

April 25, 2026

N ° 76

Cultivar[®] *Semanal*

A close-up photograph of a red tomato that has been severely damaged by caterpillars. Two large, green, segmented caterpillars are visible on the tomato's surface. The caterpillar on the left is positioned vertically, while the one on the right is curved. Between them is a large, dark, and mushy area of decay, likely caused by the caterpillars' feeding. The tomato's skin is cracked and discolored, showing signs of significant pest damage.

**Resistance
requires diverse
strategies**

Table of Contents

Trichoderma can increase the biomass of tomato plants	05
Bayer informs shareholders of advances in Crop Science	12
Agricultural Market - April 24, 2026	17
Tuta absoluta increases resistance and requires different management practices	24
Cyclic peptide advances in the control of <i>Phytophthora infestans</i>	34
Ants learn faster in colonies	40
UPL Brazil announces new national sales director	46
The pesticide market is growing again in Brazil	50

Table of Contents

FMC appoints new global regulatory manager	57
--	----

Parasitoids expand control of the HLB psyllid	60
---	----

Matheus Palhano takes over as director of insecticides at Bayer	66
---	----

Microplastics reduce tomato growth and affect wheat	69
---	----

Tuta absoluta sensory protein binds pheromones and chlorpyrifos	76
---	----

Whitefly completes its life cycle in eucalyptus genotypes	83
---	----

Santa Catarina will now export apples directly through the state's ports	88
--	----

Table of Contents

Primitive plants used CAM photosynthesis to survive the "Great Dying"	93
Massey Ferguson presents the Momentum planter with 30 and 40 rows	100
Flowers without nectar do not alter bees' choice of food	106

Trichoderma can increase the biomass of tomato plants

Species and consortia modulate soil bacteria and enhance growth

24.04.2026 | 10:33 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: USDA

The use of *Trichoderma virens* increased tomato growth and modulated the rhizosphere bacterial community, including partial recovery of microbial richness in severely disturbed soil. These results are from a study conducted at Pennsylvania State University.

The researchers evaluated *Trichoderma harzianum*, *Trichoderma virens* and the combination of both species. The experiment included two scenarios: natural soil and autoclaved soil, with drastically reduced microbiota. The plants received a single inoculation via soil. The analysis took place 11 weeks after transplanting, at the beginning of flowering.

The data shows an increase in aboveground biomass with *Trichoderma*

virens and with the consortium between *Trichoderma harzianum* + *Trichoderma virens*. The gain reached 28% and 55%, respectively, compared to the control. The effect occurred in both soil types. The treatment with *Trichoderma harzianum* did not perform as well.

Natural soil

Despite the stimulus to growth, *Trichoderma virens* and the consortium reduced the bacterial richness in the natural soil. The study points to competitive exclusion of part of the microbiota. This process involves competition for resources, modification of microenvironments, and the release of

antimicrobial metabolites. Even so, the reduction did not compromise plant development, according to the scientists.

Autoclaved soil

In autoclaved soil, the behavior changed. *Trichoderma virens* and the consortium increased bacterial richness compared to the control. Recovery reached up to 28% with *Trichoderma virens*. The effect indicates a capacity for partial reconstruction of the microbiota after severe disturbance. However, the restoration did not reach the levels of the natural soil.

The bacterial composition varied depending on the treatment. In natural soil,

Trichoderma harzianum, *Trichoderma virens* and the consortium reduced diversity and altered the abundance of important groups. In autoclaved soil, there was an increase in certain phyla and genera associated with ecological functions. The study identified changes in groups linked to nitrogen fixation, growth promotion, and chemical detoxification.

Observed interaction

The researchers also observed interactions between bacteria and species of *Trichoderma*. Co-occurrence networks indicated both positive and negative associations between taxa. These interactions may influence persistence. *Trichoderma virens* e *Trichoderma*

harzianum and its agronomic efficiency. The result helps to explain variations in field performance.

The density of cultivable bacteria decreased in several treatments with *Trichoderma virens* and with the consortium, especially on natural land. This data reinforces the hypothesis of competitive exclusion. In contrast, *Trichoderma harzianum* increased this density under certain conditions.

Volatile compounds

The volatile compounds emitted by bacteria did not alter the growth of *Trichoderma virens*, *Trichoderma harzianum* or *Fusarium oxysporum* in an in

vitro assay. The result suggests a limited effect of these compounds in the evaluated context.

Scientists point out that increased plant growth can occur even with reduced bacterial diversity. The direct effect of *Trichoderma virens* can overcome losses associated with microbial exclusion.

Furthermore, changes in community composition can favor beneficial groups or reduce pathogens.

More information at
doi.org/10.1016/j.microb.2026.100685

[RETURN TO INDEX](#)

Bayer informs shareholders of advances in Crop Science

The company prioritizes profitability, innovation, and cash generation

24.04.2026 | 07:57 (UTC -3)

Cultivar Magazine



Bayer AG reported progress in its recovery plan and reinforced its focus on Crop Science. The information was shared during the company's annual shareholders' meeting held today. CEO Bill Anderson highlighted operational progress, prioritizing profitability, innovation, and cash generation. The agricultural division is implementing a broad performance improvement program and plans new products starting in 2027.

The company is reorganizing its crop protection portfolio. The strategy prioritizes innovative molecules and higher margins. The Plenexos insecticide is part of this movement, Anderson explained. The company launched the product in Colombia at the end of 2025. [Bayer anticipates registration in Brazil sometime](#)

in 2026..

The Crop Science division is also streamlining its structure and assets. The company is seeking operational efficiency and greater cash generation. The company indicates 2026 as a critical year for consolidating this foundation. The plan includes adjustments to the portfolio and global presence.

Mid-term

The CEO highlighted the agricultural pipeline with medium-term innovations. The company projects a greater impact starting in 2027. Anderson cited technologies with the potential for productive transformation. Among them are solutions for reducing inputs and

increasing agronomic efficiency.

Bayer also links agricultural innovation to global challenges. The executive mentioned pressure on fertilizers and supply chains. The company invests in biological and genetic solutions. The goal includes improving nitrogen use in crops such as corn. The strategy seeks to reduce dependence on synthetic fertilizers.

In the regulatory landscape, the company is monitoring decisions in the United States. The CEO cited a Supreme Court ruling as a significant milestone. The issue involves access to crop protection technologies. The company maintains a strategy to mitigate legal risks, reaching settlements whenever possible.



Progress on Bayer's Five Key Priorities

Bayer is on track with the three-year plan, advancing our priorities to improve performance and strengthen our positioning

Crop Science Profitability

- // Executing against Crop Science's five-year framework through a portfolio refresh and disciplined resource allocation
- // Moving towards growth and higher EBITDA margins over time and planning to launch 10 blockbusters in the next 10 years

Pharma Growth & Pipeline

- // Effectively managing loss of exclusivity transition and further increasing R&D productivity to revitalize the pipeline
- // Plan to return to meaningful sales growth by 2027 and expand margins by 2028

Litigation

- // Multi-pronged strategy with a goal of significantly containing litigation by the end of 2026
- // Monsanto recently announced a nationwide settlement agreement; in parallel, the U.S. Supreme Court agreed to hear the *Durnell* case

Cash & Deleveraging

- // Significant progress on free cash flow generation and reduction of net financial debt to support our long-term priorities
- // Continually evaluate our capital allocation framework and are mapping the path forward to deliver value for our shareholders

Dynamic Shared Ownership

- // Fully implemented throughout our organization, improving our culture, workstreams, and value to customers
- // In addition to cost savings of greater than €2bn, we expect meaningful uplift to topline by improving our innovation and speed to market



Updates on Managing Litigation Risk

Multi-pronged approach to protect our liquidity, resolve claims at scale, and contain our exposure

Workstreams

Litigation

- // Settlement to avoid protracted legal disputes (pending court approval)
- // In parallel, pursuing *Durnell* case at the U.S. Supreme Court

Legislation

- // Engaging with policymakers for regulatory clarity outside the courts
- // Encouraging legal uniformity over patchwork labeling state-by-state

Communication

- // Awareness through letters, messaging, and the Modern Ag Alliance
- // Partnering with organizations to highlight crop protection importance

Recent Updates

- // Monsanto has reached a proposed nationwide glyphosate settlement establishing a long-term claims program funded by declining capped annual payments for up to 21 years
- // Agreement prioritizes speed, certainty, and risk containment, freeing management focus and capital for Bayer's innovation priorities
- // Agreement complements other workstreams, in particular the Supreme Court review of the *Durnell* case, where a favorable decision would address cases not covered by the settlement and disincentivize and cover potential opt-outs
- // Critically, a preemption ruling could set a uniform national standard for pesticide labeling and provide regulatory clarity urgently needed by U.S. farmers

Since 2024, the Legal Risk Committee of the Supervisory Board oversees all workstreams in coordination with the Board of Management

RETURN TO INDEX

Agricultural Market - April 24, 2026

Soybeans gain external support, but supply limits price increases.

24.04.2026 | 07:51 (UTC -3)

Vlamir Brandalitze - @brandalitzeconsulting



The war in Iran is keeping oil prices high and supporting the soybean complex in the international market. Brent crude is back

above US\$100 and WTI is above US\$93. This scenario reinforces the demand for biofuels and favors soybean and corn oil. At the same time, the progress of planting in the United States is putting pressure on prices and limiting gains in Chicago.

US soybean planting is progressing faster than average. The planted area has already exceeded 16%, compared to historical averages of 7% to 8%. Illinois has reached almost 25%. This pace indicates a possible increase in planted area, with projections between 34,5 and 35 million hectares. The harvest could reach 125 million tons, above the 116 million tons harvested in the previous cycle. This potential is weighing on prices.

In Chicago, the July contract tested \$12 per bushel but lost momentum. The market saw strong hedging activity. Prices retreated to support levels between \$11,40 and \$11,80. The environment indicates difficulty in sustaining gains in the short term.

In Brazil, premiums remain positive, but the weaker exchange rate limits returns. The dollar is falling to the R\$4,95 range. At the port, indications have fallen from US\$139 to around US\$137-US\$138 per ton for shipment in October.

Exports maintain a strong pace. In the first 12 working days of April, the country shipped 10,8 million tons. The volume could exceed 16 million tons for the month. China accounts for about 75% of

shipments. In the accumulated total for the year through April, shipments total 33,7 million tons, a record for the period.

Soybean meal is also increasing, with 7,3 million tons exported this year. Soybean oil reached almost 800 tons. The soybean complex generated US\$4,984 billion in foreign exchange in the first days of April.

The Brazilian harvest has reached 96% of the area. Rio Grande do Sul accounts for the remaining areas, with less than 20% yet to be harvested. Total production could reach 180 million tons, up from 171,5 million tons in the previous cycle.

Corn situation

In the corn market, the external market is supported by oil and demand. In Chicago, the grain is holding at US\$4,50 on the spot market and above US\$5 in longer-term contracts. Planting in the US remains close to average, with 14% of the area sown.

In Brazil, the concern is focused on the second corn crop. Dry weather is affecting Goiás, Minas Gerais, and parts of Paraná. Mato Grosso do Sul is also facing a water deficit. Production is expected to fall below the projected 109 million tons, with estimates closer to 100 million tons.

The domestic market is reacting. On the B3 stock exchange, prices are rising amid competition between buyers and sellers. Exports total 7,1 million tons this year, up from 6 million tons in the same period last

year.

Wheat situation

In the wheat market, the global scenario indicates supply constraints. Weather problems and export controls in Russia are supporting prices above US\$6 per bushel. In Brazil, the planted area may fall to around 2 million hectares. Production is expected to decline to around 6 million tons.

Rice situation

Rice harvesting is progressing well, with over 90% of the area completed nationwide. Market prices range from

R\$60 to R\$82 per sack, depending on the region. Retail consumption remains strong.

Bean situation

Beans are in limited supply, especially the premium carioca variety. Prices range between R\$ 340 and R\$ 365. The market is experiencing a weekly increase and active demand.

[RETURN TO INDEX](#)

Tuta absoluta increases resistance and requires different management practices

Review highlights the spread of the pest, failures in chemical control, and greater scope for biological control

23.04.2026 | 10:16 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Sandeepkumar Jalapathi - Tamil Nadu Agricultural University

The tomato leafminer (*Tuta absoluta*) is expanding its area of invasion, accumulating cases of insecticide resistance, and putting pressure on production systems across four continents. Faced with this situation, scientists are advocating for integrated pest management programs with a greater emphasis on biological control, traps using sex pheromones, and cultural practices.

Researchers analyzed studies published between 2000 and March 20, 2026. In the initial screening, they started with 2.131 records and used 248 studies in the final review. Recurring themes included integrated pest management, biological control, insecticide resistance, and tools such as CRISPR/Cas9 and RNAi. More than half of the selected articles were

published between 2020 and 2026, suggesting recent progress in research on the pest.

Native to South America, *Tuta absoluta* has reached Europe, Africa, and Asia. In the nine years since entering Europe, the invaded area has grown by 600 square kilometers per year. The insect is also continuing to expand in China. According to the review, this dispersal results from a combination of trade in infested material, climate adaptation, and the availability of cultivated and wild hosts.

Economic impact

The economic impact remains high. In protected and open field crops,

uncontrolled infestations can reduce productivity by 80% to 100%. In tomatoes, the larvae create mines in the leaves, reduce photosynthesis, and compromise plant development. In fruits, the galleries facilitate the entry of secondary pathogens and promote rot.

The review also draws attention to the species' biological plasticity. In warmer regions of Egypt, for example, the projection reaches 9,52 generations per year. In colder areas, the value drops, but still remains high. This rapid cycle accelerates selection pressure and makes containment difficult when management relies on few tools.

Regarding resistance, scientists describe mutations associated with

organophosphates, pyrethroids, and diamides, as well as metabolic mechanisms involving esterases, glutathione S-transferases, and cytochrome P450. Cases appear in countries such as Brazil, China, Greece, Spain, Iran, Italy, Kenya, and others. In some populations, resistance to certain active ingredients reaches high levels.

In China, seven evaluated populations showed greater resistance to chlorpyrifos and chlorantraniliprole in some regions, while *Bacillus thuringiensis*, emamectin benzoate, indoxacarb, and spinosad still showed low resistance in most of the populations tested. In another set of studies included in the review, chitin synthesis inhibitors exhibited high levels of

resistance in the field.

Control means

For scientists, this scenario reinforces the need for rotation of mechanisms of action, continuous monitoring of susceptibility, and integration with non-chemical tactics. They state that biological control, sex pheromone traps, and cultural management are currently among the most promising approaches to address resistance associated with failures of chemical control.

In the field of monitoring and suppression, pheromones stand out. The female releases the compound recognized by males through a refined olfactory system.

Pheromone-binding proteins act in recognition and attraction. The expression of one of these proteins peaks during courtship, around 6 am. In trials cited by the review, baits "overdosed" with 0,8 mg of synthetic pheromone attracted more males than standard formulations with 0,5 mg in areas with high infestation. Another study pointed to better performance of delta traps with rubber septa and black adhesive plates.

Ecological base

The ecological basis of the problem increases the difficulty of management. The pest finds its main and most suitable host in the tomato, but it also infests potatoes, eggplants, sweet cucumbers,

and other solanaceous plants. In less favorable plants, such as tobacco, the larvae can secrete proteins that help neutralize the plant's defenses. The availability of wild hosts in some regions also favors dispersal and persistence in the environment.

Scientists point to opportunities for new technologies. Plant-mediated RNAi appears as a promising alternative, although it faces application obstacles. CRISPR/Cas9 emerges as a tool with the potential to interfere with genes linked to pheromone perception and other biological processes of the pest. At the same time, researchers note technical limitations, costs, regulatory requirements, and the need for biosafety assessments before any

widespread use in the field.

Role of endosymbionts

Another important point involves endosymbionts. Bacteria associated with the pest can enhance adaptation to hosts and aid in the detoxification of plant compounds and insecticides. This microbiological component adds complexity to management and can influence insect performance in the face of environmental stresses and control tactics.

According to scientists, the most consistent approach to managing the pest involves integrated programs tailored to local realities. This includes early detection, monitoring population dynamics,

rational use of insecticides, preservation of natural enemies, pheromone traps, and cultural practices to keep infestation below the economic damage threshold.

More information at
doi.org/10.3390/insects17040441

[RETURN TO INDEX](#)

Cyclic peptide advances in the control of *Phytophthora infestans*

CS5 inhibitor outperforms Nikkomycin Z and reduces infection in potatoes

23.04.2026 | 08:15 (UTC -3)

Schubert Peter, Cultivar Magazine



doi.org/10.1016/j.ijbiomac.2026.150339

A cyclic peptide inhibits chitin synthase in *Phytophthora infestans* and reduces

growth, germination, and infection in potatoes. Results indicate a new molecular target and an alternative to broad-spectrum fungicides, with potential for more specific management of oomycetes.

Researchers have characterized the PiChs enzyme, the pathogen's only chitin synthase. The protein primarily produces soluble chito-oligosaccharides with a degree of polymerization between 4 and 6. This pattern explains the low detection of chitin in the oomycete cell wall. Activity increases after proteolytic processing and depends on divalent ions, with a greater response in the presence of magnesium.

Enzymatic assays indicate sensitivity to Nikkomycin Z, but with lower affinity compared to fungal enzymes. The team

developed the cyclic peptide CS5, with a stronger binding to the active site of PiChs. Molecular modeling and simulations confirm competition between CS5 and Nikkomycin Z for the same site. The new compound forms more hydrogen bonds and maintains a more stable interaction with the protein.

In vitro tests

In vitro tests show a significant reduction in mycelial growth and sporangium germination. In solid medium, the peptide promoted approximately 70% inhibition. In liquid medium, the rate exceeded 80% at a concentration of 0,2 millimolar. The dose-response curve indicates an EC50 close to 86 micrometers.

Ex vivo trials on potato tubers reinforce the effect. Treatments with particles of 100 micrometers or more prevented late blight symptoms after inoculation. Statistical analysis indicates a negative relationship between dose and disease incidence.

Enzymatic activity confirms the greater efficiency of CS5 compared to the classic inhibitor. The peptide completely blocks PiChs at 0,2 millimolar, while Nikkomycin Z requires higher concentrations. The IC₅₀ of CS5 reaches approximately 82 micrometers, lower than the value observed for the reference compound.

Structural simulations

Structural simulations point to key residues in the interaction, such as Asp480 and His749. Alterations in these sites reduce the peptide's affinity, highlighting its central role in the binding mechanism. The model also indicates a broader network of interactions in the complex with CS5.

Chitin synthase participates in critical stages of the pathogen's life cycle, including hyphal growth and reproduction. The presence of a single gene in *Phytophthora infestans* increases interest as a specific target. Targeted inhibitors can reduce impacts on non-target organisms and limit selection pressure for resistance.

Further information can be found at doi.org/10.1016/j.ijbiomac.2026.150339

[RETURN TO INDEX](#)

Ants learn faster in colonies

Social interactions accelerate associative learning and route reversal

23.04.2026 | 07:54 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: AntWeb - CC BY 4.0

Ants of the species *Temnothorax rugatulus* exhibit faster associative learning when operating in colonies. Experiments compared isolated individuals with complete groups. Results indicate a collective advantage in the initial phases of

acquisition and reversal of visual associations linked to the presence of food.

Researchers trained ants to associate visual cues with food. One corridor contained food and a positive visual signal. Another corridor offered no food. Tests measured the time spent in each option over 17 sessions, divided between acquisition and reversal.

Colonies showed a higher success rate in the first sessions. The difference appeared early in the acquisition phase. Statistical analysis indicated a significant effect of the collective condition. Interaction between sessions and condition also showed relevance. After a few sessions, performance converged across treatments.

During the reversal phase, a similar pattern occurred. Ants in groups adjusted their behavior more quickly after the cues were reversed. The first three sessions showed a clear advantage for the colonies. Subsequently, accuracy levels became closer to those of isolated individuals.

Longer stay

Observations indicated a longer period of ant grouping in the corridor with food during training. The average ratio reached 0,77 in colony acquisition, compared to 0,66 in individuals. In the reverse, values ??reached 0,69 and 0,56, respectively.

Recruitment behavior

Recruitment behavior contributed to this result. Researchers recorded tandem runs, a form of direct communication between worker ants. One ant guides another to the resource. The number of events was concentrated in the first sessions of each phase.

This mechanism generates positive feedback. More individuals visit the location with food. New ants begin recruitment. The process amplifies initial differences and accelerates collective learning.

Foraging rates varied. Isolated individuals visited corridors in 49,3% of sessions.

Colonies recorded 45,9%. The difference was not statistically significant. Division of labor in colonies may explain the lower

frequency of individual visits.

Forecast and results

Results contradict initial predictions based on a theoretical model. Expectations indicated delays in groups during acquisition. Data show the opposite effect. Social interactions provided useful information from the beginning of the process.

Scientists highlight ecological implications. Environments with rapidly changing resources demand agile adaptation. Colonies can abandon degraded areas more efficiently. The ability to relearn routes favors the exploration of new locations.

Further information can be found at
doi.org/10.1098/rstb.2024.0442

[RETURN TO INDEX](#)

UPL Brazil announces new national sales director

Giuliano Scalabrin has been with the company for 14 years and will lead the execution of the company's commercial strategy

22.04.2026 | 16:32 (UTC -3)

Rafael Iglesias, Cultivar Magazine edition



UPL Brazil announced the appointment of agricultural engineer Giuliano Argenta Scalabrin (pictured) as national sales

director. He has been with the company for 14 years and during his career has participated in important milestones, such as the creation of Natural Plant Protection (NPP) – a business unit focused on biosolutions, where he served as director in Brazil – and also Orígeo, a joint venture between UPL and Bunge that operates in direct sales to producers in Matopiba, Pará, Mato Grosso, and Rondônia.

Before taking over the national sales area, Scalabrin led the business unit responsible for sugarcane and pasture, as well as the Southeast and Northeast regions of Brazil, for all crops. Throughout his career at UPL, he worked in various sales and marketing areas, including the Cerrado region, encompassing the states of Bahia, Goiás, Maranhão, Mato Grosso, Minas

Gerais, Pará, Piauí, and Tocantins.

He graduated in 1995 from the Federal University of Rio Grande do Sul (UFRGS), and holds postgraduate degrees in marketing from the Higher School of Advertising and Marketing (ESPM) and in executive business management from the Brazilian Institute of Capital Markets (IBMec).

“I am honored by this challenge and motivated to contribute even more to UPL's strategy. Effective sales execution depends on actively listening to clients and partners in the field. It is through this close contact that we strengthen relationships and understand the demands and challenges of the farmer. My team and I are dedicated to building even stronger

relationships to offer the best solutions for crop protection,” said Scalabrin.

Cristiano Figueiredo, CEO of UPL Brazil, highlighted that Giuliano's appointment reinforces the company's commitment to valuing internal talent and recognizing a career built on consistency and results within the company. "Giuliano's career at UPL is marked by his knowledge of the field, his ability to create connections, and his leadership across different business areas. This provides the consistency and vision necessary for us to advance our goals and expand the value we deliver to Brazilian farmers," he concluded.

[RETURN TO INDEX](#)

The pesticide market is growing again in Brazil

Revenue rises 3% in reais after a previous drop, but falls 7% in dollars

22.04.2026 | 15:48 (UTC -3)

Fernanda Campos, Cultivar Magazine edition



With a turnover of R\$ 98,7 billion in the 2024/25 harvest, the Brazilian agricultural pesticide market grew 3% in Brazilian currency compared to the previous cycle (R\$ 95,9 billion). In dollars, however, the

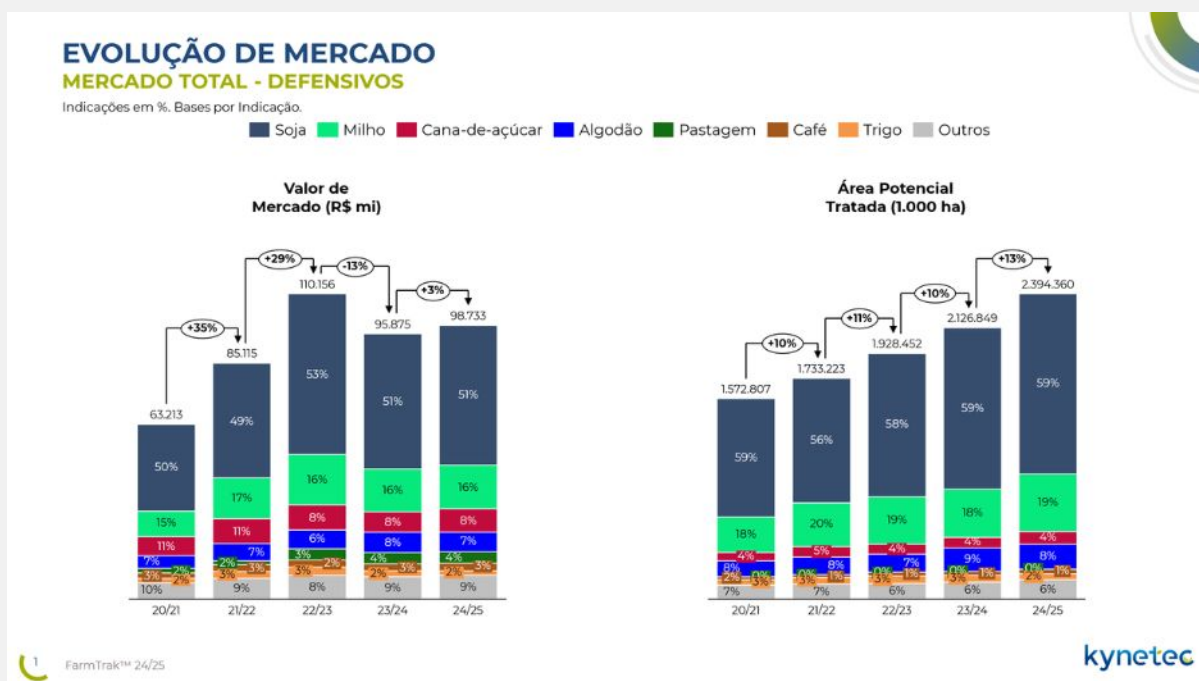
sector's revenue fell 7%, from US\$ 19,4 billion to US\$ 18,1 billion. The data comes from the annual FarmTrak study by Kynetec Brasil, which considers more than three thousand interviews conducted directly with producers throughout the national agricultural frontier.

The devaluation of the exchange rate during the period, which went from R\$ 4,94 to R\$ 5,46, explains the result in the American currency, informs the research manager of the consulting firm, Lucas Alves. According to him, the 3% recovery in reais in the harvest is relevant for the industry, as it reverses a 13% drop in performance recorded in 2023/24.

According to Alves, in 2023/24, despite the increase in planted area (+1%) and the

intensity of treatments carried out in the field (+9%), input prices plummeted by an average of 79%. "This scenario influenced the reduction in the sector's revenue, from R\$ 110,1 billion to R\$ 95,9 billion," he explains.

The consultancy expects the market to show growth again, in reais (Brazilian currency), in the 2025/26 crop season, in the range of 8%. "This potential growth should be driven by soybean and corn crops and related to increased planted area and the intensity of treatments adopted," it explains.



Price fluctuation

Lucas Alves emphasizes that understanding the industry's most recent indicators requires an analysis of the market landscape over the last five harvests. Kynetec's data shows cycles marked by significant price increases for pesticides, starting with the arrival of the coronavirus pandemic, followed by periods

of declines in input costs.

Between the 2020/21 and 2022/23 seasons, the agricultural pesticides market showed a significant increase in value, from R\$ 61,4 billion to R\$ 110,1 billion (+79%), in addition to registering an increase in planted area (+2%) and in the intensity of treatments (+23%).

“From 2020/21 to 2022/23, the average cost of applying pesticides rose from R\$37,93 to R\$54,15 per hectare,” Alves exemplifies. The manager adds that all product segments were affected by price inflation, such as herbicides, especially non-selective ones.

"An application that cost R\$37,68 in 2020/21, became worth, on average, R\$97,60 (+159%) in 2022/23. The price

increase also began at a time of trade restrictions for some of the main molecules on the market, due to the closure of factories in Brazil's main supplier of products, China. Freight costs became more expensive due to the rise in the dollar," he reinforces.

According to him, some of Brazil's main commodities, including soybeans and corn, also experienced favorable price increases in the 20/21 and 22/23 harvests. "This helped to sustain sales, even with higher production costs for farmers," he states.

In the 2024/25 harvest, the expert points out, the slight recovery in the sector, in reais, resulted from new investments by producers to expand the planted area (+2%) and also to boost, by the same 9%

as in 2023/24, the management practices adopted in the crops. "Despite the fact that a price adjustment scenario of eight negative points still prevailed," Alves concludes.

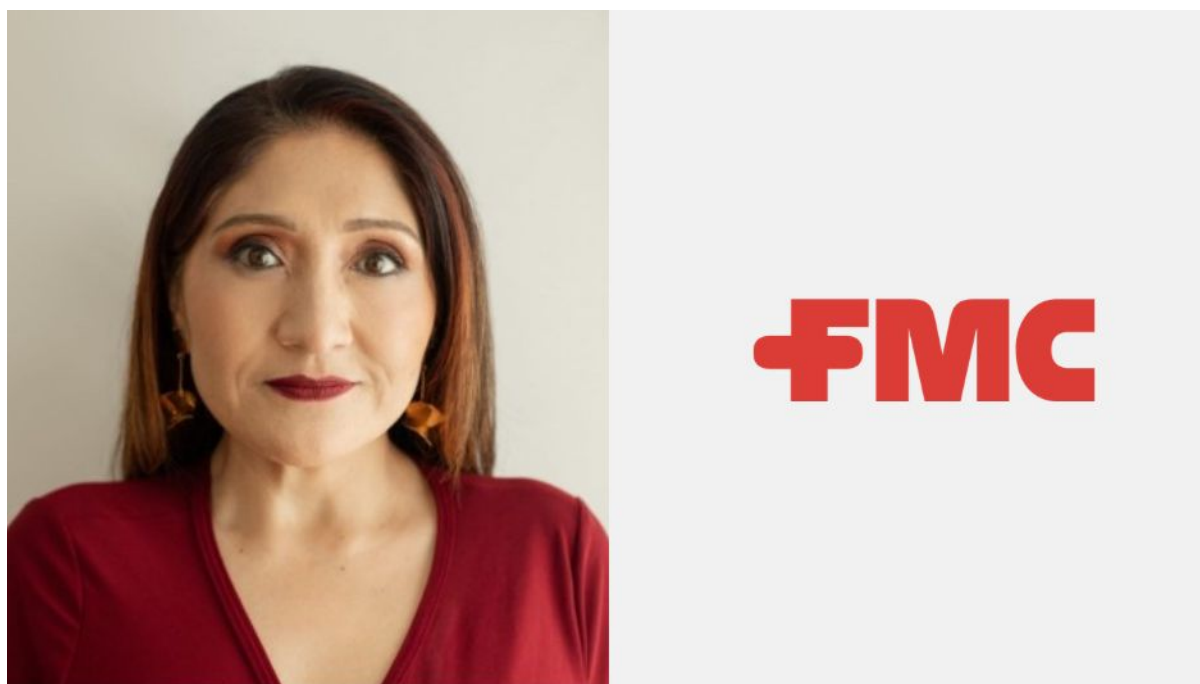
[RETURN TO INDEX](#)

FMC appoints new global regulatory manager

Jenny Moya takes over after leading the area in Latin America for four years

22.04.2026 | 14:47 (UTC -3)

Cultivar Magazine



FMC Corporation has appointed Jenny Moya (pictured) as its new global Regulatory Affairs manager. The chemical engineer has been with the company for

over eight years and previously served as Director of Regulatory Affairs for Latin America, a role she held for four years from Brazil.

Throughout her career, the executive has led regulatory strategies, compliance initiatives, and multicultural teams in different markets across the region, including the Andean Region, the Caribbean, Mexico, the Southern Cone, and Brazil. Her areas of focus include strengthening internal processes, anticipating regulatory risks, and ensuring operations aligned with legal requirements in each country.

Jenny Moya holds a degree in Chemical Engineering from the Universidad de America and a specialization in Environmental Management from the

Universidad de Los Andes, both in
Colombia.

[RETURN TO INDEX](#)

Parasitoids expand control of the HLB psyllid

Study reveals interaction between species and reinforces biological management in citrus

22.04.2026 | 13:48 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Jeffrey W Lotz, Florida Department of Agriculture and Consumer Services

The combined use of parasitoids expands the control of [Diaphorina citri, vector of](#)

huanglongbing (HLB), according to a study conducted in Colombia. The research demonstrated coexistence and simultaneous parasitism between *tamarixia radiata* and *Diaphorencyrtus aligarhensis*, with direct implications for biological control programs.

The study evaluated development, morphometry, and interaction between species under controlled conditions.

Tamarixia radiata presented a shorter cycle, with an average of 11,7 days.

Diaphorencyrtus aligarhensis completed its life cycle in 14,4 days. The pest insect *diaphorina citri* without parasitism reached 17 days. The difference indicates a faster rate of action by the ectoparasitoid.

Different strategies

The results indicate distinct parasitism strategies. *Yamarixia radiata* acts as an ectoparasitoid. Development occurs externally, with immediate paralysis of the host nymph. This mechanism favors efficiency and speed. *Diaphorencyrtus aligarhensis* exhibits an endoparasitoid habit. Development occurs inside the host, with the parasitized nymph continuing to grow.

The research recorded instances of multiparasitism and superparasitism. In some cases, *tamarixia radiata* and *Diaphorencyrtus aligarhensis* used the same host simultaneously. Multiple ovipositions of *Diaphorencyrtus*

aligarhensis also occurred in a single nymph of *Diaphorina citri*. Dissection confirmed more than one developing individual in the same host.

Feeding in the host

The study also recorded feeding on the host. Adults of *Tamarixia radiata* and *Diaphorencyrtus aligarhensis* consumed hemolymph from young nymphs of *diaphorina citri*. This behavior broadens the impact on the pest population, beyond direct parasitism.

Morphometric characterization indicated progressive growth in all phases. This work provides the first detailed description of immature stages of *Diaphorencyrtus aligarhensis* in Colombia. The data assists

in the identification and monitoring of mass rearing programs.

The results indicate complementary potential between *Tamarixia radiata* and *Diaphorencyrtus aligarhensis*. According to the researchers, differences in development time and target stage broaden the scope of control over *Diaphorina citri*. However, intra- and interspecific competition can limit gains from joint releases.

More information at
doi.org/10.3390/insects17050444

Característica	<i>Tamarixia radiata</i>	<i>Diaphorencyrtus aligarhensis</i>
Tipo de parasitismo	Ectoparasitoide (desenvolve-se fora do hospedeiro)	Endoparasitoide (desenvolve-se dentro do hospedeiro)
Ciclo de vida	Mais curto (aprox. 11-12 dias)	Mais longo (aprox. 14-15 dias)
Ação na ninfa	Paralisa a ninfa imediatamente	A ninfa continua crescendo por um tempo
Preferência	Ninfas de 4º e 5º ínstar (mais velhas)	Ninfas de 2º e 3º ínstar (mais jovens)

[RETURN TO INDEX](#)

Matheus Palhano takes over as director of insecticides at Bayer

Agronomist takes the lead in the field in Latin America

22.04.2026 | 09:58 (UTC -3)

Cultivar Magazine



Agronomist Matheus Palhano has assumed the position of director of

insecticides at Bayer for Latin America. The executive expressed gratitude for the opportunity, as well as positive expectations for the new cycle.

Palhano has nearly eight years of experience at Bayer. Prior to his new position, he led the non-selective herbicides area in Latin America, between December 2022 and April 2026. He also served as technical manager for soybean major launches in the region, from August 2021 to December 2022.

His career at the company also includes leadership in crop protection and biological stewardship in Latin America, between November 2019 and December 2022, based in Santa Cruz das Palmeiras. Prior to that, he held the position of regulatory

supervisor, between August 2018 and November 2019. He also worked at Monsanto Company as a regulatory supervisor.

In his academic background, Palhano graduated in agronomy from Unesp, focusing on weed science. He pursued a master's degree in Weed Science at the University of Arkansas between 2014 and 2016. He also completed a training period at the University of Nebraska-Lincoln in 2013, working in the weed program.

[RETURN TO INDEX](#)

Microplastics reduce tomato growth and affect wheat

A study using clay-silt soil indicates greater toxicity of PET fibers and absorption of aged nanoplastics by tomatoes and wheat

22.04.2026 | 07:27 (UTC -3)

Schubert Peter, Cultivar Magazine

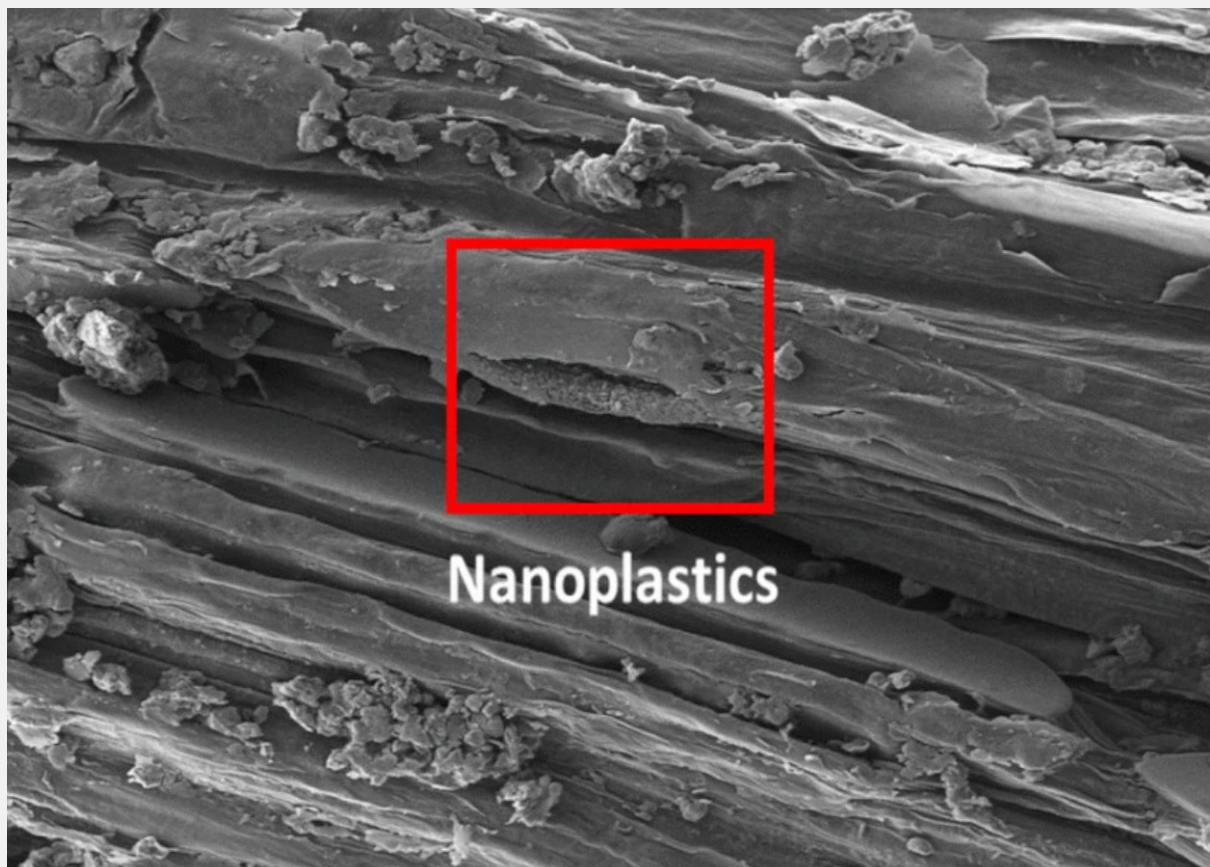


Image: doi.org/10.1007/s11356-026-37686-z

PET fibers in concentrations compatible with biosolids reduced growth and chlorophyll content in tomatoes and, to a lesser extent, in wheat. Combined exposure to micro- and nanoplastics also amplified the phytotoxic effects in tomatoes. This information is from research that also recorded the absorption of aged nanoplastics by plants, with translocation to the root and base of the stem in both species and advancement to the vascular system of the leaves in tomatoes. The study was conducted with wheat and tomatoes in silty loam agricultural soil.

The scientists evaluated conditions considered environmentally realistic. They used aged particles, concentrations close to those found in agricultural soils and

biosolids, as well as different polymers, sizes, shapes, and individual and mixed exposure scenarios. The test included fragments of polyethylene, polyethylene terephthalate fibers, and polystyrene nanoplastics.

One of the main findings involves the mobility of microplastics in the soil profile. The presence of plants reduced the leaching of aged PET (polyethylene terephthalate) fibers and PE (polyethylene) fragments. Smaller particles leached more than larger ones. Scientists attribute part of this effect to the interaction of roots with the plastics. Microscopy images showed fibers adhered to the root surface, especially around root hairs and at the root tips.

In the case of PET, the contrast between pots with and without plants was striking. Without plants, 42% to 65% of the PET particles present in the soil migrated via leachate. With plants, this range dropped to 14% to 26%. For PE fragments, leaching ranged from 23% to 48% in the absence of plants and from 13% to 21% in the presence of plants. The study suggests greater retention of fibers in the soil due to the action of the root system.

Greater sensitivity

Tomatoes responded with greater sensitivity. At the highest environmental concentration of PET fibers, equivalent to the range reported for biosolids, shoot length decreased by 67%, total root length

decreased by 47%, and root biomass decreased by 82% compared to the control. In wheat, the clearest response occurred in the root system, with a 39% reduction in total root length under the same conditions.

PE fragments and PS nanoplastics, when evaluated in isolation at the highest concentrations tested, did not cause statistically significant changes in growth parameters. Even so, the mixture of materials amplified the damage to the tomato. Co-exposure reduced shoot length by 47% and total root length by 27%. The researchers point to a possible additive or synergistic effect between the different plastic materials.

Chlorophyll content

Chlorophyll content followed this trend. The higher concentration of PET fibers lowered this indicator in tomatoes and wheat. In the mixed exposure, there was a 25% reduction in tomatoes and a 12% reduction in wheat. The scientific work associates the drop in chlorophyll with a loss of photosynthetic performance and impaired plant growth.

Another key point involves the absorption of nanoplastics. No absorption of pristine particles of approximately 400 nanometers was detected. However, aged nanoplastics entered the plants. Signals appeared in the roots and stem bases of tomatoes and wheat. In tomatoes, the authors also

observed particles in the vascular tissue of the leaves. Detection was performed using fluorescence microscopy and scanning electron microscopy.

According to scientists, the change in surface characteristics after aging helps explain this behavior. Aged particles showed an increased carbonyl index and a more negative surface charge. This combination can alter mobility, aggregation, and interaction with plant tissues.

Further information at
doi.org/10.1007/s11356-026-37686-z

[RETURN TO INDEX](#)

Tuta absoluta sensory protein binds pheromones and chlorpyrifos

Study identifies 23 CSP genes in the tomato leafminer and points to a dual role in chemical perception and response to insecticides

22.04.2026 | 06:57 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Marja van der Straten, NVWA Plant Protection Service

Researchers have identified 23 genes for chemosensory proteins in tomato leafminer (*Tuta absoluta*) and associated two of them, TabsCSP8 and TabsCSP19, with distinct responses to insecticides and bioinsecticides. The work also showed an affinity of TabsCSP8 with chlorpyrifos and with the main component of the pest's sex pheromone. The scientists point to a dual role for these proteins: perception of chemical signals and response to toxic compounds.

Researchers report the identification of 23 genes from TabsCSP1 to TabsCSP23 through genomic analysis. Phylogeny has grouped most of these genes with orthologs from other Lepidoptera, a fact that reinforces the evolutionary

conservation of the family. Some of the genes have formed their own branches of *Tuta absoluta*, an indication of functional diversification within the species.

Gene expression

In the gene expression phase, the team evaluated four candidates after exposing second-instar larvae to [Bacillus thuringiensis \(Bt\)](#), [chlorantraniliprole](#), indoxacarb, [spinosad](#) and chlorpyrifos. RT-qPCR results indicated a significant increase in TabsCSP8 after spinosad and in TabsCSP19 after *Bt*. TabsCSP4 and TabsCSP17 did not show significant induction under the tested conditions. This data suggests a specific response depending on the stressor.

Scientists also mapped the expression profile throughout the life cycle. TabsCSP8 and TabsCSP19 reached higher expression in the adult stage. TabsCSP8 also showed relatively high expression in the first larval instar. In tissue analysis, both concentrated transcripts in the head and, to a lesser extent, in the epidermis of larvae. This pattern reinforces the link with chemical perception and with interface functions between insect and environment.

In the binding assays, the differences between the two proteins became clearer. TabsCSP8 showed strong affinity for chlorpyrifos, with a K_i of $7,62 \pm 0,67$ micrometers, and moderate affinity for the major component of the sex pheromone, (3E,8Z,11Z)-tetradecatrien-1-yl acetate,

with a K_i of $11,50 \pm 2,89$ micrometers. The protein did not exhibit detectable binding to spinosad or any of the other ligands evaluated. TabsCSP19, on the other hand, did not show detectable binding to any of the insecticides, pheromones, or plant volatiles tested.

Molecular modeling

Molecular modeling of TabsCSP8 indicated interactions with chlorpyrifos and the pheromone through hydrogen bonds and hydrophobic interactions. In the case of chlorpyrifos, Arg95 appeared as an important residue for stabilizing the complex. For the pheromone, His46 performed a similar function. The authors use this result to support the ability of

TabsCSP8 to accommodate molecules of different natures.

The study also noted a relevant point for management: gene induction and binding affinity did not proceed together in all cases. TabsCSP8 responded to spinosad, but did not bind to the compound in in vitro tests. TabsCSP19 increased expression after Bt, but did not show detectable binding to the bioinsecticide. According to the scientists, this uncoupling may indicate indirect functions, such as support for detoxification, physiological response to stress, or immune defense.

More information at
doi.org/10.1016/j.pestbp.2026.107138

[RETURN TO INDEX](#)

Whitefly completes its life cycle in eucalyptus genotypes

Study indicates development and viability of *Bemisia tabaci* MEAM1 under controlled conditions

20.04.2026 | 15:29 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Central Science Laboratory - Harpenden

The whitefly [Bemisia tabaci](#) MEAM1 completes its life cycle in eucalyptus genotypes and exhibits variation in biological performance depending on the host. The study's results indicated potential for adaptation in forestry systems.

Scientists based in São Paulo evaluated development time and feasibility in *eucalyptus camaldulensis* and in the hybrid *Eucalyptus urophylla* x *eucalyptus grandis*. Soybeans were used as a comparison standard. The tests were conducted in a laboratory at a temperature of 26°C and a photoperiod of 14 hours.

Soybeans showed a faster growth cycle in all phases. The period from egg to adult was around 21 days. In *eucalyptus camaldulensis* there was an intermediate

value, around 23 days. The hybrid recorded the longest time, above 25 days.

Feasibility standard

Viability followed the same pattern. The soybeans achieved approximately 91% total survival. In *eucalyptus camaldulensis* the performance was similar, at 83%. The hybrid reduced viability to approximately 71%.

The egg stage maintained high viability in all hosts, above 96%. The difference occurred in the nymphal stage. The hybrid reduced survival by about 20% compared to soybean.

Host influence

The data indicate host influence on development, mainly in the nymphal stage. Chemical compounds from eucalyptus can affect the insect during phloem feeding.

Despite lower performance, both genotypes allowed for complete development. The result suggests the possibility of using eucalyptus as an alternative host in agroforestry landscapes.

Scientists recommend field studies to assess population impact and interaction with natural enemies.

The study was developed by Luis Gustavo Talarico Rubim, Anna Mara Ferreira Maciel, André Luiz Lourenção, Alexandre Coutinho Vianna Lima, and Wesley Augusto Conde Godoy.

More information at
doi.org/10.1111/afe.70053

[RETURN TO INDEX](#)

Santa Catarina will now export apples directly through the state's ports

Certification at the point of origin reduces logistics costs and increases the competitiveness of fruit from Santa Catarina

20.04.2026 | 14:49 (UTC -3)

Denise De Rocchi, Cultivar Magazine edition



Producers in Santa Catarina now have a new logistics model for exporting apples.

Starting with the 2025/2026 harvest, phytosanitary certification can be carried out directly in the municipalities of São Joaquim and Fraiburgo, allowing the fruit to be shipped from ports in Santa Catarina without needing to be transported to other states.

With the change, cargo can go directly, for example, through the Port of Imbituba, reducing transportation costs and waiting time. The measure also increases the shelf life of the fruit, which is perishable, by shortening the interval between harvesting and shipping.

Previously, producers had to send their produce to Vacaria (RS) for certification or wait for the process at the port of Itajaí, which generated additional expenses for

logistics and storage.

According to the state government, decentralizing the certification process fulfills a long-standing demand from the production sector and should strengthen the competitiveness of Santa Catarina apples in the international market. The expectation for the current harvest is exports of around 20 tons.

In São Joaquim, one of the main centers of the crop, more than 500 tons have already been locally certified this harvest. The assessment is that the measure brings operational gains and improves the quality of the exported product.

Phytosanitary certification is required by importing countries and guarantees that the fruit is free from pests. In Santa

Catarina, sanitary defense actions have been crucial for the sector's performance, especially the eradication of *Cydia pomonella*, a pest that directly affects the fruit.

The state is responsible for more than half of the national apple production, with a volume exceeding 1 million tons per year. For the current harvest, the estimate is over 500 tons, including both Gala and Fuji varieties, with an increase in quality compared to the previous cycle.

According to the sector, the external market remains strategic, especially in years of higher production, helping to balance prices in the face of increased domestic supply.

[RETURN TO INDEX](#)

Primitive plants used CAM photosynthesis to survive the "Great Dying"

Lycophytes dominated post-extinction environments with physiological adaptations to extreme heat

20.04.2026 | 14:00 (UTC -3)

Schubert Peter, Cultivar Magazine



A study indicates that lycophytic plants developed a physiological mechanism similar to CAM photosynthesis (crassulacean acid metabolism) during the Permian-Triassic period. This favored the survival and expansion of this plant group under conditions of intense heat and low water availability.

During this period, approximately 252 million years ago, an event known as the "Great Dying" occurred, causing a sharp increase in global temperature. Forests collapsed. Terrestrial environments became arid. Climate models indicate temperatures exceeding 40°C in much of the continental area, with peaks between 45°C and 65°C.

In this scenario, lycophytes occupied niches left by other plants. Plant communities began to exhibit low diversity and a predominance of these herbaceous groups. This dominance lasted for about 5 million years after the extinction.

Adaptive key

The adaptive key involved a change in the pattern of gas exchange. The plants opened their stomata at night. CO₂ was stored in the form of organic acids. During the day, photosynthesis occurred with the stomata closed. This process reduced water loss and maintained metabolic activity under intense heat.

Carbon isotopic analyses in fossils support this interpretation. Lycophytes showed distinct values ??compared to other plants from the period. The data indicate a metabolism compatible with CAM or a mixed system between CAM and C3.

Phylogenetic relationships

The research also utilized phylogenetic relationships. Results show a close relationship between Triassic lycophytes and current species of the genus *Isoetes*. This modern group exhibits physiological flexibility, with the ability to switch between photosynthetic pathways according to environmental stress.

Climate simulations reinforce the hypothesis. The occurrence of fossils coincides with regions of high temperature. Conditions exceeded the limits for C3 plants. The absence of C4 plants during this period eliminates this route as an alternative.

Lycophyte dominance

The dominance of lycophytes has altered the functioning of the Earth's ecosystem. Plants with CAM exhibit lower productivity. Biomass accumulation has decreased. Carbon and nutrient flows have been impacted. This scenario may have prolonged global warming conditions.

The results indicate a central role for physiological innovation in ecosystem recovery. Adaptation maintained a minimum vegetation cover during extreme conditions. This process prevented the complete collapse of the terrestrial biosphere.

More information at
doi.org/10.1038/s41559-026-03026-0

The Great Death

The "Great Dying" (Permian-Triassic extinction) was the worst extinction event in Earth's known history. Estimates suggest it eliminated 81 to 96% of marine species, 70% of terrestrial vertebrates, and about 90% of all life.

The main cause was the giant eruptions of the Siberian Traps, which released enormous amounts of CO₂, causing extreme global warming (peaks of up to 65 °C), ocean acidification, and deforestation.

Terrestrial environments became arid and hot. The recovery of the biosphere took more than 10 million years.

[RETURN TO INDEX](#)

Massey Ferguson presents the Momentum planter with 30 and 40 rows

Machine scales up with a focus on precision,
input control, and productivity

20.04.2026 | 11:01 (UTC -3)

Cultivar Magazine, based on information from Flavia Amarante



Massey Ferguson presents the new Momentum planter in 30 and 40 row versions. The equipment expands its capabilities in large-scale grain operations. The design prioritizes planting precision, input control, and real-time monitoring. The machine operates in conjunction with the MF 9S tractor, with power exceeding 340 hp.

The new generation incorporates an evolution in the concept of an intelligent chassis. The system integrates Smart Frame and Weight Transfer technologies. This combination promotes greater uniformity in seed deposition depth. This factor directly impacts the emergence and initial vigor of the plants.

The Smart Frame automatically distributes weight along the structure. This solution

improves line contact with the ground under different conditions. Weight Transfer allows for the application of additional load to machine sections via commands from the cab. This function prevents line lifting at the ends, a common situation in wide-width equipment.

Field trials indicate gains of up to 3% in soybean productivity and 2,3% in second-crop corn. The improvement results from better emergence and initial vigor of the crops. The economic return can reach R\$ 465 per hectare, explains Lucas Zanetti, Product Marketing Manager at Massey Ferguson.

The planter retains the VSet system for seed singulation. The VDrive continues with rate control and row-by-row section

control. New features include vApply, a technology focused on fertilizer control. The system offers dosage monitoring and section control. This solution reduces input overlap during maneuvers and contour turns.

Operation monitoring

In monitoring the operation, the machine adopts the new generation 20/20 monitor. The equipment expands processing capacity and integrates rear cameras. The operator can identify faults more quickly. The system enhances line-by-line control and improves decision-making during planting.

The planting row design also underwent changes. The new configuration features

greater spacing between rows and a reorganization of hoses and components. This change improves straw flow. The adjustment reduces the risk of clogging, especially in areas under no-till planting with corn straw. The operation becomes more efficient with fewer stops.

The manufacturer positions the Momentum 30 and 40 rows as an advancement within its portfolio. The technological package increases operational efficiency and planting quality. The result appears throughout the crop cycle, with a direct impact on productivity.



[Clique aqui e veja no Instagram](#)
[Click here and watch on Instagram](#)

[RETURN TO INDEX](#)

Flowers without nectar do not alter bees' choice of food

Study rules out "bait" effect and points to rapid learning in *Bombus terrestris*

20.04.2026 | 08:17 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Rasbak - CC BY-SA 3.0

Flowers without nectar do not increase the attractiveness of neighboring flowers to bees. Experiment with *Bombus terrestris* indicates the absence of a "bait" effect. The work also shows rapid learning to avoid empty flowers.

Researchers evaluated the role of nectarless flowers within inflorescences. The hypothesis predicted an increase in the perceived value of nectar-bearing flowers by contrast. The test used artificial structures with two equivalent options in sucrose supply. One option included extra nectarless flowers with a distinct color.

The results indicate no change in preference. Bees did not favor inflorescences with "bait" flowers. The choice between blue and purple colors

remained stable across treatments. Position in the environment did not influence decisions.

The experiment

The experiment involved 92 individuals. Each inflorescence offered an equal volume of sugar solution. In the "bait" treatment, two yellow flowers contained only water. The same scenario maintained the total energy value between options.

During the initial flights, bees frequently visited nectar-free flowers. After a few cycles, there was a sharp reduction in visits and probing. In the first cycle, about a quarter of the initial visits occurred on empty flowers. In subsequent cycles, this

figure dropped to less than 1%.

Fast learning

The behavior indicates rapid associative learning. Bees begin to avoid colors associated with the absence of reward. Still, occasional inspections persist. This pattern suggests memory limitation or a resource rechecking strategy.

Immediate effect

The analysis also tested the immediate effect after contact with empty flowers. Prior experience did not increase the likelihood of choosing the same inflorescence in the following cycle. There was no positive reinforcement by contrast.

Researchers point to an evaluation based on absolute value. Bees consider the number of productive flowers or the total volume of nectar. Yellow flowers are ignored after learning this.

More information at
doi.org/10.1111/een.70092

[RETURN TO INDEX](#)



*The Cultivar Semanal magazine is a technical and scientific publication focused on agriculture in Brazil.
It was designed to be read on mobile phones.
It is published on Saturdays.*

Grupo Cultivar de Publicações Ltda.

revistacultivar.com

FOUNDERS

Milton de Sousa Guerra (*in memoriam*)

Newton Peter (director)

Schubert Peter

TEAM

Schubert Peter (editor in chief)

Charles Ricardo Echer (advertising manager)

Rocheli Wachholz

Nathianni Gomes

Sedeli Feijó

Franciele Ávila

Ariadne Marin Fuentes

CONTACT

editor@grupocultivar.com

comercial@grupocultivar.com