes de segurança para garantir desempenho igual ao novo.

Vantagens para o Produtor

Economia de até 30%
Peças remanufaturadas custam menos que as novas, mantendo a mesma garantia de fábrica.

Disponibilidade e Agilidade
Componentes prontos para substituição reduzem drasticamente o tempo de máquina parada no campo.

Sustentabilidade na Prática
O processo reduz o consumo de energia, água e matéria-prima comparado à fabricação nova.

Comparativo Rápido

Desempenho:	Peça Remanufaturada (Padrão de Fábrica)	Peça Nova (Referência) (Padrão de Fábrica)
Custo:	Peça Remanufaturada (Até 30% menor)	Peça Nova (Referência) 100% (Preço cheio)
Garantia:	Peça Remanufaturada (Mesma garantia original)	Peça Nova (Referência) (Mesma garantia original)

Another advantage of remanufacturing is its contribution to more sustainable agriculture. Reusing components reduces the need for raw materials and significantly decreases energy and water consumption compared to manufacturing new products. The process also contributes to reducing waste generation and making better use of resources throughout the equipment's life cycle. In practice, this means that parts

that have already been part of a machine's operation can return to the field in perfect condition to begin a new work cycle.

“When we recover an original component, we are leveraging all the engineering knowledge incorporated into that part and offering the producer a solution that combines performance, economy, and sustainability. It is an efficient way to extend the lifespan of machines and contribute to an increasingly responsible agriculture with the resources available,” highlights Cavalcanti.

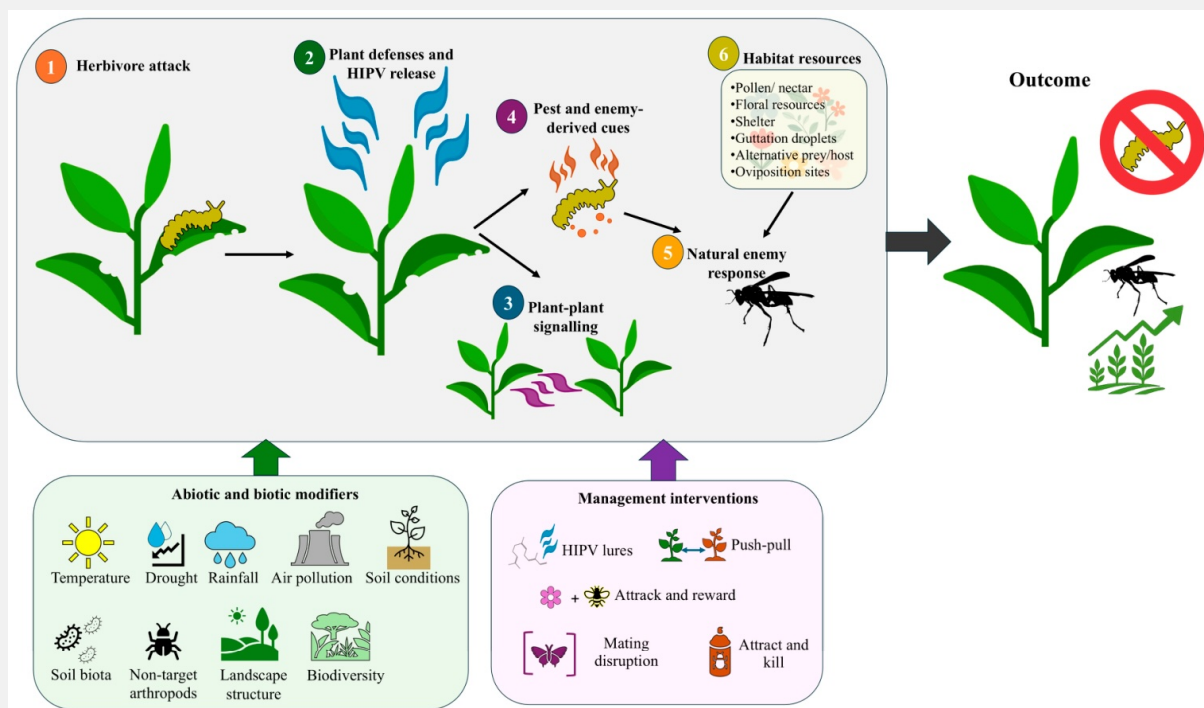
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Chemical signals broaden options for biological control

Plant volatiles, pheromones, and habitat management can enhance the action of natural enemies

04.08.2026 | 10:56 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.3390/insects17080808

The combined use of chemical signals from plants and insects can increase the

efficiency of biological control in crops, orchards, vegetable gardens, and protected cultivation. A study by Chinese researchers brings together results on volatile compounds, pheromones, kairomones, push-pull systems, habitat management, and plant breeding. However, the scientists warn of a key difference: attracting predators and parasitoids does not guarantee pest reduction, less damage, or increased productivity (doi 10.3390/insects17080808).

Plants attacked by herbivorous insects release volatile organic compounds. This group includes herbivory-induced volatiles, known by the acronym HIPVs. Terpenoids, green leaf volatiles, and methyl salicylate

are part of this group. Predators and parasitoids use these signals to locate infested plants.

Agricultural application

The agricultural application of these compounds can promote conservative biological control. Methyl salicylate is among the most studied attractants. Methyl jasmonate can also induce the release of defensive volatiles by plants. The effect varies according to the compound, dose, formulation, release rate, crop, and environment.

The integration of long- and short-range signals represents one of the research fronts. HIPVs can guide parasitoids to the

infested area. Cuticular hydrocarbons left by insects on leaves help in locating the host nearby. Female *Trissolcus japonicus*, for example, intensified foraging on surfaces with chemical traces associated with *Halyomorpha halys*.



Photo: Oregon State University - CC BY-SA 2.0

Mixtures with pheromones

Mixtures with pheromones also showed results. In wheat, the combination of the alarm pheromone (E)-beta-farnesene with methyl salicylate increased parasitism and reduced the presence of the aphid *Sitobion miscanthi*. In tomato, the combined use of methyl salicylate and the aggregation pheromone of the predatory stink bug *Podisus maculiventris* increased the persistence of the natural enemy and reduced the infestation of *Manduca sexta*.

The selection of mixtures requires caution. Natural enemies may respond to specific proportions of compounds. The indiscriminate addition of volatiles can

mask signals, reduce attraction, or cause repellency. Some attractants also recruit the pest itself. Trials with bell peppers showed greater thrips capture in traps with methyl salicylate. The result reinforces the need to evaluate the balance between recruitment of natural enemies and the risk of increased crop colonization.

The "attract and reward" strategy links volatile dispensers to food resources and shelter. Flowering strips, nectar, pollen, alternative prey, and oviposition sites can prolong the presence of predators and parasitoids. Studies with buckwheat, **Fagopyrum esculentum**, have recorded an increase in parasitoids in brassicas, sweet corn, grapevines, and broccoli. In apple orchards, the combination of methyl

salicylate with **Calendula officinalis** increased the presence of **Propylea japonica** and favored the suppression of **Aphis citricola**.

Agent ecology

The type of resource needs to match the ecology of the control agent. Nectar and pollen benefit adult parasitoids and omnivorous predators. Strictly carnivorous predators depend more on alternative prey, shelter, and suitable micro-habitats. Guttation can also provide food. In blueberries, droplets remained available throughout the day and during the growing season. Pesticide residues or toxic metabolites, however, can turn this resource into a risk.

Push-pull systems are another application. The technique uses repellent stimuli to drive the pest away from the main crop and attractive stimuli to concentrate it on trap plants or baited traps. In corn, elephant grass, *Pennisetum purpureum*, acts as an attractant. *Desmodium*, *Desmodium uncinatum*, exerts a repellent effect on borers such as *Eldana saccharina*, *Chilo partellus*, *Sesamia calamistis*, and *Busseola fusca*. Compounds released by companion plants can also attract parasitoids.

The environment modifies the emission and stability of signals. Drought, increased temperature, elevated carbon dioxide, ozone, nutrient deficiency, and air pollution can alter the composition of volatiles. Ozone can degrade terpenoids used by

parasitoids. Water deficit can also reduce the attractiveness of infested plants.

The study proposes four priorities: improving the induction of plant defenses; combining HIPVs with pheromones and other signals from natural enemies; integrating habitat management with food resources; and incorporating defensive traits through breeding or genetic engineering. The researchers recommend field assessments with a complete sequence of indicators: arrival and persistence of natural enemies, predation or parasitism, pest density, damage, productivity, pesticide use, and economic return.

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UPL increases revenue by 10% in the first fiscal quarter

The company reports an increase in EBITDA and growth in its seed and crop protection operations

04.08.2026 | 10:07 (UTC -3)

Cultivar Magazine

UPL LIMITED Q1FY27 FINANCIAL RESULTS

Mumbai, India | August 03, 2026



UPL reported revenue of 10.181 crore rupees in the first quarter of fiscal year 2027, a 10% increase over the same period of the previous year. EBITDA

reached 1.500 crore rupees, a 15% increase, with a margin of 14,7%. The company released the results on August 3rd.

The contribution margin rose 1,8 percentage points to 45,2%. The company attributed the result to price adjustments, increased use of industrial capacity, and the product mix. Prices rose 3% during the period, supported by the exchange rate.

Results by segments

UPL Corporation, focused on crop protection, reported revenues of 6.374 crore rupees, a 7% increase. Operating EBITDA rose 38% to 532 crore rupees. North and Latin America led the regional expansion.

Advanta reported revenue of 1.754 crore rupees, up 26%. Corn and sunflower oil drove performance, with increases in volume and prices. EBITDA reached 359 crore rupees, a 24% increase.

Superfrom's revenue reached 2.919 crore rupees, a growth of 14%. The specialty chemicals area advanced 51%, supported by volumes and prices. EBITDA increased 7% to 358 crore rupees.

Results may be regional

By region, revenue grew 18% in North America, 15% in India, 8% in Latin America, and 4% in Europe. Net debt remained at \$2,5 billion. The ratio of net

debt to EBITDA fell from 2,6 to 2,4 times.

For fiscal year 2027, UPL projects revenue growth between 7% and 11%. The EBITDA forecast indicates growth between 10% and 14%.

Exhibit 1: UPL Limited: Financial Highlights

Q1FY27	Revenue	Contribution	EBITDA
	₹10,181 cr	₹4,607 cr ▲ 15% YoY	₹1,500 cr ▲ 15% YoY
	▲ 10% YoY	Margin: 45.2% ▲ 180 bps	Margin: 14.7% ▲ 60 bps
	Gross Debt	Net Debt/ EBITDA	Net Working Capital
	\$3.0 Bn ▼ vs. \$3.1 Bn Jun'25	2.4x ▼ vs. 2.6x Jun'25	110 Days
	Net Debt	Net Debt/ Equity	▲ 24 Days vs. Jun'25
	\$2.5 Bn ◀ vs. \$2.5 Bn Jun'25	0.6x ◀ vs. 0.6x Jun'25	

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Coverage period influences biomass and agricultural yield

Longer growing periods increase biomass, improve soil attributes, and benefit soybean and bean crops

04.08.2026 | 08:30 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Syngenta

Irrigated cultivation of cover crops for up to 105 days increased biomass production and soybean and common bean productivity in the Cerrado region. The management also improved soil chemical attributes after three years. Among the treatments, the Salud mix showed the best results for soybeans and increased nutrient availability.

The study evaluated nine cover crops and four growing seasons in Santo Antônio de Goiás, Goiás (doi 10.1002/cft2.70151).

The researchers conducted the experiment during the growing seasons of 2022 to 2025, under center pivot irrigation and no-till systems. The annual sequence included cover crops, common beans, and soybeans.

Periods evaluated

The evaluated periods reached 60, 75, 90, and 105 days. To obtain these durations, the team sowed the cover crops 60, 45, 30, and 15 days after the soybean harvest. All received desiccation on the same date, 15 days before sowing the beans.

Biomass increased linearly with the increase in the time spent in the field. The cover crops produced 1.178 kilograms per hectare at 60 days and 6.309 kilograms per hectare at 105 days. This result represents an increase of more than five times between the two periods.

Higher production

Millet, *Pennisetum glaucum*, recorded the highest average biomass production, with 5.563 kilograms per hectare. The forage mix reached 5.259 kilograms per hectare. This mixture included *Urochloa ruziziensis*, *Eleusine coracana*, *Pennisetum glaucum*, and *Sorghum bicolor*.

Spontaneous vegetation showed the lowest average, with 3.134 kilograms per hectare. This result reinforces the importance of choosing species with the capacity for rapid growth and high straw production.

The effect of the planting period varied among the cover crops. *Urochloa ruziziensis* and the Salud mix showed strong biomass gain between 60 and 105 days. Black oat, *Avena strigosa*, and

buckwheat, *Fagopyrum esculentum*, responded with less intensity. The data indicate the need to align the species with the time available between soybean harvest and bean planting.

Species gathered

The Salud mix brought together species of grasses, legumes, and brassicas. The composition included *Vigna radiata*, *Pennisetum glaucum*, *Urochloa ruziziensis*, *Eleusine coracana*, *Raphanus sativus*, *Crotalaria ochroleuca*, and *Crambe koktebelica*.

After three years, this consortium showed the highest levels of calcium, magnesium, phosphorus, sulfur, and soil organic matter

compared to most isolated species. The treatment also achieved the highest cation exchange capacity.

The growing season influenced potassium, sulfur, iron, manganese, zinc, organic matter, cation exchange capacity, pH, and base saturation. Soil analysis was performed only once, at the end of the third year. Therefore, the results represent cumulative effects and do not allow for tracking annual changes.

Soybean response

Soybeans responded well to the cover crop used. The Salud mix yielded 4.973 kilograms per hectare. Millet reached 4.965 kilograms per hectare. Urochloa

ruzizensis produced 4.897 kilograms per hectare.

Buckwheat showed the lowest soybean productivity, at 4.574 kilograms per hectare. Spontaneous vegetation reached 4.781 kilograms per hectare.

The longer period also benefited the oilseed. Productivity increased from 4.955 kilograms per hectare after 60 days of cover to 5.303 kilograms per hectare after 105 days. The gain reached 348 kilograms per hectare.

Bean response

Common bean, *Phaseolus vulgaris*, did not show a significant response to the species. However, the duration of the cover crops

influenced the yield. Productivity increased from 2.064 kilograms per hectare at 60 days to 2.306 kilograms per hectare at 105 days. The 90-day period recorded 2.382 kilograms per hectare.

Researchers attribute the difference between soybeans and beans to the timing of nutrient release. Beans were planted immediately after desiccation. Soybeans were sown after the bean harvest, with most of the biomass already decomposing. This interval may have increased the oilseed's nutrient uptake.

The study did not evaluate costs or financial return. The results demonstrate agronomic gains from extending the irrigated cover period. Management for up to 105 days increased straw entry,

improved soil attributes, and enhanced the performance of commercial crops.

The research was developed by scientists Adriano S. Nascente, Izabely VL Ferreira, Rafael B. Oliveira, Dennis RC Cruz, Natasha OC Monteiro, Victorya GM Souza, Edmilson JM Caetano, Aline CM Façanha, and Evandro I. Costa.

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Oligomycin A controls soybean anthracnose in study

A metabolite of *Streptomyces paludis* showed activity against *Colletotrichum truncatum*

04.08.2026 | 08:09 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Daren Mueller / Iowa State University, Bugwood, BY CC 3.0

Researchers isolated oligomycin A from the fermented extract of *Streptomyces paludis* 13-3 and identified antifungal activity against *Colletotrichum truncatum*, the causal agent of soybean anthracnose. In detached seedlings, the compound achieved 85,85% control efficacy at a concentration of one microgram per milliliter, without causing phytotoxicity.

The study used bioassay-guided fractionation (doi 10.1002/ps.71177). The team characterized the substance by nuclear magnetic resonance spectroscopy and high-resolution mass spectrometry with electrospray ionization.

Oligomycin A showed an average effective concentration of 0,0173 micrograms per milliliter against mycelial growth. For

conidia germination, the value reached 0,0811 micrograms per milliliter. The antifungal potency exceeded that of difenoconazole by approximately 58 times.

At a concentration of 0,1 micrograms per milliliter, the substance inhibited eight tested phytopathogens. Inhibition levels ranged from 61,69% to 83,39%.

Fluorescent staining and scanning electron microscopy analyses indicated intracellular accumulation of reactive oxygen species and structural damage in *Colletotrichum truncatum*.

According to the researchers, the results provide the first evidence of the action of oligomycin A against *Colletotrichum truncatum*. The natural compound may serve as a reference molecule for the

development of new antifungal agents intended for the management of soybean anthracnose.

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ADM raises its 2026 forecast after profits grew in the second quarter

Biofuels, oilseed crushing, and nutrition drive company results

04.08.2026 | 07:36 (UTC -3)

Cultivar Magazine



ADM reported net income of \$908 million in the second quarter of 2026. Adjusted income reached \$895 million. Adjusted

earnings per share totaled \$1,84, a 98% increase compared to the same period in 2025. The company raised its annual forecast to a range between \$5,15 and \$5,60 per adjusted share. The previous estimate ranged from \$4,15 to \$4,70.

Operating profit for the segments reached \$1,45 billion, a 75% increase. Agricultural Services and Oilseeds led the performance, generating \$867 million, a 129% growth.

Oilseed crushing saw a \$330 million increase in operating profit. Global volumes grew by approximately 5%. ADM attributed the result to better asset utilization, biofuel margins, energy prices, and renewable volume targets in the United States. Demand for soybean meal remained strong. Brazil and the United

States achieved record export volumes of the product.

Agricultural Services operations boosted operating profit by 159%. The full resumption of operations at the Barcarena grain terminal in Pará supported the results in South America. Increased soybean sales by producers also boosted exports.

Carbohydrate Solutions reported an operating profit of \$411 million, up 22%. Margins for U.S. ethanol were supported by biofuel policies, energy prices, and falling corn prices in the United States.

Nutrition achieved \$172 million in operating profit, a 51% increase. Human Nutrition grew with the performance of flavors and the evolution of the Decatur

East unit. Animal Nutrition advanced after operational improvements and portfolio changes adopted in 2025.

	Quarter Ended June 30			Six Months Ended June 30		
	2026	2025	Change	2026	2025	Change
Earnings before income taxes	\$ 1,088	\$ 279	\$ 809	\$ 1,472	\$ 632	\$ 840
Other Business (earnings)	(80)	(94)	14	(133)	(190)	57
Corporate	460	498	(38)	883	939	(56)
Specified items:						
(Gain) on sales of assets and businesses	(21)	(8)	(13)	(83)	(8)	(75)
Impairment, exit, restructuring charges, and settlement contingencies	3	224	(221)	20	273	(253)
(Gain) on contract termination	—	(69)	69	—	(69)	69
ADM's share of equity method investment non-recurring charges	—	—	—	55	—	55
Total Segment Operating Profit⁽¹⁾	\$ 1,450	\$ 830	\$ 620	\$ 2,214	\$ 1,577	\$ 637
Ag Services and Oilseeds	\$ 867	\$ 379	\$ 488	\$ 1,140	\$ 791	\$ 349
Ag Services	293	113	180	493	272	221
Crushing	363	33	330	284	79	205
Refined Products and Other	151	156	(5)	237	291	(54)
Wilmar	60	77	(17)	126	149	(23)
Carbohydrate Solutions	\$ 411	\$ 337	\$ 74	\$ 767	\$ 576	\$ 191
Starches and Sweeteners	326	304	22	555	511	44
Vantage Corn Processors	85	33	52	212	65	147
Nutrition	\$ 172	\$ 114	\$ 58	\$ 307	\$ 210	\$ 97
Human Nutrition	139	92	47	243	168	75
Animal Nutrition	33	22	11	64	42	22
Corporate	\$ (460)	\$ (498)	\$ 38	\$ (883)	\$ (939)	\$ 56
Interest expense – net	(103)	(112)	9	(208)	(212)	4
Unallocated corporate function costs	(374)	(294)	(80)	(718)	(647)	(71)
Other income – net	19	7	12	50	24	26
Specified items:						
Impairment, exit, restructuring charges, and settlement contingencies	(2)	(99)	97	(7)	(104)	97

1. Non-GAAP measure - see notes on page 3

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Proprietary business information of ADM.

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Bayer Crop Science increases revenue and margin in the second quarter

Seeds, glyphosate, and insecticides boost Bayer's agricultural results, with a 30,2% increase in EBITDA

04.08.2026 | 07:17 (UTC -3)

Cultivar Magazine



Judith Hartmann, Bill Anderson and Michael Preuss

Bayer's Crop Science division reported revenue of €4,910 billion in the second

quarter of 2026. This represents a 3,5% increase on an adjusted basis for exchange rates and portfolio. EBITDA before special items advanced 30,2% to €902 million. The margin increased from 14,5% to 18,4% year-on-year. Sales growth and reduced cost of goods sold supported the performance.

Bayer's Chairman of the Board, Bill Anderson, stated that the group is maintaining its projected performance for the fiscal year. "Operationally, we are on track to achieve our projections for the year," said the executive during the results presentation. Anderson also highlighted the execution of the Crop Science five-year plan as one of the company's strategic priorities.

Seeds and crop protection

Soybean seed and trait business grew 16,9% in the quarter. The cotton seed area advanced 69,2%. The company attributed part of this movement to the return of dicamba registration in the United States. The corn seed and trait segment declined 2,5%. Gains in Europe, the Middle East, Africa, Asia and the Pacific only partially offset the reduction in volumes in North America. Bayer reported a concentration of sales in the first quarter in that region.

In crop protection, glyphosate-based herbicides led the growth. Sales rose 12,6%, with increases in volume and prices. Europe, the Middle East, and Africa

saw the main advances. Insecticides grew 15,9%. Higher volumes and prices in these regions, as well as in Asia and the Pacific, contributed to the result.

Agricultural recipe

Agricultural revenue reached €4,910 billion, compared to €4,788 billion in the second quarter of 2025. Reported growth reached 2,5%. On an adjusted basis, Europe, the Middle East and Africa grew by 3,3%. North America advanced 3,4%. Asia and the Pacific increased by 9,5%. Latin America remained practically stable, with an increase of 0,1%.

The improved operating results also reflected the division's efficiency programs.

The cost of goods sold fell. The company attributed this movement to the execution of Crop Science's five-year plan. The program seeks to increase profitability and preserve the global competitiveness of the agricultural business.

first semester

In the first half of the year, Crop Science's revenue reached €12,468 billion. The adjusted growth was 5,5%. EBITDA before special items grew 20,5% to €3,916 billion. The margin reached 31,4%, compared to 26,3% in the same period of 2025. This performance was supported by the soybean and corn areas, licensing revenues, and efficiency programs.

Bayer also reorganized its glyphosate business in the United States. The company consolidated this operation into Ruveon LLC. The new structure assumed responsibility for pricing, commercial strategies, production, and logistics in the North American market. Ruveon remains within the Bayer group and is integrated into the execution of Crop Science's five-year plan.

The company also announced a licensing agreement for the widespread commercialization of hybrid wheat. This initiative is part of a strategy to renew its agricultural portfolio.

Other segments

In other segments, the Pharmaceuticals division recorded revenue of €4,458 billion in the quarter. This figure was close to that observed a year earlier, with an adjusted increase of 0,8%. EBITDA before special items fell 3,6% to €1,055 billion. Consumer Health achieved revenue of €1,445 billion, with adjusted growth of 1,5%. EBITDA before special items decreased 3,6% to €319 million.

Overall result

In the group, second-quarter revenue totaled €10,872 billion. The adjusted increase was 2,2%. EBITDA before special items grew 1,9% to €2,144 billion. Net profit reached €219 million, compared to a loss of €199 million in the same period of

2025. Free cash flow was negative at €371 million. Payments related to litigation contributed to this result. Net financial debt ended June at €33,647 billion.

Projections for 2026

For 2026, Bayer maintained its group projections on a constant currency basis for revenue, results, and free cash flow. The company only revised its estimate for net financial debt. The new range is from €29 billion to €30 billion. The previous forecast ranged from €32 billion to €33 billion. The adjustment considers a €3 billion investment from funds managed by Apollo in a new company linked to the long-acting reversible contraceptive business.

In Crop Science, Bayer is monitoring climate and geopolitical risks during the second half of the year. The company cited potential effects of El Niño and climate volatility on planting and productivity in some regions. The company is also maintaining its five-year plan, focusing on cost reduction, margin expansion, and adjustments to its business structure.

A 6

Sales by strategic business entity

€ million	Q2 2025	Q2 2026	Change (%) ¹		H1 2025	H1 2026	Change (%) ¹	
			Reported	Fx & p adj.			Reported	Fx & p adj.
Crop Science	4,788	4,910	+2.5	+3.5	12,368	12,468	+0.8	+5.5
Corn Seed & Traits	1,461	1,410	-3.5	-2.5	4,650	4,561	-1.9	+4.1
Herbicides	1,326	1,347	+1.6	+1.9	2,920	2,714	-7.1	-4.7
of which glyphosate-based products	652	734	+12.6	+12.6	1,243	1,212	-2.5	-0.6
Fungicides	634	628	-0.9	-2.0	1,550	1,420	-8.4	-7.2
Soybean Seed & Traits	393	451	+14.8	+16.9	915	1,423	+55.5	+67.9
Insecticides	298	332	+11.4	+15.9	685	668	-2.5	+2.2
Vegetable Seeds	199	193	-3.0	-2.5	391	354	-9.5	-7.4
Cotton Seed	91	149	+63.7	+69.2	323	332	+2.8	+8.8
Other	386	400	+3.6	+5.0	934	996	+6.6	+10.8

Fx & p adj. = currency- and portfolio-adjusted

¹ For definition see Annual Report 2025, A 2.3 "Alternative Performance Measures Used by the Bayer Group."

1.2 Business Development by Division Crop Science

A 5

Key data – Crop Science

€ million	Q2 2025	Q2 2026	Change (%) ¹		H1 2025	H1 2026	Change (%) ¹	
			Reported	Fx & p adj.			Reported	Fx & p adj.
Sales	4,788	4,910	+2.5	+3.5	12,368	12,468	+0.8	+5.5
Change in sales¹								
Volume	+0.3%	+2.6%			-1.7%	+4.6%		
Price	+1.9%	+0.9%			+0.5%	+0.9%		
Currency	-6.1%	-0.7%			-2.8%	-4.6%		
Portfolio	0.0%	-0.3%			0.0%	-0.1%		
Sales by region								
Europe/Middle East/Africa	1,021	1,056	+3.4	+3.3	3,115	3,054	-2.0	-0.4
North America	2,262	2,269	+0.3	+3.4	6,131	6,356	+3.7	+11.7
Asia/Pacific	598	620	+3.7	+9.5	1,169	1,131	-3.3	+4.3
Latin America	907	965	+6.4	+0.1	1,953	1,927	-1.3	-3.9
EBITDA¹	(564)	861	.		1,593	3,926	+146.5	
Special items ¹	(1,256)	(41)			(1,657)	10		
EBITDA before special items¹	693	902	+30.2		3,250	3,916	+20.5	
EBITDA margin before special items ¹	14.5%	18.4%			26.3%	31.4%		
EBIT¹	(414)	144	.		972	2,421	+149.1	
Special items ¹	(417)	(54)			(818)	(8)		
EBIT before special items¹	4	198	.		1,790	2,429	+35.7	
Net cash provided by (used in) operating activities	634	582	-8.2		(1,772)	(1,772)	.	
Cash flow-relevant capital expenditures	204	268	+31.4		368	464	+26.1	
Research and development expenses ²	369	595	+61.2		985	1,128	+14.5	

Fx & p adj. = currency- and portfolio-adjusted

¹ For definition see Annual Report 2025, A 2.3 "Alternative Performance Measures Used by the Bayer Group."

² After special items and depreciation/amortization/impairments

€ million	Q2 2025	Q2 2026	Change (%)		H1 2025	H1 2026	Change (%)	
			Reported	Fx & p adj.			Reported	Fx & p adj.
Sales	10,739	10,872	+1.2	+2.2	24,477	24,277	-0.8	+3.3
Change in sales¹								
Volume	+0.7%	+3.2%			+0.2%	+4.2%		
Price	+0.2%	-1.0%			+0.2%	-0.9%		
Currency	-4.9%	-0.6%			-2.4%	-3.9%		
Portfolio	+0.4%	-0.4%			+0.3%	-0.2%		
Sales by region								
Europe/Middle East/Africa	3,305	3,069	-7.1	-7.4	7,709	7,150	-7.3	-6.4
North America	4,120	4,367	+6.0	+8.9	9,942	10,412	+4.7	+12.2
Asia/Pacific	2,002	1,996	-0.3	+2.9	4,081	3,897	-4.5	+1.2
Latin America	1,312	1,440	+9.8	+3.7	2,745	2,818	+2.7	+0.9
EBITDA¹	285	1,985	.		3,783	6,767	+78.9	
Special items ¹	(1,820)	(159)			(2,407)	170		
EBITDA before special items¹	2,105	2,144	+1.9		6,190	6,597	+6.6	
EBITDA margin before special items ¹	19.6%	19.7%			25.3%	27.2%		
EBIT¹	13	827	.		2,337	4,355	+86.4	
Special items ¹	(981)	(172)			(1,568)	152		
EBIT before special items¹	994	999	+0.5		3,905	4,203	+7.6	
Financial result	(439)	(506)	-15.3		(933)	(1,045)	-12.0	
Net income (from continuing and discontinued operations)	(199)	219	.		1,100	2,982	+171.1	
Earnings per share from continuing and discontinued operations (€)	(0.20)	0.23	.		1.12	3.04	+171.4	
Core earnings per share^{1, 2} from continuing operations (€)	1.14	0.95	-16.7		3.54	3.66	+3.4	
Net cash provided by (used in) operating activities (from continuing and discontinued operations)	1,058	690	-34.8		43	(1,104)	.	
Free cash flow¹	125	(371)	.		(1,403)	(2,691)	-91.8	
Net financial debt (at end of period)	33,274	33,647	+1.1		33,274	33,647	+1.1	
Cash flow-relevant capital expenditures (from continuing and discontinued operations)	465	660	+41.9		853	1,071	+25.6	
Research and development expenses³	1,408	1,518	+7.8		2,866	2,937	+2.5	
Depreciation, amortization and impairment losses/loss reversals	272	1,158	.		1,446	2,412	+66.8	
Number of employees (at end of period)⁴	89,556	87,830	-1.9		89,556	87,830	-1.9	
Personnel expenses (including pension expenses and restructuring measures)	2,976	2,985	+0.3		6,003	5,796	-3.4	

Fx & p adj. = currency- and portfolio-adjusted

¹ For definition see Annual Report 2025, A 2.3 "Alternative Performance Measures Used by the Bayer Group."

² Prior-year figures based on updated methodology in effect from 2026; see section A 3.1.2 "Corporate Outlook" of the Annual Report 2025 for details.

³ After special items and depreciation/amortization/impairments

⁴ Employees calculated as full-time equivalents (FTEs)

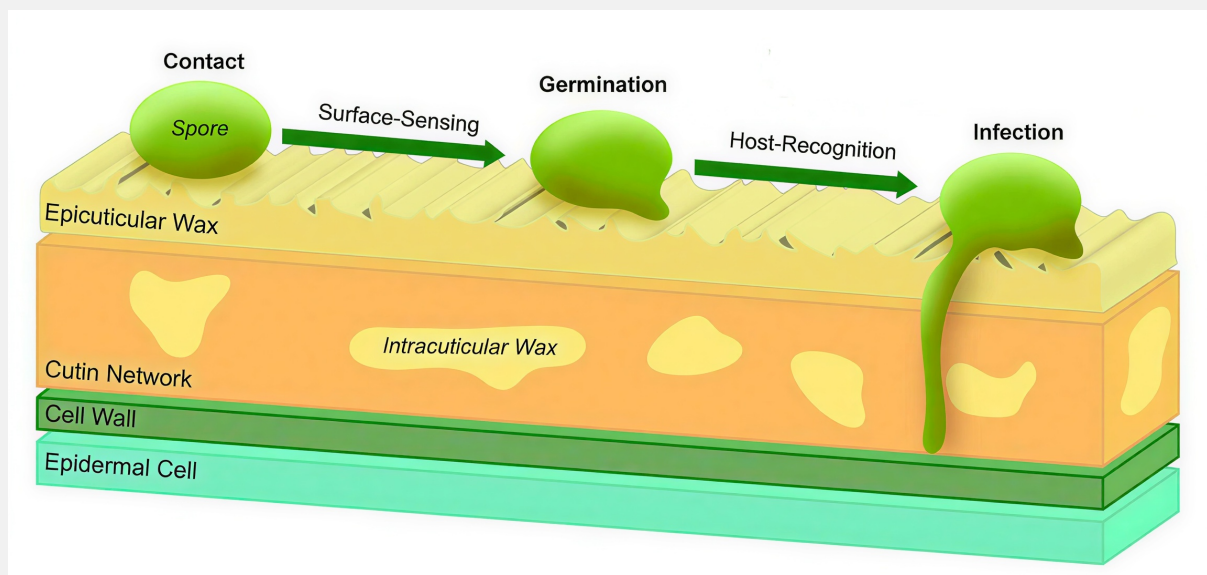
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Biomimetic surfaces can prevent fungal diseases

Model reproduces leaf waxes to identify signals used by fungi in recognizing the host plant

04.08.2026 | 06:05 (UTC -3)

Cultivar Magazine



doi 10.1116/6.0005533

Researchers at the University of Adelaide, Australia, propose treating foliar fungal diseases as a biointerface problem. The approach seeks to identify the physical

and chemical signals used by pathogens to recognize the leaf surface. This knowledge can guide preventative strategies based on genetic improvement and products capable of modifying the properties of the plant cuticle (doi 10.1116/6.0005533).

The concept stems from a step common to foliar pathogens. Before infection, the fungus needs to come into contact with the leaf and recognize the host. Surface characteristics can stimulate spore germination and the advancement of colonization. Interruption of this recognition can prevent or reduce disease development.

First interface

The cuticle covers the aerial parts of plants and forms the first interface with the environment. This layer comprises a matrix of cutin and cuticular waxes. The epicuticular waxes occupy the outer region and define properties such as chemical composition, hydrophobicity, roughness, and topography.

The composition varies between species, cultivars, tissues, developmental stages, and environmental conditions. Waxes include long-chain aliphatic compounds, as well as terpenes, polyphenols, and volatile substances. On the surface, these materials can form crystalline structures with plate-, fiber-, or tubular-like morphologies.

Host recognition

Evidence gathered in the study indicates a biological function of these waxes in host recognition. Fungal spores can detect specific compounds and adjust steps prior to penetration. Barley powdery mildew, caused by *Blumeria graminis* subsp.

hordei, responds to the aldehyde hexacosanal, with a 26-carbon chain.

Wheat powdery mildew, associated with *Blumeria graminis* subsp. *tritici*, uses octacosanal, with a 28-carbon chain.

These compounds occur in the epicuticular waxes of the respective crops.

Traditional infection models use whole leaves. They allow for the assessment of susceptibility in species and cultivars, but

make it difficult to separate the effects of surface chemistry, morphology, physiology, and immune responses, the scientists explain. Natural tissue variation also reduces the reproducibility of the assays.

Many studies evaluate metabolic, proteomic, or transcriptomic changes after disease establishment. These methods describe subsequent responses, but do not isolate the factors responsible for the pathogen's success in its first contact with the plant.

Artificial surfaces

To overcome this limitation, the researchers propose artificial surfaces

coated with leaf waxes. The system deposits wax extracts onto inert substrates and forms films with a known composition. The spin coating technique spreads a solution over a moving surface and produces a thin, uniform layer.

The model preserves the chemistry found in the leaf and removes some of the complexity of living tissues. The rotation speed, solvent, volume, and solution concentration allow control of film thickness and hydrophobicity. Tests can relate these properties to spore germination.

Preliminary data

Preliminary data presented by the scientists show germination of two subspecies of *Blumeria graminis* on surfaces coated with waxes from different plants. The integration between the biological results and the characterization of the films may reveal compounds or properties capable of stimulating the disease.

Early models produce smooth surfaces. They don't reproduce the full natural morphology of waxes, but they allow for the separation of the effect from chemical composition. Future systems may incorporate roughness, topography, chemical gradients, temperature, and humidity. Other deposition and microfabrication techniques may also expand the control over surface

characteristics.

The proposal includes the evaluation of different crops and pathogen groups. Much of the available research focuses on biotrophic powdery mildews. The inclusion of rusts, rots, spots, and other agents could support the construction of susceptibility databases. These databases would gather information on the crop, fungus, and surface variable.

Plant selection

The results may guide the selection of plants with wax profiles less favorable to recognition by the pathogen. Breeding and gene editing programs could exploit this diversity. Another alternative involves

cuticle-inspired sprays, formulated to modify the leaf surface and confuse the fungi's detection mechanisms.

These strategies still require validation in plants and under field conditions. The goal is to shift management from post-treatment to preventing infectious contact. This approach does not replace fungicides or resistant cultivars, but offers a new line of investigation to reduce the incidence of diseases.

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Camisc Cooperative creates Executive Board to strengthen management and strategic integration.

Organizational change seeks to strengthen governance, integrate strategic areas, and support the cooperative's growth.

03.08.2026 | 13:39 (UTC -3)

Camisc



The Camisc Cooperative, located in Southwest Paraná and West Santa Catarina, announced the creation of its Executive Board, a new organizational structure aimed at strengthening the integration between strategic areas and streamlining management processes. The board will be led by Jonathan Laux, Financial, Governance and Technology Director, Tiago Almeida, Commercial Director, and Clóvis Paulichen, Operations and Human Resources Director.

With complementary experiences, professionals assume essential responsibilities for the development of the cooperative, contributing to greater integration, operational efficiency, and support for strategic decisions.

The change aims to improve internal alignment, strengthen decision-making, and prepare Camisc for the upcoming challenges in agribusiness, while maintaining a focus on efficiency, growth, and value creation for cooperative members, clients, and communities.

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Microtomography reveals networks of mycorrhizal fungi in the soil

Three-dimensional technique preserves roots, hyphae, and spores, and expands studies on water and nutrients

03.08.2026 | 12:59 (UTC -3)

Schubert Peter, Cultivar Magazine



Fungal hyphae are present in the soil as extremely thin structures. Even minor disturbances and cleaning efforts can destroy them. With TUM's new approach, it is possible to minimize them as much as possible – Photo: Jan Jansa

Researchers at the Technical University of Munich have developed a method to visualize, in three dimensions, the roots and structures of arbuscular mycorrhizal fungi within intact soil. The approach uses synchrotron X-ray micro-computed tomography. The procedure allows the identification of hyphae, spores, and structures present inside the roots, without the prior removal of mineral particles (doi 10.1111/nph.71379).

This method seeks to overcome a recurring limitation in mycorrhizal studies. Previous techniques required the removal of soil adhering to the roots. Cleaning eliminated fine structures and altered

spatial connections between fungi, roots, and pores. Other systems kept the material intact but restricted growth and observation to two-dimensional environments or transparent devices with simplified geometry.

Extraradicular hyphae

Arbuscular mycorrhizal fungi form networks of extraradical hyphae. These structures expand the exploration area of ??the roots and reach regions outside the nutrient depletion zones. Plants provide carbohydrates produced by photosynthesis. The fungi contribute to the absorption of phosphorus, nitrogen, zinc, copper, and water. The effect depends on the network architecture, hyphal length,

diameter, and connectivity with roots and soil particles.

The team created experimental systems with small, removable soil cores. The containers preserved their internal structure during removal and transport to the equipment. The study used chicory roots, *Cichorium intybus*, under sterile conditions, as well as tomato plants, *Solanum lycopersicum*, grown in pots.

The researchers evaluated the fungi *Rhizophagus irregularis* and *Funneliformis mosseae*. The treatments included coarse sand and silty loam soil. Some cores received a mesh to prevent root entry and allow only hyphal growth. Others remained open to allow the entry of both roots and fungi.

Porous structures

Microtomography detected structures in air-filled pores. The highest resolution images reached a voxel size of 0.65 micrometers. The detection limit was close to two micrometers. The team stopped irrigation two days before the analyses to reduce water in macropores and mesopores. Water exhibits X-ray attenuation similar to that of hyphae and makes it difficult to separate the materials.

Digital processing allowed for the separation of mineral particles, pore spaces, roots, root hairs, hyphae, and spores. The analysis also calculated length, volume, surface area, diameter, tortuosity, and contact between fungal

structures, soil, and roots. The workflow also estimated the occupancy of pores by fungi.

Two textures

The images showed continuous hyphae between soil particles in both textures. The diameters were close to six micrometers.

The team also identified spore clusters.

Funneliformis mosseae structures frequently appeared within aggregates or surrounded by mineral particles.

Rhizophagus irregularis spores occurred in pores both inside and outside the aggregates.

In soil volumes with roots, fungal networks grew towards the root surface and followed

its contour. Some hyphae connected the roots to mineral particles and reached distances greater than five millimeters from the root surface. Analyses also recorded structures consistent with arbuscules, vesicles, and intraradicular hyphae in the cortex of *Solanum lycopersicum*.

Volumes analyzed

The study presented values ??from two analyzed volumes as a demonstration of the method's capability. In the sand sample, the segmented network reached 8,280 micrometers in length. In the silty loam sample, the length reached 2,287 micrometers. The researchers emphasized that these numbers are not representative of the entire mycelium or for definitive

comparisons between species and soils.

The technique still has limitations. Hyphae in water-filled micropores remain difficult to detect. The signal also loses quality when the structures maintain close contact with mineral particles, especially in silty loam soil. In the rhizosphere, differentiating between fine hyphae and retracted root hairs requires criteria of diameter, branching, and growth pattern.

Researchers point to applications in three-dimensional models of water and nutrient transport. Integrating the images with functional models of soil, plants, and fungi can broaden the understanding of mycorrhizal processes. The approach can also support the identification of more efficient networks for soil exploration and contribute to research focused on crop

tolerance to drought.

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CNH Industrial releases second quarter results

Revenue reaches US\$4,8 billion, while net profit falls to US\$141 million

03.08.2026 | 10:11 (UTC -3)

Cultivar Magazine, based on information from CNH



CNH Industrial ended the second quarter of 2026 with a net profit of US\$141 million, lower than the US\$217 million recorded in the same period last year. Adjusted net profit was US\$161 million, compared to

US\$216 million in the second quarter of 2025.

Despite the reduction in profit, the company reported revenue growth. Consolidated revenues totaled US\$4,80 billion in the period ended June 30, while net sales from manufacturing activities reached US\$4,14 billion, both indicators above those recorded in the second quarter of 2025.

Cash generation also showed a positive result. Net cash from operating activities reached US\$145 million, and free cash flow from manufacturing activities was US\$150 million.

According to the company, income tax expense was US\$43 million, down from US\$76 million in the same period of the

previous year. The effective tax rate was 25,0%, compared to 27,6% in the second quarter of 2025.

According to CNH CEO Gerrit Marx, the performance reflects the company's ability to execute during a downturn in the agricultural cycle. He stated that although the financial situation of farmers remains pressured, there are already signs of improvement in the machinery market, such as the normalization of dealer inventories, the aging of fleets, and a greater balance between the prices of new and used equipment.

Marx also stated that the company is maintaining investments in quality, operational efficiency, supply chain, strengthening its dealer network, and developing new technologies, focusing on

preparing for the next market growth cycle.

2026 Second Quarter Results

US-GAAP				
(\$ millions, except per share data)	Q2 2026	Q2 2025	Change	Change at c.c. ⁽²⁾
Consolidated revenues	4,803	4,711	+2%	—%
of which Net sales of Industrial Activities	4,143	4,021	+3%	1%
Net income	141	217	(35)%	
Diluted EPS	0.11	0.17	(0.06)	
Cash flow provided by operating activities	145	772	(627)	
NON-GAAP ⁽¹⁾				
(\$ millions, except per share data)	Q2 2026	Q2 2025	Change	
Adjusted EBIT of Industrial Activities	167	224	(25)%	
Adjusted EBIT margin of Industrial Activities	4.0%	5.6%	(160) bps	
Adjusted Net income	161	216	(25)%	
Adjusted diluted EPS \$	0.13	0.17	(0.04)	
Free cash flow of Industrial Activities	150	451	(301)	
Agriculture				
(\$ millions)	Q2 2026	Q2 2025	Change	Change at c.c. ⁽²⁾
Net sales	3,277	3,248	+1%	(1)%
Adjusted EBIT	170	263	(35)%	
Adjusted EBIT margin ⁽¹⁾	5.2%	8.1%	(290) bps	
Construction				
(\$ millions)	Q2 2026	Q2 2025	Change	Change at c.c. ⁽²⁾
Net sales	866	773	+12%	+10%
Adjusted EBIT	15	35	(57)%	
Adjusted EBIT margin ⁽¹⁾	1.7%	4.5%	(280) bps	
Financial Services				
(\$ millions)	Q2 2026	Q2 2025	Change	Change at c.c. ⁽²⁾
Revenues	656	685	(4)%	(7)%
Net income	71	87	(18)%	
Equity at quarter-end	2,923	2,907	+16	
Retail loan originations	2,531	2,740	(209)	

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Silica nanoparticles reduce egg laying by fall armyworm

Residual effect in the soil alters corn volatiles and decreases the preference of *Spodoptera frugiperda*

02.08.2026 | 17:03 (UTC -3)

Schubert Peter, Cultivar Magazine



Foliar application of silicon dioxide nanoparticles generated a residual effect in the soil capable of reducing fall armyworm egg laying in corn plants grown in the next generation. The mechanism involved soil microorganisms and changes in the emission of volatile compounds by the crop, according to a study by Chinese researchers (doi 10.1002/ps.71169).

Corn grown in soil treated with nanoparticles received fewer *Spodoptera frugiperda* eggs in field and laboratory tests. Choice assays also indicated less preference for the plants by adults and larvae. The treatment did not cause significant changes in initial growth or silicon accumulation.

Soil sterilization eliminated the response. Reintroduction of the microbial community restored the effect, a result associated with the participation of microorganisms in the process.

Analysis of volatiles identified increased emissions of hexanal, (Z)- β -ionone, dihydroactinidiolide, 6,10,14-trimethyl-2-pentadecanone, and (3E,7E)-4,8,12-trimethyltrideca-1,3,7,11-tetraene.

Hexanal, dihydroactinidiolide, and the last compound showed concentration-dependent behavioral responses. At levels close to those observed in the control plants, they acted as attractants. At high concentrations, recorded in corn grown in conditioned soil, they began to repel the insect.

The results indicate a feedback mechanism between nanoparticles, soil, and plant. This strategy may support the development of methods aimed at reducing crop colonization by the pest.

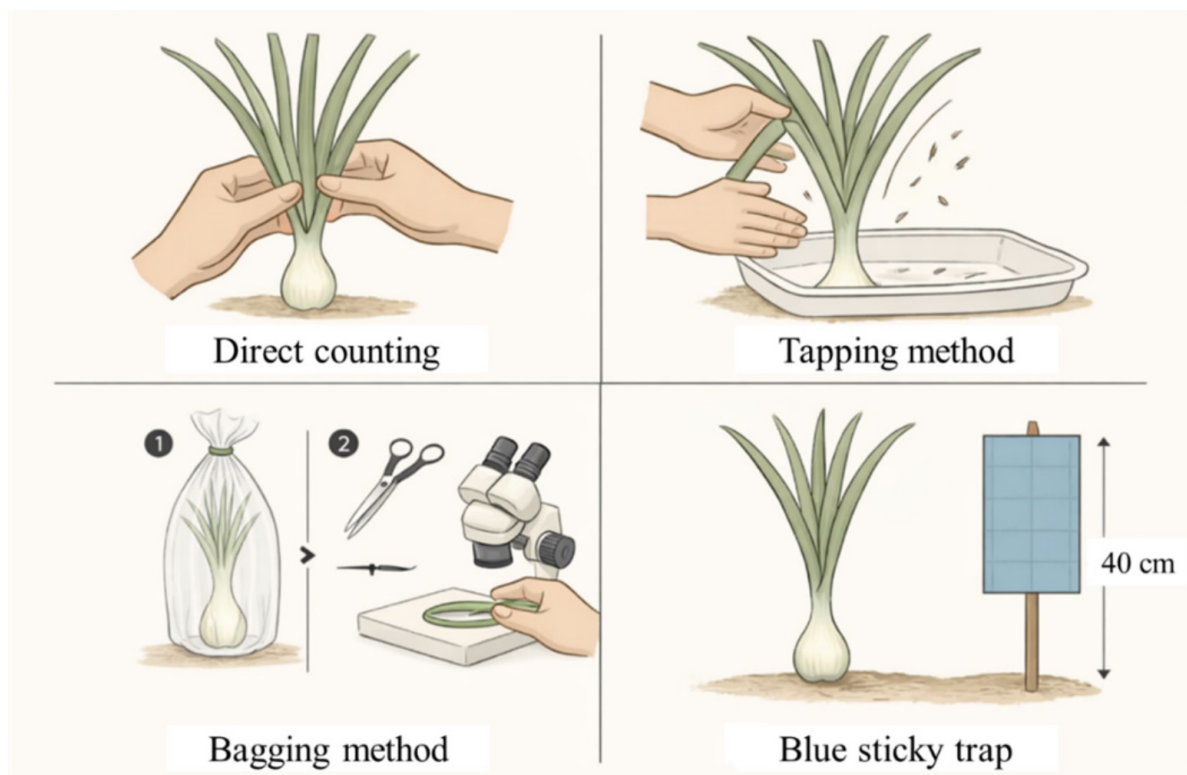
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Blue trap improves thrips monitoring in onions

The method showed greater accuracy, lower cost per hectare, and a strong correlation with pest density

02.08.2026 | 16:25 (UTC -3)

Schubert Peter, Cultivar Magazine



Schematic representation of four thrips sampling techniques in onion crops - doi 10.37486/2675-1305.ec08029

The blue sticky trap demonstrated the best performance for monitoring thrips in commercial onion crops. The method recorded a relative variance of 5,27%, an economic precision of 135,50, and a cost of \$3,64 per hectare. The result indicates greater operational efficiency for Integrated Pest Management programs.

Researchers from the Federal University of Viçosa compared four techniques in 30 fields of the Andromeda cultivar in the Alto Paranaíba region of Minas Gerais (doi 10.37486/2675-1305.ec08029). The study evaluated direct counting, beating of plants, bagging, and blue sticky traps. Direct counting served as a reference for absolute density.

The blue trap showed a coefficient of determination of 0,79 and a regression slope of 0,82. These values ??indicated the highest correlation with the population present on the plants. The method required 0,10 samples per hectare and recorded an average time of 61,94 seconds per sample.

The bagging method had the lowest unit cost, at \$0,08 per sample. However, it required 60,14 samples per hectare and did not show a significant correlation with absolute density. The technique also required 94,45 seconds per sample.

The plant beating method showed the shortest time, with 10,16 seconds per sample. The method achieved a moderate correlation with thrips density, but recorded

a relative variance of 43,81%, above the 25% limit adopted in the study.

Direct counting identified a predominance of *Thrips tabaci*, responsible for 89,4% of the individuals. *Frankliniella occidentalis* and *Frankliniella schultzei* completed the observed composition.

The researchers concluded that blue traps offer the most reliable indicator of infestation pressure in the field and can support decisions about the timing of control measures.

The work was carried out by scientists Lara B. Ribeiro, Samuel R. França, Daniel C. Nogueira, Monique F. Malaquias, Mariana MF Oliveira, Carlos G. da Cruz, and Flávio L. Fernandes.

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