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Cultivar[®] *Semanal*

***Phytophthora*
species count
rises to 261**

Table of Contents

Study questions the universal rise in pests with warming	06
Water stress alters indirect defenses in tomato and wheat	10
Agricultural Market - May 15, 2026	18
Vittia's sales fall 11,5% in Q1 26	27
Phytophthora receives a new review after 180 years of research	31
John Deere strengthens portfolio management in Latin America	39
Rice can trap and kill Spodoptera frugiperda in its spikelets	41
Celito Missio is the new president of Aprosem	50
Syngenta inaugurates research and development center in Almería	54

Table of Contents

Conab projects a record harvest of 358 million tons.	59
Andrallus spinidens is recorded in rice in Brazil	68
Odor receptors open a new front in pest management	73
Pesticide sales in the EU are set to grow again in 2024	82
Corteva launches Verpixo fungicide in the US	91
Rodrigo Burci Dias takes over management at Sumitomo Chemical	95
Abramilho Congress presents data and perspectives of the sector	98
Julio Braga takes on a role in product marketing at CNH	107

Table of Contents

Nufarm strengthens its Marketing area with a new manager	110
Aqueous formulation improves pesticide deposition	113
UPL announces new supply chain director in Brazil	117
UPL appoints Daniel Ferreira to Commercial Directorate	121
Bayer boosts results in the first quarter with growth in Crop Science	123
Specialty Marketing has new leadership at Sipcam Nichino	128
Predators vary in their control of the diamondback moth	130
Elicit Plant has a new Commercial VP for Latin America	138

Table of Contents

New Holland brings Braud vendimiadora to Sitevinitech 2026 141

CropLife Brazil renews Board of Directors 145

BASF launches BioHub for biological pesticides 149

Baculovirus changes the dietary choices of *Spodoptera exigua* 153

Heat reduces reproductive success in bumblebees 161

Study questions the universal rise in pests with warming

Field data indicate distinct arthropod responses in rice, cotton, grapes, citrus, and olive trees

15.05.2026 | 09:46 (UTC -3)

Peter Schubert, Cultivar Magazine, based on information from Kathy Keatley Garvey



Photo: Kathy Keatley Garvey

A study led by entomologist Mia Lippey of the University of California, Davis, challenges the hypothesis of a widespread increase in agricultural pests under climate warming. The research indicates distinct responses among species, crops, and regions.

Scientists analyzed numerous field observations per year. The survey included 43 arthropod populations. The group gathered 30 pest populations and 13 natural enemy populations. The data involved 28 pest species and 11 natural enemy species in rice, cotton, grapes, citrus, and olive trees. The areas evaluated are located in Andalusia, Spain, and California, in the United States.

Pest proliferation

The results do not confirm a universal proliferation of pests. Some populations increased under higher temperatures. Others decreased or showed no response. The same pattern occurred among natural enemies. The study found partial support for greater vulnerability of these enemies to warming, compared to pests.

According to the researchers, models based on laboratory experiments predicted an increase in pest density and a reduction in natural enemies with rising temperatures. Field data challenge this prediction. The team also could not explain the variation in responses through thermal performance measured in the laboratory or

through life history characteristics.

Lippey stated that species, culture, and location contributed to the diversity of the results. She also said that isolated characteristics do not allow for reliable predictions of the effects of climate change on agricultural arthropods.

Further information at
doi.org/10.1073/pnas.2606726123

[RETURN TO INDEX](#)

Water stress alters indirect defenses in tomato and wheat

Study shows effects of drought on defense genes and attraction of natural enemies in laboratory tests

15.05.2026 | 08:25 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Pflanzenschutzamt Saarbrücken - Bugwood

Water stress altered morphological characteristics, expression of defense genes, and olfactory responses of natural enemies in tomato and wheat plants. The result comes from a study in three water regimes and plants with or without pest infestation.

The research evaluated "bottom-up" effects, in which changes in the plant influence higher trophic levels. This type of response can interfere with the interaction between crop, pest, and biological control agent. According to the scientists, the topic gains relevance in climate change scenarios, with greater water restriction and pressure on integrated pest management programs.

The researchers worked with tomato plants (*Solanum lycopersicum*) and wheat (*Triticum aestivum*). The plants received three irrigation regimes: optimal regime, moderate water stress, and severe water stress. Some of the plants were infested with phytophagous insects. In the tomato plants, the researchers used *Bemisia tabaci* and *Phenacoccus solenopsis*. In wheat, they used *Sitobion fragariae*.

The study measured height, stem diameter, root length, fresh mass, and dry mass. It also analyzed genes linked to abscisic acid, jasmonic acid, and salicylic acid pathways. The team evaluated the olfactory response of three natural enemies: *encarsia formosa*, *Cryptolaemus montrouzieri* and *Aphidius colemani*.

Water deficit

In tomato plants, water deficit reduced height, stem diameter, fresh weight, and dry weight. Moderate stress increased root length compared to the optimum regime and severe stress. In wheat, severe stress reduced height and dry weight. Stem diameter also decreased under moderate and severe stress.

The molecular response varied between crops. In tomatoes, moderate and severe regimes increased the expression of ASR1, a gene associated with the abscisic acid pathway, and PIN2, a marker related to jasmonic acid. In plants infested by *Bemisia tabaci*, ASR1 increased in tomato plants under severe stress. In plants

infested with *Phenacoccus solenopsis*, ASR1 increased under moderate and severe stress.

In wheat, the PR1 gene, linked to the salicylic acid pathway, showed higher expression under severe water stress, with or without infestation by *Sitobion fragariae*. The LOX gene, associated with jasmonic acid, did not show activation under the same conditions. The authors suggest a possible antagonism between the salicylic acid and jasmonic acid pathways.

natural enemies

The responses of natural enemies have also changed. *Encarsia formosa* preferred volatiles from tomato plants under

moderate water stress when there was no infestation. *Cryptolaemus montrouzieri* also showed a preference for tomato plants under moderate stress without the presence of pests. However, when there was an infestation by *Phenacoccus solenopsis*, the predator preferred well-watered plants compared to plants under severe stress.

In wheat, *Aphidius colemani* showed a preference for plants under optimal irrigation conditions in most comparisons. The exception occurred in the comparison with plants under moderate stress and infested by *Sitobion fragariae*.

Plant defense

Scientists conclude that water deficit and pest infestation activate plant defense mechanisms with distinct effects on natural enemies. The combination of abiotic and biotic stress altered volatile signals and influenced the attraction of biological control agents.

The results may support biological management strategies within integrated pest management. The researchers highlight the need for further studies. They suggest analyses of volatile compounds emitted under different stress combinations and field trials to validate the use of induced plant defenses in biological control programs.

More information at
doi.org/10.1002/ps.70900

[RETURN TO INDEX](#)

Agricultural Market - May 15, 2026

Commodity prices fall amid US-China standoff

15.05.2026 | 07:26 (UTC -3)

Vlamir Brandalitze - @brandalitzeconsulting



The international agricultural commodities market registered a decline after the first day of negotiations between Donald Trump and Xi Jinping in China. As of now, no

agreement has been reached between the United States and China. This environment pressured soybean, corn, and wheat prices in Chicago. Soybeans suffered the biggest loss, with declines of 35 to over 40 points. All contracts fell below the US\$12 per bushel level.

In the United States, soybean planting is progressing at an accelerated pace. The planted area has reached 55%, compared to an average of 42%. In Illinois, the main producing state, planting has exceeded 62%, against a historical average of 50%. Weather conditions remain normal for this time of year.

In Brazil, the 2025/26 soybean crop, estimated at 180 million tons, has 63% of its production already traded. The previous

year's figure was 67%, with an average of 68%. The new crop also saw transactions, with barter operations advancing in the preceding days, when Chicago traded above US\$12 per bushel. Advance sales reached 16%, below last year's 21% and the average of 23%.

Brazilian soybean exports remain strong, with total exports already exceeding 46,5 million tons. During the same period last year, the volume reached 43 million tons.

Corn situation

Corn also fell in Chicago. Positions lost 10 to 15 points. The decline came in the same risk aversion movement, even without China occupying a large position as a

buyer of US corn. Planting in the United States reached 65%, compared to 66% last year and an average of 57%. In Iowa, progress is approaching 80%. The state should plant most of the crops before May 20, within the ideal window.

In Brazil, the corn market remains calm. Sellers are awaiting an assessment of the damage caused by frost to the second corn crop, especially in Paraná. There is a risk of new frosts at the end of next week, with the arrival of a new cold front. Buyers are avoiding paying more. According to data cited by Secex, the first week saw shipments of only 100 tons, on two ships. From January to the first week of the month, the accumulated total exceeds 7,4 million tons, compared to 6,1 million last

year.

Wheat situation

Wheat prices followed the external decline. Contracts traded between US\$6,50 and US\$7,10. Despite the pressure, the Northern Hemisphere harvest presents its own fundamentals. In the United States, only 28% of crops are rated as good or excellent. Last year, the index reached 54%. The previous week, the percentage was 31%. Poor and very poor crops rose to 40%, compared to 18% the previous year.

In Brazil, wheat trading remains sporadic. Mills are buying on a hand-to-mouth basis. Nominal prices are around R\$ 1.300 per

ton in Rio Grande do Sul and R\$ 1.350 in Paraná.

Sorghum situation

Sorghum is gaining relevance in the Brazilian market. The area planted in the United States is decreasing this season. The harvested area in the United States was indicated at 2,1 million hectares, compared to 2,43 million in the previous year. Projected production totals 9,3 million tons, compared to 11,1 million in the last cycle. This movement opens up opportunities for Brazilian sorghum.

In the United States, sorghum planting has reached 30%, in line with last year and the historical average. In Brazil, crops are

progressing in development and ear formation. The planted area is estimated at 2,2 million hectares, compared to 1,6 million last year. Production could reach 7,5 million to 8 million tons, or even exceed that range, according to market commentary. Prices are estimated between R\$ 40 and R\$ 45.

Rice situation

In the rice market, things remain sideways. Producers expressed frustration with the Conab auctions. The first auction of 53,1 tons saw no transactions. The second, of 39,9 tons, traded a volume below expectations. The complaints involve premiums considered low in the Pepero program and the payment deadline.

In the Western Border region, prices are between R\$ 57 and R\$ 58. Parboiled rice is trading near R\$ 54. Along the coast, prices are R\$ 3 to R\$ 5 higher. In Mato Grosso, scarce supply sustains prices between R\$ 92 and R\$ 100 per sack. In retail, promotions range from R\$ 11 to R\$ 22 per package. Premium brands reach R\$ 25, R\$ 30 or R\$ 32 in large urban centers.

Bean situation

Bean production in Paraná, Brazil's main bean producer, was severely impacted by frosts. Losses were reported in areas of the Southwest, Central, and part of the Midwest of the state. Northern Santa Catarina also registered damage. The

market maintains firm prices, with sellers holding back and buyers active.

Carioca beans (grade 9 and above) are trading between R\$390 and R\$440 per sack, with some sellers expecting prices closer to R\$500. Commercial carioca beans (grades 8 and 8,5) also saw increases. Minimum prices are around R\$370, with some markets above R\$405 to R\$410. Black beans followed suit and are now priced between R\$200 and R\$220 per sack, with reduced supply.

[RETURN TO INDEX](#)

Vittia's sales fall 11,5% in Q1 26

Net revenue totals R\$ 121,9 million; company attributes decline to caution in purchasing supplies

15.05.2026 | 07:19 (UTC -3)

Cultivar Magazine



Vittia reported an 11,5% drop in net revenue in the first quarter of 2026. The total was R\$ 121,9 million, compared to R\$ 137,8 million in the same period of 2025. The decline occurred in a cautious

environment in the agricultural sector, with pressure on producer profitability, restricted credit, and greater selectivity in the purchase of inputs.

The decline affected all segments reported by the company. Foliar fertilizers and industrial products fell 15,3%, to R\$ 49,7 million. Soil fertilizers dropped 10,3%, to R\$ 26,2 million. Biological and natural solutions decreased 7,9%, to R\$ 46,1 million.

Gross profit fell 16,2% to R\$35,2 million. The gross margin decreased from 30,5% to 28,9%. Adjusted EBITDA was negative R\$587, compared to a positive result of R\$6,9 million in Q1 25. The company attributed the performance to the reduction in gross profit.

The adjusted net result was negative at R\$ 5,9 million. In the same quarter of the previous year, the adjusted loss totaled R\$ 2 million.

Despite the drop in sales, Vittia reduced its net debt by 19,9%, to R\$ 174,4 million. Leverage, measured by net debt to adjusted EBITDA, stood at 1,62 times.

The company invested R\$ 6,2 million in CAPEX during the quarter. The resources were focused on operational improvements. The company also invested R\$ 6,5 million in research and development, an amount equivalent to 5,3% of net revenue.

Em milhares de R\$	1T26	1T25	Var %
Receita líquida	121.914	137.820	(11,5%)
Custo do produto vendido	(86.698)	(95.779)	(9,5%)
Lucro bruto	35.216	42.041	(16,2%)
Margem bruta	28,9%	30,5%	-1,6 p.p.
Despesas operacionais	(47.336)	(44.916)	5,4%
EBITDA ajustado	(587)	6.861	N/A
Margem EBITDA ajustado	(0,5%)	5,0%	-5,5 p.p.
Resultado financeiro líquido	2.112	508	315,7%
Imposto de renda e contribuição social	3.526	409	762,1%
Resultado líquido	(6.482)	(1.959)	231,1%
Margem líquida	(5,3%)	(1,4%)	-3,9 p.p.
Resultado líquido ajustado (i)	(5.902)	(1.959)	201,4%
Margem líquida ajustada	(4,8%)	(1,4%)	-3,4 p.p.
Investimentos (imobilizado e intangível)	6.186	5.344	15,8%

(i) O resultado líquido ajustado exclui os impactos contábeis relacionados à recuperação extemporânea de tributos, sendo ambos os valores considerados líquidos dos efeitos fiscais correspondentes.

RETURN TO INDEX

Phytophthora receives a new review after 180 years of research

Work brings together advances from morphology to genome and reinforces correct identification in management

15.05.2026 | 07:18 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Margaret McGrath, Cornell University

USDA researchers have compiled 180 years of advances in taxonomy and identification of *Phytophthora*, a genus with 261 valid species and a direct impact on crops, forests, nurseries, urban landscapes, and natural ecosystems. Its scientific review connects potato blight and the Irish famine to the birth of modern plant pathology. It also updates databases for Sanger sequencing, high-throughput technologies, and complete genomes.

The genus includes some of the most important plant pathogens. The best-known case involves [Phytophthora infestans](#), the causal agent of potato blight. The disease struck Ireland between 1845 and 1852. Approximately 1,5 million people died and up to 1,5 million emigrated due to the famine associated

with the disease, which was not yet formally described at that time.

The review shows the progress from the first hypotheses about the cause of the disease to the use of genomics. In the 1840s, late blight appeared in North America and Europe. Records indicate an almost simultaneous occurrence in 1841 and 1842 in Philadelphia, in the United States, and in Liège, Belgium. The disease spread to other European regions and culminated in the Irish famine. ([Click here and read: Study confirms the origin of *Phytophthora infestans*](#))

Miles Joseph Berkeley defended the fungal theory after observing mold-covered potato leaves under a microscope.

Heinrich Anton de Bary described

Phytophthora infestans in 1876 and coined the name *Phytophthora*, derived from the Greek words for "plant" and "destruction." This milestone helped solidify phytopathology as a scientific field.

Two phrases

The work divides taxonomic history into two phases. The morphological era spans from 1876 to 1999. It utilized characteristics such as size and shape of sporangia, oogonia, antheridia, chlamydospores, growth in culture media, temperature, and pathogenicity. Despite the large number of species published during this period, only 48 remain valid.

The molecular era began in 2000. Since then, 214 species have been described with integration between morphological and molecular characters. Sanger sequencing has gained a leading role in molecular characterization. The ITS region of ribosomal DNA has historically been used as a marker for species description and identification. Nuclear and mitochondrial genes have also begun to support identification and phylogeny studies.

The study updates the information from "Revision of *Phytophthora*," published in 2023. The previous survey listed 211 valid species and a representative lineage of *Phytophthora palmivora*. The new database lists 261 valid species, with 50 additional species published in recent

years.

Scientists highlight the importance of ex-types, cultures derived from the reference specimens used in species definition. Their work presents updated databases for identification by Sanger and by second- and third-generation HTS technologies. These databases cover the 261 valid species and a representative lineage of *Phytophthora palmivora*.

The work also brings together 257 complete genomes available at NCBI, associated with 76 species. Of this total, 46 correspond to ex-types, including 35 reference genomes at NCBI. The genomic assemblies utilize platforms such as Illumina, PacBio, and MinION ONT.

High-performance technologies

High-throughput technologies have expanded diagnostic capabilities.

Metabarcoding allows for the identification of organisms from environmental DNA.

However, this work points to limitations in short reads, especially in studies with ITS1 of approximately 250 base pairs. Third-generation sequencing, with longer reads, could improve species-level resolution.

Scientists also note challenges. HTS technologies require instruments, reagents, and knowledge in bioinformatics. Identification can face problems with hybrid species, DNA from non-viable organisms, and species with similar

sequence profiles. The text also points to the need for standardization of bioinformatics protocols and workflows, especially in areas of quarantine, regulation, and biosafety.

Further information can be found at doi.org/10.1094/PDIS-07-25-1349-FE

[RETURN TO INDEX](#)

John Deere strengthens portfolio management in Latin America

Bruno Muller assumes new position as manager after a 17-year career with the company

14.05.2026 | 15:59 (UTC -3)

Cultivar Magazine



With over 17 years of experience at John Deere, Bruno Muller (pictured) has been promoted to Portfolio Manager for Latin America. Prior to assuming his new role,

the executive served as Global Sugar Portfolio Manager and Tractor and Harvester Portfolio Manager for Latin America, positions he held simultaneously for over a year.

Bruno holds a degree in Business Administration and Marketing from ESPM, a master's degree in Production Engineering from the Federal University of Rio Grande do Sul, and an MBA from the Global Agribusiness Academy of the Dom Cabral Foundation.

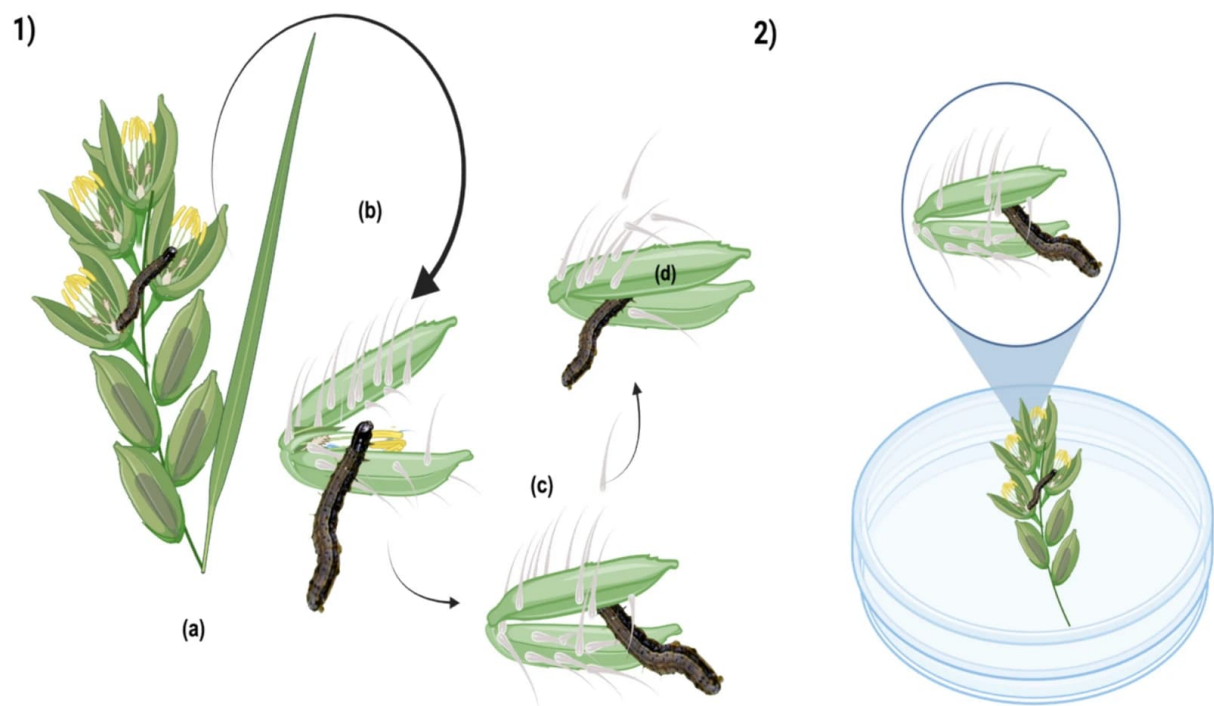
[RETURN TO INDEX](#)

Rice can trap and kill *Spodoptera frugiperda* in its spikelets

Study shows action of floral trichomes and volatiles against young caterpillar larvae

14.05.2026 | 14:58 (UTC -3)

Schubert Peter, Cultivar Magazine



doi.org/10.1186/s13717-026-00683-8

Rice plants can trap and kill young caterpillars of *Spodoptera frugiperda* during the flowering phase. Researchers at

the University of Arkansas documented the phenomenon in rice spikelets. The mechanism involves non-glandular trichomes and the natural closure of the spikelet after anthesis. The discovery points to a possible physical defense of the plant against herbivores in reproductive structures.

The study began with an observation made during experiments with rice and *Spodoptera frugiperda*. Second instar larvae were found dead inside the spikelets. The researchers conducted four experiments with wild rice, *Oryza sativa japonica* cv. *Kitaake*. The assays evaluated caterpillar exposure to panicles, bioassays in Petri dishes, choice tests, and analysis of volatile compounds emitted by

the panicles. The caterpillars used in the study came from commercial breeding and received a wheat germ-based diet until the second instar.

First experiment

In the first experiment, scientists placed 30 second-instar larvae in a rice panicle with a flag leaf at the beginning of anthesis. After 48 hours, 50% of the caterpillars were trapped in the panicles. The presence of the flag leaf did not prevent the larvae from migrating to the reproductive structures.

Second experiment

In the second experiment, the authors used panicles with florets in anthesis and panicles in the pasty stage in Petri dishes. Each dish received a second-instar caterpillar, kept there for 24 hours. The result repeated the pattern observed in the plants. Approximately 53% of the larvae became trapped. According to the authors, when the caterpillar attempted to feed on the panicle, approximately half of the individuals died within 48 hours, with or without available leaf material.

Images from the study show the sequence proposed by the authors. The larva enters the spikelet during anthesis, attempts to access the floret, and becomes trapped between the structures covered in trichomes. Then, the spikelet closes

naturally after anthesis. This movement traps the caterpillar and leads to its death.

Third experiment

The third experiment evaluated the potential attraction of caterpillars to floral volatiles. The larvae showed a preference for panicles with florets compared to panicles in a pasty stage, although the result was at the statistical limit reported by the authors. The test presented a chi-square of 6,2, two degrees of freedom, and a p-value of 0,05. For the researchers, the result provides additional evidence about the possible role of floral volatiles in guiding caterpillars to the panicle.

Scanning electron microscopy analysis indicated damage to the larva's body after

separation from the spikelet. Images show trichomes on the spikelet, the trapped larva, and deformation in the insect's anterior segment. Scientists attributed the damage to the mechanical pressure of the spikelet's closure and the presence of dense trichomes. They also hypothesized that the angle of trichome insertion played a role in the entrapment.

The observation was validated in two other rice lines. The researchers tested the conventional cultivar Diamond, used in the south-central United States, and the GSOR 302684 line, described as rich in trichomes. Both showed a similar effect.

Fourth experiment

In the fourth experiment, researchers collected volatiles from panicles with florets shortly after anthesis and from panicles in the pasty stage, two to three weeks after anthesis. The collection lasted six hours. The analysis was performed by gas chromatography coupled with mass spectrometry. Total emissions and average volatile content were higher in panicles with florets.

Compounds found only in panicles with florets included dodecane, ethylhexanal, and an unidentified alcohol. Ethylhexanol appeared in both instars, but in twice the quantity in panicles with florets. The authors speculate that these compounds may participate in the attraction of *Spodoptera frugiperda* for the florets. After approaching, the larva becomes attached

by the trichomes.

According to the researchers, the trichomes present in the spikelets may act as a defense system against insects, especially against floral feeders in early stages. They indicate the need for further assays with trichome-deficient mutants, measurements of trichome density, length and angle, as well as studies on the mechanics of entrapment and the response of different instars.

Further information at

doi.org/10.1186/s13717-026-00683-8



[RETURN TO INDEX](#)

Celito Missio is the new president of Aprosem

New administration strengthens training, communication, and strategic coordination in Matopiba.

14.05.2026 | 13:45 (UTC -3)

Bruna Clerici



The Association of Seed Producers of the Matopiba States – Aprosem, elected its new board of directors who will lead the entity for the 2026/27 biennium. The

management will be headed by Celito Missio (pictured), from Sementes Oilema, with Gregory Sanders, from Progresso Sementes, as vice-president.

The new composition reinforces the continuity of the entity's institutional work, focusing on strengthening the seed sector, representing its members, and strategically coordinating with key agribusiness players.

The administrative board will be led by Ricardo Teixeira, from Sementes Neovita, while the financial board remains under the responsibility of Antônio Assunção, from Cooproeste. The marketing board continues with Priscilla Sanders, from Progresso Sementes, and the services board is occupied by Lucas Pinto, from Sementec.

With a consolidated presence in Matopiba, Aprosem prioritizes the training of its members' employees, directly contributing to the quality of the product offered. In 2026, the year in which the organization celebrates 15 years of operation, communication also assumes a strategic role, reinforcing the collective construction of solutions and the commitment to the sustainable development of the region.

According to the organization, ongoing priorities include dialogue with public and private entities, promoting regulatory advancements, and strengthening legal certainty in the seed production and marketing environment.

[RETURN TO INDEX](#)

Syngenta inaugurates research and development center in Almería

The unit in El Ejido will support the development of resistant seeds for vegetables

14.05.2026 | 11:08 (UTC -3)

Cultivar Magazine, based on information from Syngenta



Syngenta Vegetable Seeds has opened a Research and Development Technology Center in El Ejido, in the Almería region of southern Spain. The unit will focus on combating emerging pathogens in fruit vegetables. The facility is also expected to reduce traditional genetic improvement timelines.

The center is part of a larger company innovation complex in El Ejido. The facility brings together breeding, seed operations, trait development, fruit quality, applied data science, and digital tools in one location.

According to Matthew Johnston, global leader of Syngenta Vegetable Seeds, new pathogens are emerging at an unprecedented rate and affecting producers in various regions. He stated

that the delivery of resistant seeds protects crops and farmers' income. Johnston also said that the investment reinforces the company's commitment to innovation in Spain and other countries.

The unit adopts a field-to-laboratory approach. Diagnosis begins in the producers' fields, not just in laboratories. The proposal places the farmer at the center of the research.

The center features biosecurity technology. The structure allows for work with emerging threats in a controlled and quarantined environment. The company reports that the unit maintains high standards of plant health.

Uri Krieger, global head of research and development at Syngenta Vegetable

Seeds, stated that the center demonstrates the connection between breeders and producers. According to him, the work takes place throughout the year and generates data that is shared with R&D teams in strategic producing regions.

The official opening took place today. The event was attended by the Spanish Minister of Agriculture, Luis Planas, and 100 guests.

Southern Spain is among the world's leading vegetable-producing areas. The Almería region alone boasts over 30 hectares of greenhouses, with annual production reaching nearly 4 million tons of vegetables. For Syngenta, this environment fosters agricultural innovation and the development of solutions for producers across different continents.

[RETURN TO INDEX](#)

Conab projects a record harvest of 358 million tons.

The eighth survey indicates a 1,6% increase in grain production, with growth in soybeans and declines in rice, wheat, and second-crop corn.

14.05.2026 | 10:17 (UTC -3)

Cultivar Magazine



Brazilian grain production is expected to reach 358 million tons in the 2025/26 harvest. This estimate is part of the eighth

survey by the National Supply Company (Conab), based on field research conducted in April. The volume exceeds the 2024/25 harvest result by 5,7 million tons. The growth reaches 1,6% and confirms a new record for the agricultural sector.

The expansion is largely due to the performance of soybeans, first-crop corn, and sorghum. Soybeans are expected to add 8,6 million tons to the volume harvested in the previous cycle. First-crop corn is expected to increase by 3,5 million tons. Sorghum is expected to grow by 1,5 million tons.

The cultivated area is estimated at 83,5 million hectares. This number still depends on confirmation of the planting of third-crop and winter crops. Even so, the projection

indicates a growth of 2,2%. The incorporated area reaches 1,8 million hectares compared to the previous harvest.

Some crops are expected to have reduced production compared to the 2024/25 season. Second-crop corn is projected to decrease by 4,8 million tons. Rice is expected to be harvested 1,7 million tons less. Wheat is expected to lose 1,5 million tons.

Information by culture

Soybeans lead national production. Conab projects 180,1 million tons, a 5% increase. This growth corresponds to 8,6 million tons. The estimate combines a 2,9% increase in area, equivalent to 1,4 million

hectares, and favorable weather conditions. As of May 11, the harvest had reached 98,3% nationwide. This figure exceeded the average of the last five years by 1,4 percentage points.

Corn production totaled 140,2 million tons across the three harvests. This volume represents a 0,7% decrease compared to the previous cycle. The first harvest has an estimated planted area of 4,1 million hectares, an increase of 8,4%. Production reached 28,5 million tons, a rise of 14,1%.

In the second corn crop, the area reaches 17,8 million hectares. The area growth reaches 2,1%. However, production is estimated at 108,5 million tons, a decrease of 4,2%. During the analyzed period, sowing was in its final stages. The crops varied from germination to flowering. For

the third crop, Conab forecasts cultivation in 676,8 hectares and production of 3,3 million tons. The sowing calendar runs from mid-April to July.

Cotton production is expected to reach 9,6 million tons, with 4 million tons of lint. The estimate indicates a 2,6% reduction compared to the previous cycle. The planted area is expected to decrease by 2,2%, reaching 2 million hectares. Regular water availability supports expectations of good productivity levels. In terms of plant health management, producers are paying close attention to whitefly and boll weevil. As of May 11th, 3,1% of the crops were flowering, 82,9% were still in the boll formation stage, and 13,9% were entering the maturation phase.

Rice production is estimated at 11,1 million tons. This volume is 13,1% lower than the previous harvest. The reduction is mainly due to a 13,7% decrease in cultivated area and less favorable weather conditions in some crops. Irrigated area shows a decrease of 8,4%, with an estimated 1,25 million hectares and production of 10,4 million tons. Rainfed area decreased by 32%, with 268,4 hectares and production of 694,8 tons. Harvesting was progressing in all states and reached 94,6% on May 11th.

Bean production is expected to total 2,9 million tons across the three harvests. This estimate indicates a 5,2% decrease compared to the previous cycle. The first harvest began sowing in September 2025 and is projected to yield 969,1 tons. The

second harvest is expected to reach 1,2 million tons. Crops ranged from vegetative development to the beginning of harvesting during the analyzed period.

In wheat, sowing began in April and reached 17,5% of the area by May 11th. In Rio Grande do Sul, the largest national producer, and in Santa Catarina, planting had not yet begun. The estimates use statistical models, market analysis, weather forecasts, and preliminary field information. Conab projects a reduction in area and production of 6,4 million tons.

TABELA 1 - COMPARATIVO DE ÁREA, PRODUTIVIDADE E PRODUÇÃO POR PRODUTO

Brasil	Estimativa da produção de grãos			Safras 2024/25 e 2025/26					
	ÁREA (Em mil ha)			PRODUTIVIDADE (Em kg/ha)			PRODUÇÃO (Em mil t)		
	Safra 24/25	Safra 25/26	VAR. %	Safra 24/25	Safra 25/26	VAR. %	Safra 24/25	Safra 25/26	VAR. %
	(a)	(b)	(b/a)	(c)	(d)	(d/c)	(e)	(f)	(f/e)
ALGODÃO - CAROÇO (1)	2.085,6	2.039,7	(2,2)	2.776	2.764	(0,4)	5.789,9	5.636,9	(2,6)
ALGODÃO - PLUMA	2.085,6	2.039,7	(2,2)	1.957	1.948	(0,5)	4.081,5	3.973,4	(2,6)
AMENDOIM TOTAL	280,4	282,1	0,6	4.136	4.279	3,5	1.159,7	1.206,8	4,1
Amendoim 1ª Safra	273,1	274,8	0,6	4.202	4.348	3,5	1.147,6	1.194,7	4,1
Amendoim 2ª Safra	7,3	7,3	-	1.662	1.681	1,1	12,1	12,1	-
ARROZ	1.763,9	1.522,1	(13,7)	7.233	7.281	0,7	12.757,7	11.082,8	(13,1)
Arroz sequeiro	394,6	268,4	(32,0)	2.935	2.588	(11,8)	1.158,2	694,8	(40,0)
Arroz irrigado	1.369,3	1.253,7	(8,4)	8.471	8.286	(2,2)	11.599,5	10.388,0	(10,4)
FEIJÃO TOTAL	2.693,0	2.530,8	(6,0)	1.136	1.146	0,9	3.059,9	2.901,4	(5,2)
FEIJÃO 1ª SAFRA	908,5	794,5	(12,5)	1.170	1.220	4,3	1.062,7	969,1	(8,8)
Cores	347,3	333,2	(4,1)	1.707	1.800	5,5	592,8	599,8	1,2
Preto	169,0	117,8	(30,3)	1.953	1.773	(9,3)	330,2	208,8	(36,8)
Caupi	392,2	343,5	(12,4)	356	467	31,1	139,7	160,5	14,9
FEIJÃO 2ª SAFRA	1.400,1	1.309,4	(6,5)	953	939	(1,4)	1.333,6	1.229,7	(7,8)
Cores	294,6	299,6	1,7	1.499	1.609	7,3	441,6	481,9	9,1
Preto	286,6	177,4	(38,1)	1.616	1.664	3,0	463,2	295,3	(36,2)
Caupi	818,9	832,4	1,6	524	544	3,8	428,9	452,3	5,5
FEIJÃO 3ª SAFRA	384,4	426,9	11,1	1.726	1.646	(4,7)	663,7	702,6	5,9
Cores	326,5	361,0	10,6	1.881	1.802	(4,2)	614,2	650,6	5,9
Preto	14,1	14,1	-	1.268	1.145	(9,7)	17,9	16,2	(9,5)
Caupi	43,8	51,8	18,3	721	695	(3,7)	31,6	36,0	13,9
GERGELIM	608,0	573,8	(5,6)	657	661	0,6	399,4	379,0	(5,1)
GIRASSOL	61,9	70,1	13,2	1.622	1.602	(1,2)	100,4	112,3	11,9
MAMONA	69,6	78,8	13,2	1.437	2.028	41,1	100,0	159,8	59,7
MILHO TOTAL	21.838,0	22.555,9	3,3	6.464	6.214	(3,9)	141.157,6	140.171,3	(0,7)
Milho 1ª Safra	3.772,6	4.088,3	8,4	6.610	6.962	5,3	24.935,8	28.461,4	14,1
Milho 2ª Safra	17.430,3	17.790,8	2,1	6.496	6.096	(6,2)	113.228,4	108.455,4	(4,2)
Milho 3ª Safra	635,1	676,8	6,6	4.714	4.809	2,0	2.993,6	3.254,5	8,7
SOJA	47.346,1	48.716,5	2,9	3.622	3.698	2,1	171.480,5	180.129,6	5,0
SORGO	1.632,0	2.053,6	25,8	3.739	3.680	(1,6)	6.102,2	7.556,7	23,8
SUBTOTAL	78.378,5	80.423,4	2,6	4.365	4.344	(0,5)	342.107,3	349.336,6	2,1

Culturas de inverno	ÁREA (Em mil ha)			PRODUTIVIDADE (Em kg/ha)			PRODUÇÃO (Em mil t)		
	2025	2026	VAR. %	2025	2026	VAR. %	2025	2026	VAR. %
	(a)	(b)	(b/a)	(c)	(d)	(d/c)	(e)	(f)	(f/e)
AVEIA	545,8	508,1	(6,9)	2.368	2.260	(4,6)	1.292,3	1.148,4	(11,1)
CANOLA	211,9	276,8	30,6	1.627	1.620	(0,4)	344,8	448,4	30,0
CENTEIO	2,1	2,2	4,8	2.381	2.273	(4,5)	5,0	5,0	-
CEVADA	139,2	156,8	12,6	4.358	3.912	(10,2)	606,6	613,4	1,1
TRIGO	2.445,9	2.140,3	(12,5)	3.219	2.985	(7,3)	7.873,4	6.388,1	(18,9)
TRITICALE	11,4	11,4	-	3.211	2.947	(8,2)	36,6	33,6	(8,2)
SUBTOTAL	3.356,3	3.095,6	(7,8)	3.027	2.790	(7,8)	10.158,7	8.636,9	(15,0)
BRASIL (2)	81.734,8	83.519,0	2,2	4.310	4.286	(0,6)	352.266,0	357.973,5	1,6

Legenda: (1) Produção de caroço de algodão; (2) Exclui a produção de algodão em pluma.

Fonte: Conab.

[RETURN TO INDEX](#)

Andrallus spinidens is recorded in rice in Brazil

A predatory bug was found in Maranhão preying on *Mocis latipes* caterpillars

14.05.2026 | 09:45 (UTC -3)

Schubert Peter, Cultivar Magazine



Andrallus spinidens - Photo: Bruno Uehara - iNaturalist

Researchers have recorded for the first time the occurrence of *Andrallus spinidens* in rice fields in Brazil. The predatory stink bug was found in Itapecuru-Mirim, Maranhão, during the 2021/2022 harvest. Adults of the species preyed on caterpillars of *Mocis latipes*, a lepidopteran with the potential to damage rice production in the state.

The study also reports an example of *Andrallus spinidens* collected in 1981 in Roraima. The label on the specimen reads “Roraima”, “09/15/1981”, “Alfredo” and “Rice”. The authors indicate this finding as possibly the first historical record of the species in the country.

In Itapecuru-Mirim, the collection took place in a 1-hectare area of ??rice, in the

Cristina Alves settlement, 17 de Abril village. Planting occurred in December 2021. Sampling began 25 days after plant emergence. The team conducted weekly zigzag assessments until the end of the crop's reproductive cycle.

Ten specimens

The researchers identified ten specimens of *Andrallus spinidens*. The material was then sent to the entomological collections of the State University of Maranhão and the Federal University of Rio Grande do Sul. Identification was carried out using a dichotomous key and comparison with specimens of the species.

Andrallus spinidens belongs to the subfamily Asopinae, a group of predatory bugs. The species has a polyphagous habit and occurs in tropical and warm temperate regions. There are records of predation on caterpillars, beetles, and hymenopterans.

Scientists point to the possible establishment of *Andrallus spinidens* in Itapecuru-Mirim. They do not determine the origin of the occurrence in Brazil. The presence may involve native population, accidental introduction, or migration.

The study recommends monitoring of *Andrallus spinidens* in rice paddy areas. The measure can support the management of *Mocis latipes* and other lepidopterans. Scientists also advocate for

studies on population dynamics, habitats during the rice-free period, and predation potential under local conditions.

The study was developed by Matheus HF Lima, Jocélia Grazia, Lurdiana D. Barros, Ricardo Brugnera, Pedro LER Cardoso, Roberto S. Graça-Júnior, Ellen CC de Araujom, Alaide P. Lima, João VS Camara, John JS Ausique, and Joseane R. de Souza.

Further information can be found at doi.org/10.37486/2675-1305.ec08011

[RETURN TO INDEX](#)

Odor receptors open a new front in pest management

Review brings together advances in cryo-EM, molecular evolution, and applications for semiochemicals and genetic control

13.05.2026 | 21:17 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Frank Pears - Colorado State University

Recent advances in visualizing insect olfactory receptors have created a molecular basis for new strategies for managing agricultural pests. A scientific review compiles data on the structure, evolution, signal transduction, and applications of odor receptors, called ORs, proteins linked to the detection of food, sexual partners, oviposition sites, and natural enemies.

The work highlights a central point: structures obtained by cryo-electron microscopy in the last three years have changed the understanding of the OR-Orco complex. The data indicate a functional ion channel formed by an odorant-specific OR subunit and three Orco subunits. This 1:3 ratio has appeared

in distantly related insects, such as aphids, mosquitoes, and flies.

Molecular interfaces

Odor receptors (ORs) act as molecular interfaces. They convert chemical signals from the environment into electrical impulses in olfactory neurons. Volatile molecules enter through the pores of the sensilla, cross the sensillary lymph with the aid of odor-binding proteins, and reach the dendritic membrane of the neurons. There they interact with OR-Orco complexes.

Activation then travels to the antennal lobe and subsequently to higher brain centers.

The review describes insect odor receptors as proteins with seven transmembrane

domains. They have a topology that is the inverse of that of vertebrate G protein-coupled receptors. The N-terminus is located on the intracellular side, while the C-terminus is located on the extracellular side. This characteristic makes ORs similar to ion channels.

The orc receptor plays a structural role. It does not bind directly to odorants. It acts as an obligatory partner of fine-tuning olfactory receptors (ORs). It also participates in the formation of the ion-conducting pore and contributes to the correct trafficking of receptors to the olfactory neuron membrane. The review reports high conservation of the orc receptor among insects, in contrast to the great diversity of specific ORs.

High resolution

High-resolution structures allowed for the localization of the odorant binding pocket in the aphid's *Acyrtosiphon pisum* ApOR5-Orco receptor. The alarm pheromone (E)-beta-farnesene binds to the OR subunit. This binding moves the S7b helix and promotes asymmetrical opening of the canal. In mosquitoes *Aedes aegypti* and *Anopheles gambiae* OR-Orco structures confirmed the same architectural principle.

The review also proposes an integrated model for signal transduction. The OR-Orco complex operates via a fast ionotropic pathway, with direct channel opening after odorant binding. This

opening allows the flow of cations such as sodium, potassium, and calcium. The system also triggers a metabotropic pathway mediated by IP₃. This pathway amplifies the signal by releasing calcium from intracellular stores.

evolutionary field

In the evolutionary field, scientists point to the origin of ORs as stemming from taste receptors. This transition would have accompanied the increasing importance of detecting volatile compounds during insect evolution. After diverging from taste receptors, ORs underwent specific expansions in different lineages.

The diversity of OR genes varies according to the ecology of each group. Social insects, such as ants and bees, may have broad repertoires associated with complex communication systems. Other groups maintain smaller repertoires. The review attributes this variation to the gene "birth and death" model, in which duplications create new copies. Some acquire useful functions. Others lose function.

Semiochemical design

For agriculture, the most direct application involves the rational design of semiochemicals. The three-dimensional structure of receptors allows for virtual screenings of molecules capable of

activating or blocking ORs. This approach reduces reliance on trial and error in the search for compounds with behavioral effects.

Scientists cite reverse chemical ecology as a way to accelerate the discovery of ligands. In this method, predicted receptor sequences and structures guide *in silico* or *in vitro* tests. The goal involves finding compounds capable of attracting, repelling, or disrupting the behavior of pest insects.

Another axis involves genetic interference. Reducing Orco expression through RNAi and editing via CRISPR-Cas9 caused olfactory deficits in different species. In some cases, there was also altered mating behavior and reduced fitness. These results position Orco and specific ORs as

targets for functional validation and future management strategies.

Further information at
doi.org/10.3390/insects17050496

[RETURN TO INDEX](#)

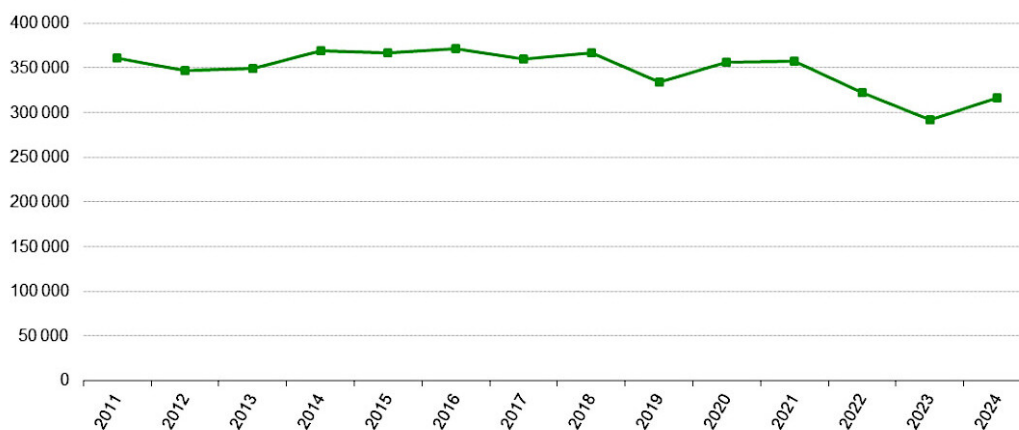
Pesticide sales in the EU are set to grow again in 2024

Eurostat reports 316 tons sold and greater progress in fungicides and molluscicides.

13.05.2026 | 20:16 (UTC -3)

Cultivar Magazine

Sales of pesticides
(tonnes, EU, 2011-2024)



Note: EU data do not take into account confidential values, which represent less than 1% of the total sales over the entire time series. Estimates made for the purpose of this publication.

Source: Eurostat (online data code: ae1_fm_salpest09)

eurostat 

Pesticide sales in the European Union reached approximately 316 tons in 2024. This volume represented a recovery after sharp declines in 2022 and 2023,

according to the European Union's Statistical Office (Eurostat). The increase was related to agrometeorological conditions, especially the humid climate, associated with the greater use of fungicides and molluscicides against pathogens favored by moisture.

Eurostat reports that pesticide sales in 2024 were influenced by several factors. Regulatory changes were significant, with substance withdrawals, new authorizations, and uncertainties regarding the renewal of approvals for active ingredients. Market dynamics also influenced the result, with more competitive prices compared to 2023. Changes in agricultural practices, such as crop rotation, expansion of areas for specific crops, and changes in pest

management strategies, also contributed to distinct trends across countries.

The indicator uses sales volumes as a basis for analysis. The data includes agricultural and non-agricultural uses. Therefore, Eurostat highlights limitations in interpreting the figures as direct consumption in crops. Agricultural consumption would be better represented by data on the effective use of active substances on farms or by application rates. However, this data does not have harmonized annual collection nor comparability between countries.

Six groups

Sales in the EU are divided into six main groups: fungicides and bactericides;

herbicides, branch desiccants and moss controllers; insecticides and acaricides; molluscicides; plant growth regulators; and other plant protection products. From 2011 to 2024, fungicides and bactericides and herbicides accounted for the largest sales volumes. In 2024, these two groups represented 40% and 35% of the total, respectively. Insecticides and acaricides accounted for 17%. Molluscicides, growth regulators and other products totaled less than 10%.

France, Spain, Germany, and Italy recorded the highest sales volumes in most major groups. These countries are also among the largest agricultural producers in the European Union.

Together, they account for 52% of the utilized agricultural area and 49% of the

arable land in the bloc, according to Eurostat.

The comparison by country, between 2011 and 2024, considers 21 Member States with total available and non-confidential data for both years. The survey shows a reduction in sales in 14 countries. The largest drops occurred in the Czech Republic, with a 44% decline; in Italy, with a 43% drop; in Ireland, with a 42% decrease; and in Portugal, with a 40% decrease. Germany, Finland, France, Lithuania, Austria, and Latvia registered increases. Slovakia had almost no change. Eurostat notes caution in interpreting some increases. In Lithuania and Latvia, the high percentages partly reflect very low absolute bases. In Germany and Austria,

large volumes of inert gases, such as carbon dioxide or nitrogen, used in the storage of agricultural products, increase the total volume of pesticides sold.

Decomposition by categories

The breakdown by category shows a predominance of inorganic fungicides within the group of fungicides and bactericides. In 2024, they accounted for 61,4% of sales in this group in the European Union. The category includes copper compounds, inorganic sulfur, and other inorganic fungicides. Many of these products are also permitted for use in organic agriculture.

In the group of herbicides, weed desiccants and moss controllers, organophosphate herbicides, including glyphosate, accounted for 42,4% of sales in 2024. Other relevant categories included "other herbicides", with 15,3%, and amide and anilide-based herbicides, with 11,7%.

Among insecticides and acaricides, the "other insecticides" category accounted for 95% of sales in 2024. This group includes 17 chemical classes, such as pyridylmethylamine insecticides, products obtained by fermentation, and linear chain lepidopteran pheromones. Pyrethroid-based insecticides followed, with 4,2% of the group's sales.

Eurostat's methodology considers quantities of active substances. These ingredients cause the desired effect on

target organisms, such as fungi, weeds, and pests. The database generally uses kilograms of active ingredient sold per year in each functional category. Microbiological substances are not included in the article's data due to the lack of a harmonized method for converting units such as CFU or international units into kilograms.

Sales of pesticides
(tonnes, 2011 and 2024)

	Fungicides and bactericides		Herbicides, haulm destructors and moss killers		Insecticides and acaricides		Molluscicides		Plant growth regulators		Other plant protection products	
	2011	2024	2011	2024	2011	2024	2011	2024	2011	2024	2011	2024
Belgium	2 408	2 325	2 505	1 964	654	527	18	36	245	405	467	260
Bulgaria	(c)	1 083	(c)	2 248	(c)	299	:	3	(c)	11	:	3
Czechia	1 627	967	3 473	2 161	291	96	13	11	1 183	486	462	232
Denmark	633	544	3 692	2 566	45	32	4	8	173	148	3	14
Germany	10 473	10 730	17 955	14 422	11 832	17 428	255	198	3 123	2 124	219	274
Estonia	49	104	357	597	(c)	(c)	(c)	(c)	32	65	(c)	(c)
Ireland	620	322	2 812	1 675	48	6	4	16	188	105	20	19
Greece	1 700	1 348	1 449	1 619	1 095	751	8	2	21	194	1 708	294
Spain	31 330	27 495	13 835	17 806	8 045	10 954	(c)	(c)	(c)	(c)	19 450	3 411
France	24 496	31 861	29 252	29 077	2 190	5 050	331	829	2 532	1 831	2 461	1 183
Croatia	:	754	:	729	:	71	:	5	:	26	:	14
Italy	43 574	23 769	8 327	5 710	2 494	4 402	97	16	390	509	15 443	5 688
Cyprus	895	611	170	174	159	105	2	1	3	3	6	59
Latvia	149	234	724	1 235	34	37	:	10	164	282	6	15
Lithuania	362	505	1 773	2 602	26	35	(c)	(c)	403	493	(c)	(c)
Luxembourg	92	(c)	102	44	(c)	(c)	1	1	(c)	4	(c)	1
Hungary	(c)	2 512	(c)	3 984	(c)	488	(c)	5	(c)	101	(c)	321
Malta	95	(c)	6	3	4	3	1	0	0	0	(c)	(c)
Netherlands	4 246	3 285	3 011	2 167	1 898	1 353	20	32	206	598	1 532	357
Austria	1 544	1 875	1 505	1 015	248	2 221	33	12	59	55	58	55
Poland	6 081	8 640	12 408	12 980	991	758	(c)	47	1 593	1 102	689	520
Portugal	9 979	4 401	1 996	2 078	883	874	3	19	4	7	1 159	980
Romania	3 455	2 804	6 771	4 988	815	600	1	9	335	139	49	370
Slovenia	797	535	264	119	39	46	1	4	1	5	20	3
Slovakia	(c)	553	1 080	991	75	77	0	(c)	113	134	(c)	(c)
Finland	1 474	2 202	1 452	1 157	32	13	(c)	1	59	33	(c)	7
Sweden	218	220	2 136	1 696	29	39	1	(c)	21	(c)	11	(c)
Iceland	0	1	3	1	0	0	0	0	:	0	0	0
Norway	105	104	680	536	5	13	1	2	38	24	17	12
Switzerland	933	1 004	919	589	261	321	38	31	33	27	91	121
Montenegro	:	62	:	14	:	24	:	0	:	0	:	0
Türkiye	:	18 078	:	12 727	:	15 395	:	221	:	2 929	:	3 849

(:) not available

(c) confidential

Note: definition of 2011 values differs for Luxembourg. Denmark data for 2024 is estimated, using the 2023 values. Croatia: Break in time series in 2024.

Source: Eurostat (online data code: aei_fm_salpest09)

eurostat 

[RETURN TO INDEX](#)

Corteva launches Verpixo fungicide in the US

The product has received EPA registration and will be used against cercosporiosis in sugar beets

13.05.2026 | 20:15 (UTC -3)

Cultivar Magazine, based on information from Corteva



Corteva announced the launch of the Verpixo fungicide after registration with the United States Environmental Protection

Agency. The product contains the molecule florylpicoxamide, whose trade name is Adavelt active. The fungicide acts against cercosporiosis, the main fungal disease of sugar beet in the country.

Verpixo will be available for the 2026 crop season. The fungicide incorporates a mode of action from group 21 of the Fungicide Resistance Action Committee (FRAC). The technology aims to protect the quality and productive potential of the crop. Its base comes from a natural compound found in soil bacteria.

According to Corteva, the product offers broad-spectrum control and increases application flexibility. Laboratory and field tests have confirmed efficacy against cercospora leaf spot, according to Colleen

Kent, marketing leader for the company's specialty crops portfolio.

Kent cited a 2024 survey by the Beet Sugar Development Foundation. The study estimated losses exceeding US\$900 million in that year of production without disease management. The executive also stated that cercosporiosis can cause annual productivity losses of up to 30%.

Corteva positions Verpixo as a tool for resistance management. The repeated use of the same chemicals has increased selection pressure. Current fungicides and a genetic trait for tolerance to cercospora leaf spot have lost effectiveness, according to the information released.

[RETURN TO INDEX](#)

Rodrigo Burci Dias takes over management at Sumitomo Chemical

Executive leaves BASF after 12 years to take on strategic sales planning at Sumitomo.

13.05.2026 | 17:19 (UTC -3)

Cultivar Magazine



After 12 years at BASF, Rodrigo Burci Dias (pictured) has taken on the role of Strategic Sales Planning Manager at Sumitomo Chemical Latin America. He will

be based in Goiânia, Goiás.

Rodrigo is an agricultural engineer with over 14 years of experience in agribusiness, working in management, market development, and marketing. Prior to his new role, he held the position of Marketing Manager for Cotton and Beans at BASF for almost two years. Throughout his career, he also gained experience at Cocamar Cooperativa Agroindustrial.

Rodrigo holds a degree in Agronomic Engineering from the State University of Maringá, a specialization in Soil Fertility and Plant Nutrition from the same institution, as well as a degree in Marketing from the Getulio Vargas Foundation and an MBA in Marketing from ESPM.

[RETURN TO INDEX](#)

Abramilho Congress presents data and perspectives of the sector

More accessible rural credit, advocacy for technology, and new raw materials for ethanol were some of the topics discussed

13.05.2026 | 15:44 (UTC -3)

Cultivar Magazine



The 4th Abramilho Congress, held this Tuesday (May 13th) in Brasília, brought together government representatives, parliamentarians, producers, and agribusiness leaders to discuss rural credit, production costs, food security, and technological innovation. The Vice-President of the Republic, Geraldo Alckmin, and the Minister of Agriculture and Livestock, André de Paula, participated in the opening of the event. During the panel discussion, sector entities called for improvements to the Harvest Plan and measures to reduce the financial pressure on producers.

Alckmin listened to the demands presented in Congress and indicated openness to discussing rural credit. The vice-president cited the creation of a

guarantee fund as a possible way to expand access to financing. He did not announce measures for the Harvest Plan, but stated his willingness to act as an interlocutor for the sector with the federal government.

During the opening, Alckmin also addressed the expansion of the ethanol blend in gasoline. According to him, raising the percentage from 30% to 32% is on track to move forward. The vice-president highlighted corn ethanol and pointed out the environmental and economic benefits associated with the biofuel.

Minister André de Paula stated his agreement with the demands presented by the sector. He adopted a cautious tone and said he would defend these issues with the federal government. According to

the minister, the topic involves different areas of public administration.

The president of Abramilho, Paulo Bertolini, gave a positive assessment of the growth in corn production. "Today we are the third largest producer in the world, the second largest exporter. This was achieved thanks to the quality of our farmers, the intensive use of technology, biotechnology, soil correction with limestone, practices such as no-till farming, mechanization and others," he said.

The growth of the second corn crop in recent years opens up prospects for a reliable supply to the Brazilian market and the possibility of a production surplus for export. "More than 140 countries around the world consume our corn, attesting to its

quality and also the sustainable process by which it is produced," explained Bertolini.

He also cited sorghum as an alternative for ethanol production. The grain exhibits greater drought tolerance and lower production costs. The crop could expand into areas where the corn planting window has narrowed, offering potential competitive advantages to the producer.



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Senator Tereza Cristina, vice-president of the Parliamentary Agricultural Front (FPA), described a scenario of simultaneous pressure on agribusiness. She cited wars, falling commodity prices, expensive inputs,

and high interest rates in Brazil. According to the senator, the sector is facing a crisis with ongoing effects.

Federal Deputy Pedro Lupion, president of the FPA (Agricultural Parliamentary Front), criticized the Plano Safra (Agricultural Plan). According to him, the program does not reflect the reality of the producer.

Lupion defended the advancement of private forms of financing as a complement to public credit. The panel also addressed Prodes, a vegetation suppression monitoring system, and the possible impacts of the 6x1 scale in the field.

Science and technology

The Chinese ambassador to Brazil, Zhu Qingqiao, advocated for investment in

science and technology as the foundation for the future of agriculture. The panel discussed the theme "Innovation that feeds the world: the future of food security".

Zhu Qingqiao stated that agriculture underpins the social and economic stability of countries. He pointed to climate change and international conflicts as major challenges to food production. The ambassador also said that China intends to promote a modern, high-quality, and sustainable agricultural system, supported by science and technology.

The Chinese representative also highlighted the trade relationship between Brazil and China. According to him, China is the largest market for Brazilian agricultural exports. Zhu advocated for greater cooperation between the two

countries and stated that both need to work in the same direction.

Biotechnology played a central role in the panel. Mario Murakami, president of the National Technical Biosafety Commission, stated that gene insertion, viewed with skepticism ten years ago, is now part of the productive reality. According to him, the technique contributes to expanding production safely and is the result of collective and continuous development.

Glauber Silveira, executive director of Abramilho, linked biotechnology to productive stability. He stated that technologies lose effectiveness over time because pests and weeds develop resistance. Therefore, the development of new solutions needs to occur continuously.

Silveira also mentioned the expectation of progress in a protocol for the mutual recognition of biotechnology approvals between Brazil and China. According to him, the measure would give Brazilian producers more security in adopting varieties already approved for the national market.



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[RETURN TO INDEX](#)

Julio Braga takes on a role in product marketing at CNH

Professional begins working with connectivity and positioning solutions in Latin America.

13.05.2026 | 10:48 (UTC -3)

Cultivar Magazine



Julio Nielsen Braga (pictured) took on a new role in CNH's Product Marketing area in April. He has been with the company for over six years and, for the last three,

worked as a Product Specialist.

In this new position, you will be responsible for leading the launch of positioning and connectivity solutions, as well as acting as a liaison between global product teams and the Latin American markets.

The responsibilities of the position also include collecting and structuring insights from customers, dealers, and the market, as well as monitoring product performance through defined metrics.

Julio Braga holds a degree in Agronomic Engineering from the São Paulo State University (Unesp) and has built his professional career focusing on product and market analysis.

[RETURN TO INDEX](#)

Nufarm strengthens its Marketing area with a new manager

Marcos Pontillo has extensive experience in working with cooperatives and agricultural distribution.

12.05.2026 | 17:08 (UTC -3)

Cultivar Magazine



Marcos Pontillo has taken on a new role at Nufarm. This May, the executive became responsible for managing the company's

Marketing team.

Pontillo is an administrator with extensive experience in agribusiness, specializing in field marketing strategies and relationships with cooperatives and distributors.

Throughout his career, he has built a track record in large companies in the sector.

Before joining Nufarm, he worked at Rizobacter. The executive also accumulated more than 25 years of experience at Syngenta, where he held leadership positions in marketing for crop protection and seeds. In addition, he worked at Atua Agro.

The manager has a degree in Business Administration and a master's degree in Marketing, as well as an MBA in Agribusiness and Management.

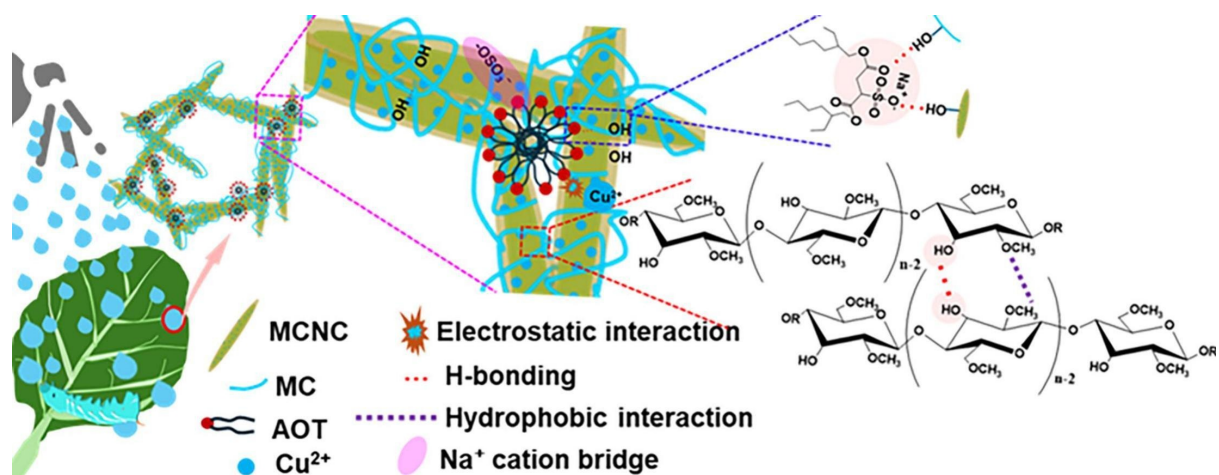
[RETURN TO INDEX](#)

Aqueous formulation improves pesticide deposition

Technology from the University of Waterloo uses cellulose nanocrystals to reduce splashing and losses in sheets

12.05.2026 | 15:52 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.1016/j.jcis.2025.139564

Researchers at the University of Waterloo have developed a water-based formulation using nanotechnology to improve pesticide deposition on leaves. The solution increased droplet adhesion, reduced

splashing, and minimized losses due to runoff and drift.

The formulation uses cellulose nanocrystals modified with tannic acid and cupric chloride. The system combines these nanocrystals with methylcellulose and the surfactant Aerosol OT. The resulting structure stabilizes the droplets upon impact with hydrophobic surfaces.

In tests described by the scientists, the formulation with 0,1% Aerosol OT, 0,1% modified nanocrystals, and 0,15% methylcellulose achieved 88,92% deposition on superhydrophobic sheets. This performance was 17 times better than that of water.

According to the researchers, the main factor in reducing splashing involves the

formation of a network based on modified nanocrystals. This network preserves the integrity of the droplet. The droplet does not fragment or bounce after impact. It flattens on the leaf surface and forms an adherent film.

The technology aims to replace solvent-dependent formulations. "We are spraying water, not solvent," said Michael Tam, professor of chemical engineering at the University of Waterloo. According to him, the approach aligns with sustainable agriculture goals.

The study also evaluated environmental resistance, dispersibility, biocompatibility, antibacterial activity, and insecticidal performance. In initial trials on cabbage plots with an industrial partner in

Singapore, the formulation showed better pest control with a lower volume of pesticide compared to conventional delivery systems.

Further information:

doi.org/10.1016/j.jcis.2025.139564

[RETURN TO INDEX](#)

UPL announces new supply chain director in Brazil

Analucia Fonseca has been with the company for over 10 years and has built her career in key areas of the supply chain.

12.05.2026 | 14:41 (UTC -3)

Rafael Iglesias, Cultivar Magazine edition



UPL announced chemical engineer Analucia Fonseca (pictured) as its new executive director of supply chain. With the

company for over 10 years, she has built her career in key areas of the supply chain, such as logistics, foreign trade, planning, and customer service.

Since February 2023, Analucia had already been leading the area in Brazil, with responsibility for these operations. Starting in April – the beginning of the company's new fiscal year – her role was expanded to also include the purchasing department.

The director of UPL Brazil graduated in Chemical Engineering in 1999 from the University of São Paulo (USP) and holds a certification in executive administration from the Brazilian Institute of Capital Markets (Ibmec). In her nearly 30-year career, she has worked in the crop

protection and consumer goods manufacturing industries.

“I am very happy with this new mission, which I undertake with a sense of responsibility and a long-term vision. The moment demands greater integration, discipline, and adaptability in the face of an increasingly complex scenario. At the same time, it opens up space for us to evolve in efficiency, innovation, and in building an even more resilient supply chain,” said Analucia.

Among the responsibilities of the executive's team, which comprises approximately 80 employees, is the integrated management of the flows that connect planning, supply, and market service. The area that will now report to

the director was previously the responsibility of Dante Matsufugi, who assumed the same role at UPL Europe, headquartered in Barcelona, ??Spain.

According to Cristiano Figueiredo, CEO of UPL Brazil, “Analucia's trajectory at UPL reflects the value we place on the company's talent. Her integrated vision of the supply chain and her deep knowledge of the business are strategic elements for advancing efficiency and operational consistency. Her leadership will drive our evolution and sustain the company's growth in Brazil,” he concluded.

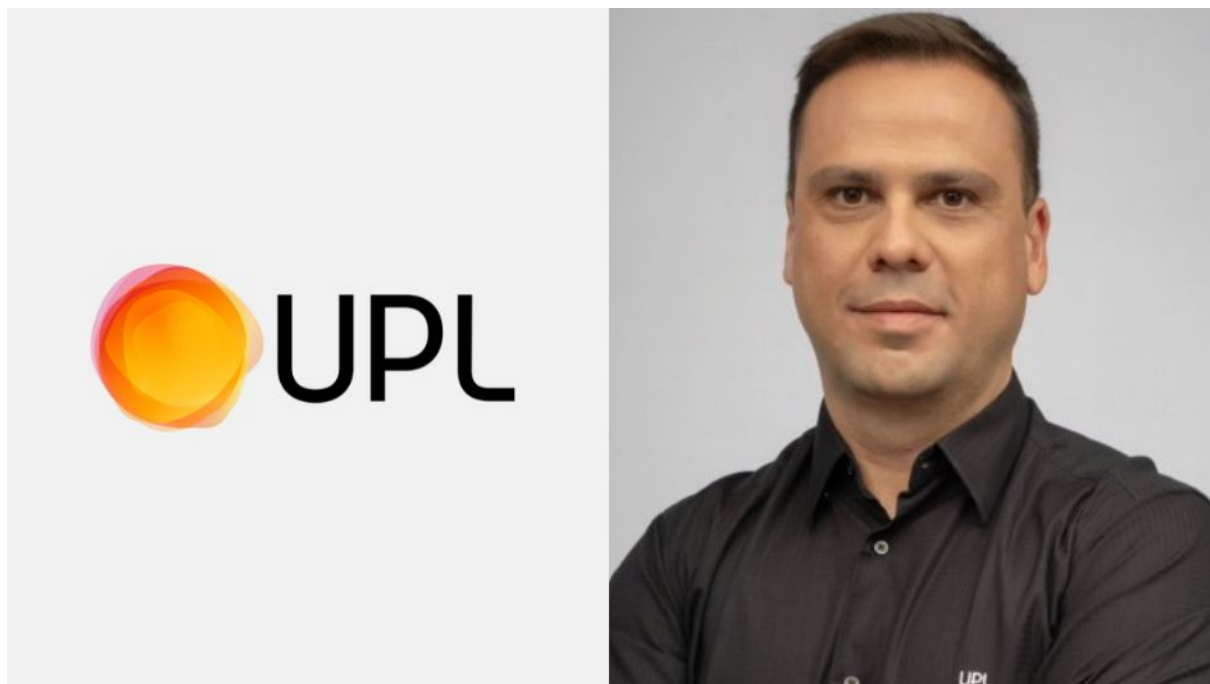
[RETURN TO INDEX](#)

UPL appoints Daniel Ferreira to Commercial Directorate

With experience in sales and marketing, executive takes over the Cerrado Oeste region.

12.05.2026 | 10:03 (UTC -3)

Cultivar Magazine



UPL Brasil has promoted Daniel Amaral Alves Ferreira (pictured) to the position of Commercial Director for the Cerrado Oeste region. The executive has been with the

company for four years and previously held the position of Market Access Director. He will be based in Campinas (SP).

With over two decades of experience in sales and market access, Ferreira has built a career in important agribusiness companies. Before joining UPL, he worked at Adama for two years and at Bayer Crop Science for eight years. He also had a stint at Mosaic Fertilizantes.

Daniel holds a degree in Agronomy from the Federal University of Uberlândia and an MBA in Marketing with an Emphasis on Sales from the Getulio Vargas Foundation.

[RETURN TO INDEX](#)

Bayer boosts results in the first quarter with growth in Crop Science

The agricultural division has grown in seeds and traits

12.05.2026 | 08:09 (UTC -3)

Cultivar Magazine, based on information from Christian Hartel



Bayer reported a 4,1% increase in group sales in the first quarter of 2026, on an

adjusted basis for exchange rates and portfolio. Revenue reached €13,405 billion. EBITDA before special items advanced 9% to €4,453 billion. The company maintained its exchange rate-adjusted annual forecast for 2026.

The Crop Science division drove the performance. Sales in the agricultural business grew 6,8%, on an adjusted basis for currency and portfolio, to €7,558 billion. EBITDA before special items rose 17,9% to €3,014 billion. The margin increased from 33,7% to 39,9%.

The advance came from seeds and traits. Soybean sales doubled on the same basis of comparison. Bayer attributed part of the result to the resolution of a licensing agreement with Corteva in North America. This effect added €448 million to revenue.

The business also saw a recovery in prices after the re-registration of dicamba in the United States.

Corn also grew. Sales of Corn Seed & Traits advanced 7,1%. The company cited higher volumes at the start of the harvest in North America and growth in other regions.

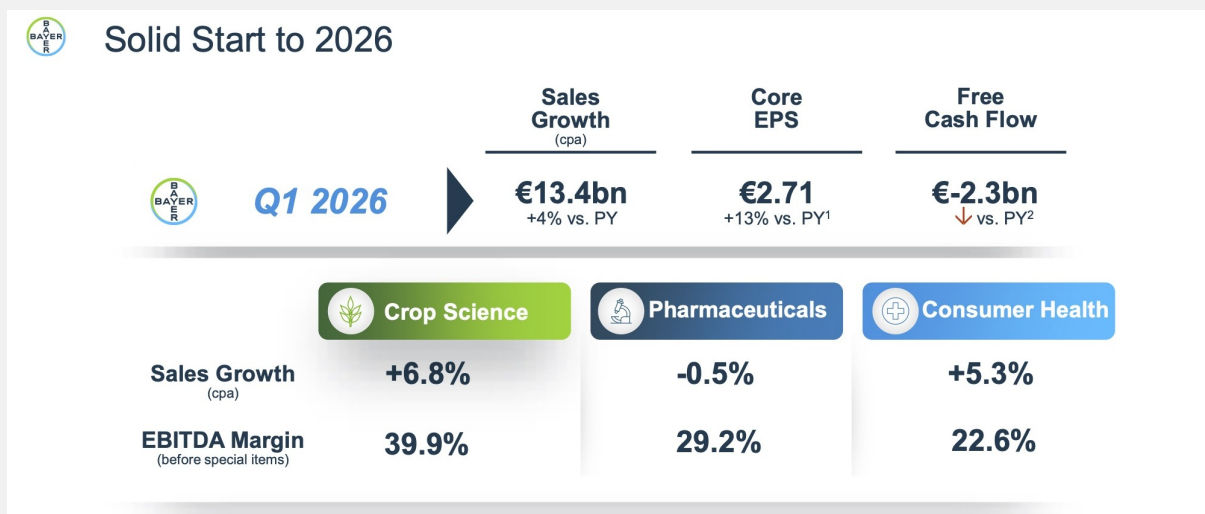
Crop protection sales declined, as expected by the company. Herbicides fell by 10,2%. Glyphosate-based products dropped by 15,1%. Fungicides declined by 10,7%.

Within the group, net profit reached €2,763 billion. This figure more than doubled compared to the same period in 2025. Adjusted earnings per share rose 12,9% to €2,71. Bayer reported a negative currency

impact of €886 million on sales and €321 million on EBITDA.

Free cash flow was negative at €2,320 billion. The company attributed the result to payments to settle legal proceedings, mainly related to PCBs and glyphosate.

Net financial debt totaled €32,518 billion as of March 31, 2026.





Q1 2026: Seed & Traits Growth and Savings Drive Margin Expansion

Crop Science

in €bn	Q1 2025	Q1 2026	Δ yoy
Net Sales	7.6	7.6	+7% cpa (0% rep)
Volume			+6%
Price			+1%
FX			-7%
Portfolio			0%
EBITDA before special items	2.6	3.0	+18%
EBITDA Margin before special items	33.7%	39.9%	

Q1 2026 Net Sales by Category (Δ % yoy cpa, €bn)



- **Core Business**
 - **Seeds & Traits:** **Corn (+7%)** growth across all regions, strong EMEA and LATAM performance, higher volumes for season start in North America; **Soybeans (+106%)** benefited from licensing resolution (~450m€) and price recovery from dicamba; **Cotton (-15%)** purchase delays and **Vegetable** declines (-12%) were nearly offset by canola growth in **Other S&T (+35%)**
 - **Core Crop Protection:** soft season start amid generic pressure and challenged farmer profitability, impacting **Insecticide (-8%)**, **Fungicide (-11%)** and non-glyphosate **Herbicide (-8%)**
- **Glyphosate (-15%):** lower volume due to delayed purchases
- **EBITDA Margin** expansion driven by soy licensing resolution, higher margin sales and disciplined savings execution outweighing FX headwinds



Q1 2026: Strong Corn and Soy Growth Outweighs Headwinds in Crop Protection Business

Crop Science

Sales by Key Category and Strategic Business Entity (€m)

	Q1 2025	Q1 2026	Δ yoy (cpa)
Crop Science	7,850	7,558	+7%
Seeds & Traits	4,328	4,714	+18%
Corn Seed & Traits	3,189	3,151	+7%
Soybean Seed & Traits	522	972	+106%
Cotton Seed & Traits	232	183	-15%
Vegetable Seeds	192	161	-12%
Other	193	247	+35%
Core Crop Protection¹	2,661	2,369	-7%
Fungicides	916	792	-11%
Herbicides excl Gly	1,003	889	-8%
Insecticides	387	336	-8%
Other	355	352	+3%
Core Business	6,989	7,081	+9% (+1% price, +8% volume)
Glyphosate-based Herbicides	591	478	-15% (0% price, -15% volume)

Sales growth rates in Key Messages cpa = currency and portfolio adjusted. ¹ excluding Glyphosate-based Herbicides.

Corn S&T: growth across all regions, strong EMEA and APAC performance and strong start to North America season

Soy S&T: significant increase due to licensing resolution (~450m€) and pricing recovery from return of dicamba label (+9% cpa vs. PY excl. licensing resolution)

Cotton S&T: decline in North and Latin America due to delayed purchases only partly offset by pricing recovery from return of dicamba label

Vegetable Seeds: volume decline due to delayed purchasing and acreage reduction

Fungicides: decline driven by continued market pressure, most notably in Latin America

Herbicides excl. GLY: decline driven by lower volumes EMEA and APAC

Insecticides: decline on continued market pressure, most notably in Latin America, partially offset by higher volume in EMEA

All Other: increase due to higher volumes in canola

Glyphosate-based Herbicides: lower volume due to delayed purchases in anticipation of prolonged market price declines

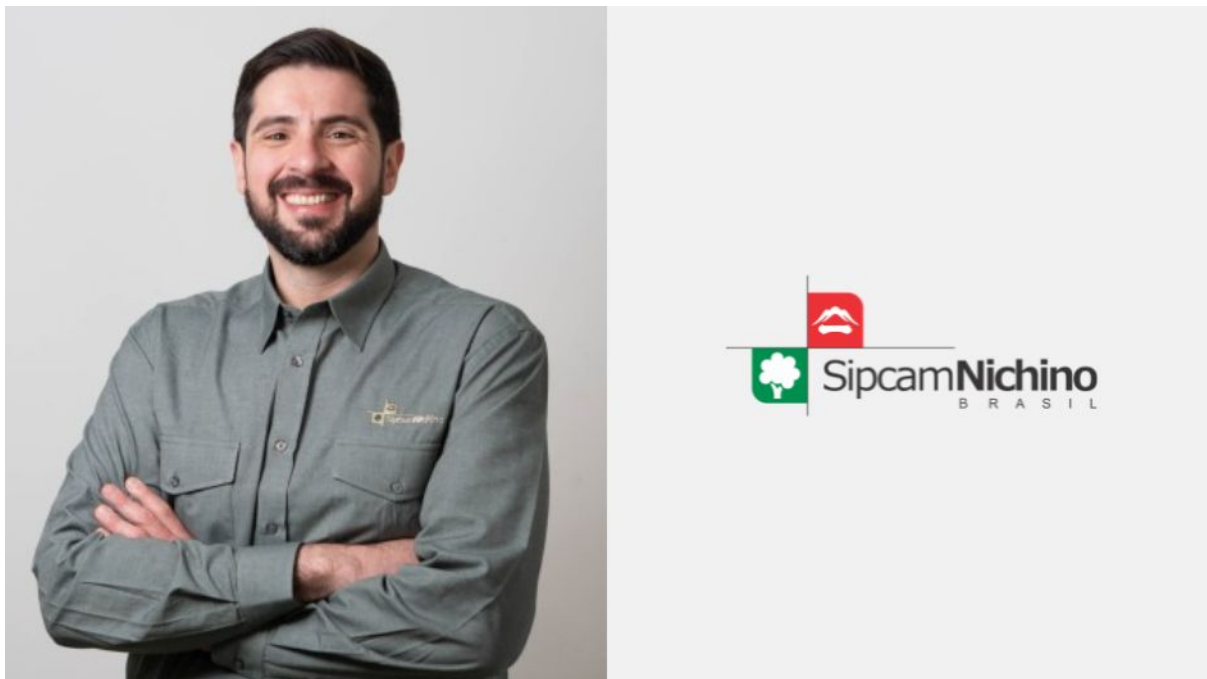
RETURN TO INDEX

Specialty Marketing has new leadership at Sipcam Nichino

Marcelo Palazim takes over area focused on coffee, bean, citrus and fruit and vegetable crops

11.05.2026 | 17:10 (UTC -3)

Cultivar Magazine



Sipcam Nichino Brasil has promoted Marcelo Palazim (pictured) to the position of Marketing Manager – Specialties. The

executive will be responsible for managing the area with a focus on high value-added crops such as fruits and vegetables, coffee, citrus, and beans.

Palazim previously served as Marketing Coordinator – Specialties and has been with the company for over three years.

An agricultural engineer graduated from the Federal University of Paraná (UFPR), the executive specializes in Agribusiness Management and has extensive experience in companies in the agricultural sector, having worked at Gowan Company, Agrotec, and Glades Crop Care.

[RETURN TO INDEX](#)

Predators vary in their control of the diamondback moth

Laboratory study indicates the effect of predator and prey stage on the consumption of *Plutella xylostella*

11.05.2026 | 16:05 (UTC -3)

Cultivar Magazine



Photo: Syngenta

Three insect predators showed potential, dependent on the developmental stage, for the biological control of the diamondback moth *Plutella xylostella*. The study evaluated *Eocanthecona furcellata*, *Hierodula patellifera* and *Paratenodera sinensis* under laboratory conditions. The results indicated greater prey consumption at higher densities. They also showed superior performance in late immature stages and in adults, compared to the early stages of the predators.

The research analyzed the functional response of predators in different combinations of natural enemy stage, prey stage, and supply density. The authors tested larvae, pupae with cocoons, pupae without cocoons, and adults of *Plutella xylostella*. The study aimed to measure

corrected prey consumption and classify functional response patterns using logistic regression and nonlinear models.

The trials with *Eocanthecona furcellata* involved second- to fifth-instar nymphs and adults. First-instar nymphs were not included in the tests, as previous observations indicate limited or inconsistent feeding at this stage.

Predators received pupae of *Tenebrio molitor* before the fasting period. Then, they were exposed to different densities of larvae or pupae of *Plutella xylostella* for 24 hours.

In tests with *Eocanthecona furcellata*, corrected consumption increased with prey density. In adults fed second-instar prey, the average increased from 8,86 prey at

density 10 to 75,81 prey at density 100.

The study reports significant density effects across all combinations of predator and prey stages.

The results indicated a clearer response in more developed predators. In

Eocanthecona furcellata, late instars and adults showed higher consumption and greater differentiation between densities.

The authors associated this pattern with increased predatory capacity during development.

Mantidae

The mantids *Hierodula patellifera* and *Paratenodera sinensis* also showed increased consumption with higher prey

density. The tests involved early instars, late instars, and adults. The prey consisted of third- and fourth-instar larvae and adults of *Plutella xylostella*. The fasting period used for mantids reached 48 hours, compared to 24 hours for *Eocanthecona furcellata*. Scientists consider this difference a limitation for direct comparisons between species.

In the classification of functional responses, type II patterns predominated. Among 37 combinations of predator-prey stages, 29 showed a response similar to type II, six showed a response similar to type III, and two were ambiguous. In *Eocanthecona furcellata*, 22 out of 25 combinations showed a type II curve. In *Paratenodera sinensis*, there was greater

variation, with three responses similar to type III.

Handling prey

Interpreting the parameters required caution. Prey handling time was poorly identified in many models. Only one of the 37 combinations generated an estimate considered stable for this parameter.

Therefore, the authors warn against comparisons based solely on maximum predation capacity.

Direct comparisons between species received limited analysis. Researchers restricted this step to the fourth instar of prey, the second and third instars of predators, and densities of 10, 20, and 30.

Within this subset, *Eocanthecona furcellata* consumed less prey than the two mantids in the second instar. In the third instar, this pattern ceased to occur consistently. At some densities, *Eocanthecona furcellata* overcame *Hierodula patellifera* and *Paratenodera sinensis*.

Differences and stages

Scientists conclude that differences between predators depend on the stage of development being compared. Aggregate assessment by species may distort the potential for control. The developmental stage of the natural enemy and prey should guide predator selection and release timing in biological control

strategies.

From an applied perspective, mantises showed higher per capita larval consumption under certain laboratory conditions. This suggests potential for rapid suppression of larval populations at high densities. *Eocanthecona furcellata*, on the other hand, it attacked different stages of the pest, including pupae with and without cocoons. This behavior may offer complementary value in management programs.

More information at DOI
10.3390/insects17050490

[RETURN TO INDEX](#)

Elicit Plant has a new Commercial VP for Latin America

Reinaldo Bonnecarrere's career is marked by leadership positions in the agricultural sector.

11.05.2026 | 15:16 (UTC -3)

Cultivar Magazine



Elicit Plant appointed **Reinaldo Bonnecarrere** (pictured) as commercial vice president for Brazil and Latin America. The executive will work from São Paulo,

focusing on expanding the company's operations in the region.

An agricultural engineer with over two decades of experience in agribusiness, Bonnecarrere built his professional career in leadership positions and strategic projects developed in Latin America and Europe. Before joining Elicit Plant, he held the position of commercial vice president at Indigo Ag. The executive also accumulated more than 13 years of experience at BASF.

A graduate of the Federal University of Santa Maria, Bonnecarrere holds a master's degree from the same institution, a specialization in plant disease management from the Federal University of Lavras, and a doctorate in agronomy

from the University of São Paulo.

“I begin this journey with great enthusiasm, motivated by the opportunity to contribute to the company's growth, build sustainable results, and work alongside a talented team during such an important phase of its evolution,” the executive stated in a press release.

[RETURN TO INDEX](#)

New Holland brings Braud vendimiadora to Sitevinitech 2026

Brand showcases machinery for viticulture and digital agriculture in Mendoza

11.05.2026 | 09:06 (UTC -3)

Cultivar Magazine, based on information from Facundo Cabrera



Photo: New Holland

New Holland presents solutions for regional economies at Sitevinitech 2026 in Mendoza, Argentina. The focus is on technology, efficiency, and productivity in vineyards. Highlights include the Braud 9070L harvester and the TD4F tractor. The brand will also exhibit the TT4, TK4, and TT3.50 tractors.

The Braud 9070L has received updates focused on harvesting efficiency and operator comfort. The equipment features lower fuel consumption, the IMS 2.0 system, and an IntelliView IV monitor. This combination facilitates access to the machine's operating parameters.

The harvester also features connectivity through the FieldOps telemetry portal. This tool allows for real-time performance

monitoring. The Intelligence Center remotely monitors the operation. The goal is to anticipate problems and extend effective working time.

The TD4F tractor is suitable for tasks in fruit and vegetable crops. The model has a Lift-O-Matic three-point hydraulic system. The maximum lifting capacity reaches 3.000 kg. The hydraulic system provides a flow rate of 36,2 l/min. The configuration allows for the operation of implements with quick response and precise control.

At the booth, New Holland is also showcasing digital agriculture solutions for increased productivity and precision in the field. Visitors can experience the operation of Braud harvesters through a virtual reality simulator.

[RETURN TO INDEX](#)

CropLife Brazil renews Board of Directors

André Savino assumes the presidency of the board; Sergi Vizoso occupies the vice-presidency.

11.05.2026 | 08:48 (UTC -3)

Cultivar Magazine, based on information from CropLife Brazil



Photo: CropLife Brazil

CropLife Brazil announced the new composition of its board of directors. André Savino, president of Syngenta Crop Protection in Brazil, assumes the

chairmanship of the board. Sergi Vizoso, vice president of BASF Agricultural Solutions in Latin America, occupies the vice-chairmanship.

The official announcement took place last Friday, May 8th, during an institutional meeting between the organization and the new president of CropLife Brasil, Ana Repezza. The members aligned management priorities and commitments for the sector in 2026.

Savino stated that CropLife Brasil represents companies focused on research and development. According to him, innovation underpins a more productive and sustainable agriculture.

"Assuming the presidency of the board is, for me and for Syngenta, a commitment to

strengthening Brazilian agribusiness," he declared.

Savino holds a degree in Agronomy from Unesp. He also has an MBA from Fundação Dom Cabral and specializations from Purdue and Insead. In addition to his corporate work, he is active as a coffee farmer.

Ana Repezza stated that the new composition reinforces the organization's commitment to the business environment and innovation. According to her, the experiences of the board members contribute to keeping up with the transformations in the sector.

Also part of the Council are Francisco Soares, president of TMG; César Barros, CEO of CTC; William Weber, commercial

director of Corteva Agriscience; Marcio Santos, CEO of Bayer; Danilo Scacalossi Pedrazzoli, industrial director for South America at Koppert Brazil; and Renato Guimarães, president of FMC for Latin America.

The organization's bylaws stipulate that the Board be renewed every two years. The board monitors technical and cross-cutting issues related to innovation, legal security, sustainability, and the development of agribusiness. CLB's governance provides for proportional representation of the chambers of chemical pesticides, bio-inputs, germplasm, and biotechnology.

[RETURN TO INDEX](#)

BASF launches BioHub for biological pesticides

A fermentation plant in Ludwigshafen produces active ingredients for fungicides and seed treatment

11.05.2026 | 07:25 (UTC -3)

Cultivar Magazine, based on information from Michelle Wolf



Photo: BASF

BASF Agricultural Solutions has put into operation the BioHub, a new fermentation

plant for biological pesticides and biotechnology-based products. The unit is located in the Ludwigshafen complex in Germany. According to the company, the investment totals tens of millions of euros.

The unit manufactures products such as biological fungicides and biological seed treatments. BASF states that these technologies support integrated crop protection programs.

BioHub uses microorganisms to convert renewable raw materials, such as glucose, into desired products. The process is called fermentation.

Commercial production of biological active ingredients began this year. Among them is the bacterium *Bacillus amyloliquefaciens*. It forms the basis of the biological

fungicide Serifel. The plant also produces the main building block of Inscalis, an insecticide based on the fungal strain *Penicillium coprobium*.

According to BASF, internalizing fermentation increases production flexibility. The measure also enhances the resilience of the supply chain.

Melanie Bausen-Wiens, a member of the board of directors of Agricultural Solutions and head of technology, stated that the BioHub operation represents an advance in industrial biotechnology. According to her, in-house production connects research to manufacturing on an industrial scale.

Maximilian Becker, a member of the board of directors of Agricultural Solutions and

responsible for business, said that the global market for biological crop protection continues to grow. He believes the new plant creates a scalable and flexible platform to strengthen the BioSolutions portfolio and ensure a consistent supply to customers.

[RETURN TO INDEX](#)

Baculovirus changes the dietary choices of *Spodoptera exigua*

Study links SeMNPV infection to the SexiOR23 olfactory receptor and the search for plants with higher protein content

11.05.2026 | 07:12 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Michasia Dowdy - University of Georgia

Infection with the baculovirus SeMNPV alters food choice and oviposition in [Spodoptera exigua](#), with a shift in preference towards plants and diets with higher protein content. The effect involves the regulation of the olfactory receptor SexiOR23, according to a study by Chinese researchers.

Scientists used the system formed by *Spodoptera exigua* multiple nucleopolyhedrovirus, or SeMNPV, and its host *Spodoptera exigua*. The objective involved evaluating how a baculovirus infection modifies host selection, larval feeding, and oviposition site selection.

In assays with fifth-instar caterpillars, uninfected individuals preferred *Brassica oleracea*. After infection with SeMNPV, the

preference changed. The caterpillars began to select more selectively *Glycinemax* (soybeans) and *Apium graveolens* (celery). These plants showed higher soluble protein content and a higher protein-to-carbohydrate ratio in the leaves.

Artificial diets

The team also tested artificial diets. One diet had a higher proportion of carbohydrates, with a protein:carbohydrate ratio of 1:7. The other had a higher proportion of protein, with a ratio of 7:1. Uninfected caterpillars chose the carbohydrate-rich diet. Infected caterpillars chose the protein-rich diet.

The researchers annotated 66 olfactory receptor genes in *Spodoptera exigua*. Six showed increased expression after infection. SexiOR23 registered the strongest induction in RNA-seq analysis, with a 23,25-fold increase. Validation by qRT-PCR showed a 5,71-fold increase in infected larvae.

The expression of SexiOR23 was concentrated in the head of the caterpillars. After infection, the gene maintained high expression in this tissue and also showed increased expression in the midgut and fat body. The high expression in the head reinforces the link with chemosensory processes associated with host selection.

Testing gene function

To test the gene's function, the authors silenced SexiOR23 using RNA interference. Silencing reduced gene expression and reversed the dietary shift caused by the infection. Caterpillars infected with silenced SexiOR23 reverted to a preference for the carbohydrate-rich diet. In the plant test, silencing reduced the choice for *Apium graveolens*, host with the highest protein:carbohydrate ratio, and re-established the preference for *brassica oleracea*.

Consumption and survival

The study also assessed consumption and survival. Infected caterpillars consumed more of the high-protein diet than the normal-protein diet. Individuals maintained on the high-protein diet showed greater tolerance to SeMNPV, with delayed mortality and higher survival compared to caterpillars maintained on a normal diet. Seven days after infection, survival was higher on the high-protein diet.

Silencing SexiOR23 did not consistently alter susceptibility to the virus until pupation. According to the authors, this result indicates a primary role for the receptor in behavioral reprogramming, rather than in the direct activation of antiviral defenses.

Adult stage

The change persisted into the adult stage. Females originating from infected caterpillars showed a 39,40-fold increase in SexiOR23 expression. In the antennae, the increase reached 11,10 times compared to uninfected adults. The higher expression in the antennae suggests involvement in decisions related to host location.

Oviposition also changed. Uninfected females laid more eggs in *brassica oleracea*, host with the lowest protein:carbohydrate ratio. Females carrying SeMNPV directed egg laying towards *Apium graveolens*, host with the highest protein-to-carbohydrate ratio.

Further information can be found at DOI
10.1016/j.pestbp.2026.107156

[RETURN TO INDEX](#)

Heat reduces reproductive success in bumblebees

Study with *Bombus terrestris* shows effect of body mass and temperature on mating and sexual selection.

08.05.2026 | 15:10 (UTC -3)

Schubert Peter, Cultivar Magazine



High temperatures reduce mating success in bumblebees. *Bombus terrestris* and amplify the reproductive disadvantage of smaller queens and males. The result appears in a study by Korean researchers, with colonies maintained under heated conditions and matings evaluated in equal proportions of females and males.

Scientists compared reproductive performance at two temperatures. The first, 23°C, represented the ideal mating condition. The second, 32°C, represented a high temperature. The study used newly emerged queens and males, six to eight days old, separated into groups of higher and lower body mass.

The average mating rate dropped from about 75% at 23°C to about 66% at 32°C.

The drop occurred independently of body mass. Even so, queens and larger males maintained greater mating success at both temperatures.

Combined effect

The study indicates a combined effect between temperature and body mass. In equal sex ratios, mate choice depended mainly on the size of the individuals.

Larger queens mated more frequently with larger males. Smaller queens mated mainly with smaller males. However, at 32°C, smaller queens increased their tendency to mate with larger males.

Scientists observed four combinations: larger queens with larger males, larger

queens with smaller males, smaller queens with larger males, and smaller queens with smaller males. The pair formed by larger queens and larger males showed the strongest selection pattern at both temperatures. The pair formed by smaller queens and smaller males performed worse under elevated temperatures.

Additional test

In a further test at 32°C, the researchers compared pairs of small queens and males with pairs of large queens and males. Mating between small individuals was around 34%. Mating between large individuals reached around 86%. The result reinforces the disadvantage of

smaller individuals under heat.

Mating behavior also changed. Mating between smaller queens and smaller males occurred later at both temperatures. Smaller males exhibited longer copulation times than larger males. Despite this, larger males transferred more sperm to the queens' spermathecae.

The amount of sperm stored by the queens was positively associated with the size of the two partners. Larger queens stored more sperm than smaller queens. Larger males left a greater volume of sperm in the queens than smaller males. This point has biological importance, since queens of *Bombus terrestris* They typically mate with a single male before hibernation.

The authors link the results to the impact of climate warming on pollinators. Elevated temperatures can reduce body size in bumblebees. Smaller body size can decrease mating rates, choice preferences, survival during hibernation, and population fitness.

Further information at
doi.org/10.3390/insects17050481

[RETURN TO INDEX](#)



*The Cultivar Semanal magazine is a technical and scientific publication focused on agriculture in Brazil.
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