

Aug 15, 2026

N ° 92

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**Climate
threatens
beneficial
insects**

Table of Contents

Irrigation and nitrogen alter the composition of cotton seeds	08
UPL appoints Carlos Melo as crop manager in Brazil	13
Climate change threatens services provided by beneficial insects	18
Host plant influences HLB transmission by <i>Diaphorina citri</i>	30
Molecular docking expands the study of pesticide resistance	35
Agricultural Market - August 14, 2026	48
BASF launches Xarvio Connect 2.0 in North America	58
Wheat promotes the initial development of peas in intercropping	63

Table of Contents

Distribution of agricultural inputs is projected to generate R\$ 171 billion in revenue in 2025	68
Area treated with pesticides will grow by 5% in Brazil in 2026	74
Fabio Torretta assumes the vice-presidency of HELM in Brazil	80
Bayer announces new leader for Belford Roxo plant	84
HELM Crop Solutions reinforces its expansion in Brazil with the launch of ULTRON®.	89
Modified fungus enhances control of gray mold in tomatoes	96
Genetic combination enhances tomato fruit set under cold conditions	102

Table of Contents

Brazil's Supreme Court upholds the Soy Moratorium and ends lawsuits regarding the agreement	108
---	-----

Synthetic volatiles increase parasitism by <i>Bracon brevicornis</i>	119
--	-----

Bees learn scents associated with the queen	123
---	-----

Aphids prefer the odors of individuals infected with fungus	128
---	-----

Bayer presents information about Plenexos during the Andav 2026 Congress	132
--	-----

Alta announces Petren and Avaris at the Andav 2026 Congress	136
---	-----

Syngenta presents biological product at the Andav 2026 Congress	140
---	-----

Table of Contents

Precision technology advances among North American producers	144
Bayer creates program for purchasing soybean seeds in Rio Grande do Sul	152
BASF highlights credit and digitalization at the Andav 2026 Congress	156
Sumitomo Chemical unveils new phase of the YEN Program	168
AgriConnection expands its portfolio and focuses on credit in distribution	172
Syngenta Seeds highlights new business model at the Andav 2026 Congress	176
EPA registers Silvec's technology for managing citrus greening	181

Table of Contents

Corn loses genetic variability in a key group for productivity	186
Fendt Ideal harvests 2.599 tons of corn in 24 hours.	191
Victor S. Leal assumes commercial leadership of EuroChem Brazil	200
Trichoderma increases crop tolerance to abiotic stresses	205
Viruses and parasitoid venom alter arthropods	217
Aphid protein activates citrus defense against psyllid	228
Symbiotic virus reduces aphid survival in laboratory	232
Fungal effector causes defoliation in cotton and olive trees	241

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Irrigation and nitrogen alter the composition of cotton seeds

Study shows effects on oil and protein content and on seed productivity under drought conditions

14.08.2026 | 14:14 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Syngenta

Water availability and nitrogen fertilization alter the composition and productivity of cotton seeds. The effect depends on water conditions during the cycle. Research conducted in the United States showed higher seed and oil productivity under irrigation in drought years, while water deficit increased protein concentration.

The experiment took place in 2022 and 2023 in Georgia. Researchers evaluated rainfed and irrigated cultivation, three nitrogen doses (zero, 135, and 202 kilograms of nitrogen per hectare), and three mepiquat chloride application strategies.

In 2023, the period with the greatest water deficit, seed productivity fell by 41% in rainfed farming compared to irrigated

cultivation. Oil production decreased by 56%, from 460 to 295 kilograms per hectare. Protein concentration, on the other hand, increased from 20% in the irrigated system to 24% in the rainfed system. Total protein production did not show a significant difference between the water regimes.

Nitrogen application

Nitrogen application increased seed, oil, and protein productivity in both years. In 2023, fertilized plots produced 42% more seeds compared to the treatment without nitrogen. Under drought conditions, doses of 135 and 202 kilograms per hectare increased protein concentration to approximately 26%, compared to 21%

without fertilization. Oil content fell from 22% to 19% under these conditions.

Mepiquat chloride did not alter the composition of the seeds. In 2022, however, the regulator increased seed and oil yields in plots fertilized with nitrogen. Without nitrogen fertilization, there was no response to the product.

The results indicate an interaction between water availability and nitrogen management. Under irrigation, oil and protein contents remained more stable across nitrogen doses (doi 10.1002/csc2.70351).

[RETURN TO INDEX](#)



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UPL appoints Carlos Melo as crop manager in Brazil

Executive takes over strategy for soybeans, corn, and pasture after five years at UPL

14.08.2026 | 14:03 (UTC -3)

Cultivar Magazine



UPL has appointed Carlos Melo as the new Crop Manager for Soybeans, Corn, and Pasture in Brazil. With over 11 years of experience in the agricultural sector and

five years with the company, the executive will lead the company's strategy for these crops, focusing on commercial execution, management and implementation of portfolio priorities, and accelerating the adoption of technologies.

In his new role, Melo will also be responsible for integration with the Commercial, Marketing, Market Development, and Research areas, as well as working with strategic partners. The work also involves building strategies focused on the different crops and producing regions of the country.

Throughout his career, the executive has accumulated experience in portfolio management, market development, technology launches, and the creation of

growth strategies for the agricultural sector. His work involves connecting the needs of producers, market trends, and business objectives, focusing on value creation and sustainable growth.

Before taking on his new role, Melo worked at UPL as Insecticide Marketing Manager. He also worked at Bayer for over five years, where his last position was as a technical sales representative.

Melo, an agricultural engineer graduated from the State University of Maringá (UEM), also has training in the areas of leadership and team development, business development, sales, and results management.

[RETURN TO INDEX](#)

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Climate change threatens services provided by beneficial insects

Study points to impacts on pollinators, natural enemies, and dung beetles

14.08.2026 | 09:59 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Michelle McEwen / Unsplash

Climate change caused by human activities threatens insects responsible for pollination, biological pest control, and nutrient cycling. Warming alters species distribution, disrupts relationships between plants, herbivores, and natural enemies, and can reduce the efficiency of ecosystem services used by agriculture. These conclusions are from a collaborative study by researchers from several countries, which also highlights effects associated with habitat loss, biological invasions, and changes in land use.

Scientists analyzed impacts on pollinators, predators, parasitoids, and dung beetles. The study links climate change to physiological, behavioral, and phenological changes. These responses can disrupt

synchronization between organisms at different trophic levels. The result includes lower population persistence and loss of functions related to agricultural production.

Pest management

The risks directly impact pest management. Predators and parasitoids depend on the presence and development of hosts or prey. Each organism has its own temperature range. Increased temperatures can alter the development rate of these groups and create temporal mismatches between pests and natural enemies.

The study cites evidence of reduced foraging efficiency in small parasitoids,

less than three millimeters long, after exposure to heat stress. Heavy rainfall can also delay insect development or remove them from plants. High temperatures impair the development, reproduction, and survival of natural enemies. These effects diminish the potential for biological control.

A long-term survey conducted in East Asia recorded a 19,3% reduction in the abundance of natural enemies over eighteen years. The same study identified a loss of connectivity in food webs formed by 124 pairs of trophic interactions.

Another study found changes in egg parasitoids of the genus *Trichogramma*.

Nine of the twelve recorded species disappeared over thirty years of monitoring. Two new species appeared

during the period.

Pest pressure

Pest pressure amplifies the importance of this process for food security. Insect pests consume between 5% and 20% of the world's main grain crops, according to studies compiled by scientists. Losses caused by pests can increase between 10% and 25% for every one-degree Celsius increase in global temperature. Insects responsible for natural control account for 33% of pests controlled without direct intervention and provide a service valued at \$4,5 billion per year.

Challenges for pollinators

Pollinators face another set of changes. Warming can advance or delay plant flowering and modify insect activity periods. The lack of coincidence between these cycles reduces encounters between flowers and pollinators. Heat and drought also alter the quantity and composition of pollen and nectar.

Changes in the sensory signals of flowers can affect the ability to locate resources. Bees and other floral visitors use plant features to associate flowers with food rewards. Alterations in these features can reduce foraging efficiency and compromise plant-insect interactions.

Scientists estimate that pollinator abundance could decrease by up to 40% by 2100 due to climate change. A scenario of complete loss of these organisms could reduce global agricultural production by between 3% and 8%. Compensation would require an expansion of cultivated area. More diverse pollinator communities have a greater capacity to maintain pollination under environmental changes.

Dung beetles

Dung beetles are also at risk. These insects participate in the removal of manure, nutrient recycling, and maintenance of soil conditions, especially in livestock systems. Changes in temperature and precipitation can displace

suitable areas for these species and alter the composition of the communities.

A study cited by the researchers projects distribution changes for 21% of 37 common species of dung beetles in Western Europe. Another analysis estimated an 81% loss of the current habitat of *Phyllognathus excavatus*, with rising temperatures as the main associated factor.

Responses vary according to body size, nesting strategy, and habitat specialization. Small species, reproducing within the dung mass, may experience less impact in some scenarios. The dung acts as a thermal refuge and reduces exposure to heat. Large species appear among the most vulnerable groups in different

analyses.

Other anthropogenic factors exacerbate the climatic effects. In livestock farming, ivermectin residues present in cattle feces reduce the richness, abundance, and biomass of dung beetles. In tropical forest areas converted to extensive pastures, a reduction in the diversity and biomass of these insects has caused a 40% drop in manure removal.

Impact reduction

To reduce the impacts, researchers highlight habitat restoration, diversification of the agricultural landscape, and Integrated Pest Management. Crop rotations and more diverse arrangements

create microclimates with less temperature fluctuation and higher humidity. These conditions favor the activity of natural enemies.

Strips of flowering plants can expand resources for pollinators and natural enemies. Silvopastoral systems also offer conditions for conserving dung beetles. The integration of trees, forage crops, and animals improves soil quality, reduces erosion, and can increase manure removal compared to intensive livestock systems.

Scientists also recommend less reliance on broad-spectrum insecticides and greater use of selective products.

Programs based on economic damage thresholds reduced the number of insecticide applications by 44% and

associated costs by 40%, without loss of pest control or productivity in the studies evaluated.

Researchers advocate for greater use of species distribution models, ecological network analyses, and conjoint distribution models. These tools allow for projecting species displacements and changes in interactions. Systems based on artificial intelligence, automated sensors, biological collections, and global monitoring networks can expand the database (doi 10.1127/entomologia/3958).

[RETURN TO INDEX](#)



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Host plant influences HLB transmission by *Diaphorina citri*

Psyllids raised on myrtle and curry acquired less bacteria after migrating to citrus

14.08.2026 | 08:56 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Florida Department of Agriculture and Consumer Services - Bugwood

The plant used by *Diaphorina citri* during successive generations influences the acquisition of *Candidatus Liberibacter asiaticus* (CLas), a bacterium associated with huanglongbing (HLB). Psyllids reared on *Murraya paniculata* or *Murraya koenigii* showed lower bacterial load and lower infection rates after transfer to infected orange trees. The result indicates an effect of prolonged experience with the host on the insect's vector competence.

Researchers at the University of Florida maintained CLas-free populations on *Citrus sinensis*, *Murraya paniculata*, and *Murraya koenigii*. The *Citrus sinensis* colony had accumulated approximately 40 generations. Each of the *Murraya* populations had accumulated approximately 454 generations. Afterward,

newly emerged adults migrated to infected *Citrus sinensis* 'Valencia' plants.

Adults originating from 'Valencia' orange trees showed infection rates between 60% and 87%. Rates ranged from 34% to 77% among insects from *Murraya paniculata* and from 10% to 62% among those reared on *Murraya koenigii*. CLa acquisition in groups from non-citrus plants was about two to four times lower compared to the group maintained on orange trees.

The trend also appeared in the offspring. Psyllids originating from *Citrus sinensis* showed a higher cumulative infection rate than individuals from the two *Murraya* species.

Researchers point to the potential application of alternative plants as trap

crops or border strips. *Murraya paniculata* attracts *Diaphorina citri* and rarely presents CLas in the field. *Murraya koenigii* shows high resistance to the pathogen. The team emphasizes the need for field validation and direct studies on transmission efficiency before adopting this strategy to reduce the spread of HLB (doi 10.1127/entomologia/3910).

[RETURN TO INDEX](#)



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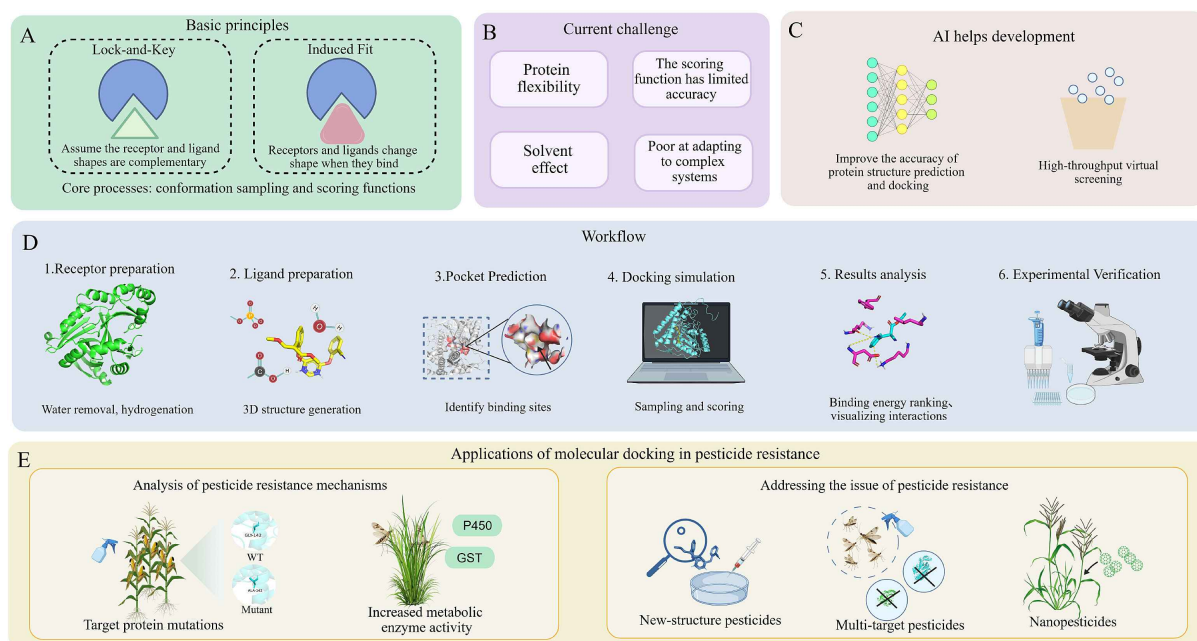
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Molecular docking expands the study of pesticide resistance

This technique helps investigate resistance mechanisms, select molecules, and guide new pesticides with the support of AI

14.08.2026 | 08:10 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.1016/j.pestbp.2026.107306

Molecular docking is gaining ground in pesticide resistance research because it allows for the computational analysis of

interactions between molecules and proteins. The technique helps investigate alterations linked to resistance and assists in the selection of new compounds. Integration with artificial intelligence expands screening and prediction capabilities. However, the results remain computational predictions and require experimental validation.

A scientific review conducted by Chinese researchers analyzed the applications, advances, and limitations of this approach. The scientists highlight two main uses in pesticide resistance: investigating the mechanisms responsible for the loss of sensitivity and supporting the development of molecules with new activity profiles.

Molecular docking

Molecular docking simulates the fitting of a ligand, generally a small molecule, into the active site of a macromolecule. The method evaluates possible conformations and estimates binding affinity. Algorithms consider molecular geometry, electrostatic interactions, hydrogen bonds, and hydrophobic interactions.

In research on resistance, one application involves mutations in target proteins. The method compares the interaction of the pesticide with wild-type proteins and with mutant versions. This comparison allows for the evaluation of changes in the binding site, the molecule's conformation, and interactions with target amino acids.

Different examples

Studies compiled in the review show different examples. In *Bemisia tabaci*, modeling and docking analyses indicated altered imidacloprid binding after mutations in the beta-1 subunit of the nicotinic acetylcholine receptor. One of the alterations modified the charge environment of the binding site and weakened the interaction with the insecticide.

In *Chilo suppressalis*, researchers compared the normal ryanodine receptor with a version containing the Y4667D mutation. The alteration eliminated an important interaction and affected a hydrogen bond in the region associated

with chlorantraniliprole. The result indicated a reduced binding capacity of the insecticide.

Metabolic resistance

The method also contributes to the study of metabolic resistance. Enzymes with higher activity can degrade or sequester a pesticide before it reaches its target.

Docking allows for the evaluation of the interaction between these enzymes and different molecules. The analysis includes conformation, residues involved, and the compound's position relative to the catalytic center.

One example involves *Spodoptera frugiperda*. Researchers evaluated the

interaction of the CYP321A9 enzyme with chlorantraniliprole and tetrachlorantraniliprole. Both molecules reached the active site and maintained a position compatible with the region near the heme cofactor. The result indicated potential for oxidative metabolism.

Another study investigated a glutathione S-transferase found in a resistant population of *Lolium rigidum*. Docking indicated an interaction of the enzyme with diclofop acid, the active metabolite of diclofop-methyl. Subsequent assays with transgenic yeast and rice confirmed the participation of this protein in herbicide resistance. This case reinforces the need to integrate computational predictions and biological experiments.

Changes to the target

In addition to diagnosing mechanisms, docking can support the search for pesticides capable of overcoming alterations in the target. Once a mutation associated with resistance has been identified, researchers can assess the available space at the modified site and select structures with the potential to maintain important interactions.

Virtual screening represents another application. Libraries with a large number of compounds undergo computational analysis before synthesis and biological testing. The process reduces the pool of candidates and focuses experiments on molecules with the greatest predicted

potential.

The approach also encompasses molecules with action on multiple targets. Compounds of this type can act on two or more proteins. Docking allows for the comparison of the interactions of the same structure with different targets. The review points to few studies with multi-target pesticides and highlights the need to evaluate the contribution of each target to the observed activity.

Artificial intelligence

Artificial intelligence expands these applications. Machine learning and deep learning models can improve scoring functions, predict binding sites, and

accelerate virtual screening. Some systems act as pre-filters for large chemical libraries. The selected compounds then proceed to classical docking methods.

In one of the cited studies, a machine learning-based model performed the pre-screening of chemical libraries before conventional docking. The strategy increased the speed of the computational screening step by a hundredfold.

Artificial intelligence also aids in predicting the three-dimensional structure of proteins. This application expands the use of docking to targets without available experimental structures. Models like AlphaFold produce structures from amino acid sequences and provide material for

subsequent molecular interaction analyses.

The review cites a study with acetolactate synthase from *Colletotrichum higginsianum*. Researchers used AlphaFold to predict the protein structure and introduced an A200D mutation. Docking revealed steric hindrance between the mutant protein and chlorimuron-ethyl. Subsequent enzymatic assays showed a 38-fold increase in the concentration required to achieve half the maximum inhibition.

Limits in technology

Despite computational advances, researchers highlight important limitations.

Accuracy depends on the quality of the protein structure, the representation of molecular flexibility, and the functions used to calculate affinity. Artificial intelligence models also depend on the quantity and diversity of training data.

Docking provides hypotheses about position, affinity, and interaction mechanism. These results do not, in isolation, demonstrate a resistance mechanism or the efficacy of a new molecule. Biochemical assays, functional studies, and other experimental methods need to confirm the predictions. The combination of these steps transforms computational results into evidence with greater support for pesticide resistance research (doi 10.1016/j.pestbp.2026.107306).

[RETURN TO INDEX](#)



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Agricultural Market - August 14, 2026

USDA raises US harvest forecast and projects strong demand for grains.

14.08.2026 | 08:09 (UTC -3)

Vlamir Brandalizze - @brandalizzeconsulting



The August report from the United States Department of Agriculture (USDA) raised its estimate for the U.S. soybean crop and

pointed to increased global demand for grains. The agency also indicated higher corn consumption, reduced global wheat stocks, and a tighter rice supply. In Brazil, soybean and corn exports remain at a high pace, while producers advance in sales and prepare for the next planting season.

In the United States, more than 95% of soybean crops have reached flowering. At the same time last year, the rate was 93%. Pod formation reached 77%, compared to 72% a year earlier. Crops classified as good to excellent total 62%.

The USDA has raised its estimate for the area planted with soybeans to 35,1 million hectares. The previous estimate was 34,5 million hectares. Conversely, productivity has decreased to approximately 3,5 tons

per hectare.

With the increase in planted area, US production rose from 121,8 million to 122,99 million tons. The increase amounts to approximately 1,2 million tons.

Global soybean production is projected to reach 442,3 million tons. Global consumption is expected to reach 443 million tons. Demand is growing by approximately 13 million tons compared to the previous cycle. This increase is helping to support prices in Chicago, according to information presented in the market commentary.

For the new season, the USDA maintained its Brazilian projection at 186 million tons. Argentina is projected at 50 million tons and Paraguay at 11,1 million tons. China

has an estimated production of 21 million tons and imports of 115 million tons. Chinese consumption reaches 136 million tons.

The commercialization of the Brazilian soybean harvest has reached 77%. The previous year's figure was 79%. The average is also 79%. Approximately 41,4 million tons remain in the hands of producers.

In the new harvest, sales reached 33%. Last year, the rate was 35%, compared to an average of 36%. The volume traded totals approximately 61,4 million tons.

Corn situation

The report painted a more favorable picture for corn. The planted area in the United States grew from 38,5 million to almost 39,1 million hectares. Productivity declined after unfavorable conditions in July.

US production rose to 406,75 million tons, compared to 406,42 million in the previous estimate. The increase represents approximately 330 tons.

Global corn production is projected at approximately 1,299 billion tons. Market commentary points to high consumption and reduced global stocks, a condition seen as supporting prices.

For the 2026/27 crop year, the USDA estimated production of 55 million tons in Argentina and 139 million tons in Brazil.

Russia is projected to produce 17,2 million tons and Ukraine 31,8 million tons.

In the European Union, the estimate fell from 53,8 million to 50,2 million tons. In the previous cycle, the bloc harvested 56,8 million tons. The information presented also reflects assessments in the European market regarding the possibility of losses exceeding those incorporated by the USDA.

In Brazil, the second corn crop harvest has reached 78%. Mato Grosso has completed its work. Paraná had just over 60% harvested. The national progress remains below that recorded last year.

Wheat situation

The USDA also reduced its estimate for the global wheat crop. Production fell from 820 million to 819,3 million tons.

Consumption increased from 826,1 million to 826,3 million tons.

Global stocks fell from around 280 million to 273 million tons. In the European Union, production dropped from 136 million to 134 million tons. In the United States, the projection decreased from 41,8 million to 41,6 million tons.

For Brazil, the estimate for the 2026/27 harvest fell from 6,7 million to 6,1 million tons. Russia maintained its production forecast at 88,5 million tons, but its export estimate was reduced from 47,5 million to 46 million tons. Ukraine's exports also suffered a cut.

Rice situation

Global rice production is also declining. After a record 545,5 million tons in the previous harvest, the projection for the new season has fallen to 537,3 million tons. Stocks are down from 198,2 million to 192,6 million tons. Global consumption exceeds 543 million tons, surpassing the volume produced.

The market is also monitoring the potential reduction in planted area in Paraguay. Estimates cited range between 150 and 180 hectares, compared to a potential of 240 hectares. Argentina and Uruguay also show indications of reduced planted area. In Rio Grande do Sul, the projections mentioned point to a decrease of between 5% and 15%.

[RETURN TO INDEX](#)

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BASF launches Xarvio Connect 2.0 in North America

The device transfers application maps and operational data between the Field Manager and compatible terminals

14.08.2026 | 07:47 (UTC -3)

Cultivar Magazine, based on information from Pace Sagester



BASF has launched the Xarvio Connect 2.0 in North America, a portable device for exchanging data between the Xarvio Field Manager and compatible agricultural machinery terminals. The solution transfers application maps, records operation data, and eliminates the need for a smartphone or tablet.

The device uses a USB connection and has an integrated SIM card.

Communication occurs through a secure mobile network, the company reports. The system keeps the data stored during periods without coverage and performs the transfer after the connection is restored.

The Xarvio Connect 2.0 accepts formats such as ISOXML and Shapefile. The technology allows the sending of maps for

fixed or variable rate operations in seeding, crop protection, and nutrition. The device is compatible with ISOBUS and CAN-bus.

According to BASF, the transfer begins after the device is connected to the machine's terminal USB port. The Xarvio Field Manager maps reach the equipment within minutes.

The solution also records information generated during operations. Among the data collected are harvest, moisture levels, and application rates. Field Manager allows the use of this information to estimate input costs, productivity, and revenue in near real-time.

BASF tested the equipment in North America during the 2024 and 2025

growing seasons. The trials involved planters, sprayers, and fertilizer spreaders from different manufacturers. According to the company, the device also operated on machines that were more than ten years old.

[RETURN TO INDEX](#)

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Saiba mais!



Wheat promotes the initial development of peas in intercropping

Study points to positive interaction with wheat and negative effect from barley and oats

14.08.2026 | 06:43 (UTC -3)

Cultivar Magazine



Photo: Wenderson Araujo / CNA

Winter wheat (*Triticum aestivum*) and durum wheat (*Triticum durum*) favored the initial development of peas (*Pisum sativum*) in intercropping. Barley and oats produced the opposite effect. Researchers observed increasing differences between intercropping and monocultures as the plants progressed. The results suggest the possible involvement of allelopathic effects.

The study evaluated six winter cereals in association with peas. Researchers conducted germination tests in the laboratory, pot trials, and a field experiment in Hungary. The species evaluated included wheat, durum wheat, einkorn, triticale, barley, and oats.

In germination, the treatments showed differences of only 1% to 3% for germination percentage, vigor, and seedling health. Other parameters showed specific responses. Pea reduced the root length of triticale on the eighth day and decreased the dry mass of oat roots. Durum wheat showed a significant increase in root length in association with the legume.

Differences intensified

The differences intensified in subsequent stages. After six weeks in pots, wheat and durum wheat increased the dry mass of pea roots. In the field, both crops favored the development of the legume in autumn and early spring. In the spring evaluation,

both increased the shoot length of the pea.

Oats showed the most unfavorable response to the legume. The association reduced the dry mass of the pea shoot in the field. Barley also limited initial growth parameters.

Researchers identified mutually favorable interactions in wheat-pea and durum wheat-pea combinations during the initial stages. The work indicates the importance of species compatibility in defining cereal-legume intercropping systems (doi 10.3390/seeds5040048).

[RETURN TO INDEX](#)

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Distribution of agricultural inputs is projected to generate R\$ 171 billion in revenue in 2025

The sector accounts for 47% of the inputs that reach Brazilian producers, according to research by Andav and Cepea

13.08.2026 | 17:00 (UTC -3)

Noemi Oliveira



The distribution of agricultural inputs plays a significant role in the Brazilian agricultural chain, reaffirming its fundamental importance to the country's economy. According to the 11th National Distribution Survey, conducted by the National Association of Agricultural and Veterinary Input Distributors (Andav) in partnership with the Center for Advanced Studies in Applied Economics (Cepea-Esalq/USP), the segment reached a revenue of R\$ 171 billion in 2025, with R\$ 105 billion from inputs, R\$ 43 billion from grain sales, and R\$ 23 billion from machinery, services, and other related activities. This information was released on Thursday, August 13th, during the final day of the Andav 2026 Congress, which began on August 11th, an event organized by

Andav and Zest Eventos.

Thiago Bernardino, technical coordinator of Cepea-Esalq/USP, emphasized during the presentation of the research methodology that the work involves the contribution of various professionals, which demonstrates the importance and value of the survey conducted by Andav for the sector.

Another important piece of data indicates that soybeans remained the main crop served by distributors, representing 43% of the sector's activity, followed by corn, with 20%. Among the input segments, chemical pesticides led with a 43% share, followed by soil fertilizers (17%) and seeds (16%).

The sector's solidity is reflected in the longevity of its operations, given that 82%

of companies have accumulated more than 11 years of experience in the market, building a base of indispensable expertise to mitigate the risks inherent in the volatility of agribusiness.

The research also showed a 3,5% growth in the number of stores compared to January 2025. Looking ahead, the outlook is one of strategic, yet cautious, optimism: 32% of agricultural input distribution companies plan to open new units by 2028.

During the presentation of the research, Paulo Tiburcio, CEO of Andav, highlighted that distributors are responsible for 47% of all inputs that reach Brazilian producers. This number demonstrates the strength and importance of the sector.

The next edition of the Andav Congress will be held between August 03rd and 05th, 2027.

[RETURN TO INDEX](#)

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Area treated with pesticides will grow by 5% in Brazil in 2026

Survey indicates a 4,5% increase in the volume applied and an expansion of 59 million hectares

13.08.2026 | 15:53 (UTC -3)

Wellington Torres



The potential area treated (PAT) with pesticides in Brazilian crops grew by 5% in the first half of 2026 compared to the same period of the previous year, representing

an increase of 59 million hectares protected, totaling 1,2 billion hectares in the first six months of the year. The total volume of products used also increased by 4,5%, according to a survey by Kynetec Brasil commissioned by the National Union of the Plant Protection Products Industry (Sindiveg).

The high pest pressure during this period spurred the adoption of crop protection technologies to preserve the productive potential of crops. Management against caterpillars, stink bugs, and especially whiteflies in soybean crops, for example, showed significant expansion, favored by climatic conditions and the challenges characteristic of the end of the crop cycle.

It is worth noting that the treatments in the first half of the year reflect the final management practices of the 25/26 summer crop, as well as the planting and development of second-crop plantings, focusing on cotton and second-crop corn.

The methodology used in the research considers the PAT metric, which takes into account the number of applications and the number of products used. Therefore, in addition to the cultivated area, the analysis reflects the adoption and intensity of use of technologies, allowing for a more accurate understanding of the situation.

Semester Highlights

In the first six months of the year, corn represented 35% of the treated area, followed by soybeans (29%), cotton (14%), pasture (6%), sugarcane (4%), fruits and vegetables (2%), beans (2%), citrus (2%), rice (2%), wheat (2%) and others (3%).

In this scenario, the producer based their choices on the pursuit of efficiency and preventive sanitary control, considering the cost-benefit ratio of technologies and migrating to high-performance solutions to guarantee productivity. Therefore, and based on the analysis of the total volume applied, herbicides represented 41% of consumption, followed by insecticides (29%) and fungicides (22%). Regarding the distribution by treated area, insecticides account for 35% of the coverage, ahead of herbicides (19%) and

fungicides (17%). The seed treatment segment accounted for 6% of the protected area, while others (adjuvants and growth regulators) represented the remaining 23%.

Regarding the regional breakdown, also in terms of treated area, Mato Grosso and Rondônia accounted for 35% of the consumption of crop protection products, São Paulo and Minas Gerais 18%, and the Bamatopiba region followed with 15%.

[RETURN TO INDEX](#)

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Fabio Torretta assumes the vice-presidency of HELM in Brazil

Executive to lead Crop Solutions area after a career in companies in the agricultural sector

13.08.2026 | 14:21 (UTC -3)

Cultivar Magazine



Fabio Torretta has assumed the position of Vice President of Crop Solutions Brazil at

HELM Brazil. The company announced the change today.

Torretta has extensive experience in leadership positions in agribusiness. Among his previous roles, he served as CEO of Arysta LifeScience and UPL in Brazil. More recently, he was a member of the Board of Directors of Vittia. His career includes activities related to leadership, business development, and team building.

The arrival occurs during a transition process in the Brazilian operation.

Sebastian Lüth will remain with the company during this period. Afterwards, the executive will assume a new strategic position at the HELM Group in Tampa, United States.

According to HELM, the change aims to combine continuity in management with new perspectives for operations. The company cites sustainable growth, operational excellence, and close relationships with customers, partners, and employees as key objectives.



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[RETURN TO INDEX](#)



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Bayer announces new leader for Belford Roxo plant

Gustavo Trindade takes over the plant protection unit with a focus on productivity, efficiency, and innovation

13.08.2026 | 14:06 (UTC -3)

Cultivar Magazine



Bayer has announced Gustavo Trindade as the new leader of its industrial plant in

Belford Roxo, Rio de Janeiro. The executive succeeds Federico Bergallo, who is now responsible for strategic Crop Protection projects in Argentina. The Rio de Janeiro unit manufactures phytosanitary products for the Crop Science agricultural division and generates two thousand jobs per year.

Trindade takes over the industrial complex with the mission of increasing productivity and efficiency. Management foresees advancements in the use of artificial intelligence, automation, and advanced data analysis in operations.

Production engineer Trindade joined Monsanto in 2015. Since then, he has worked in the areas of manufacturing, quality, customer service, purchasing, and

operational excellence. Most recently, he held the leadership of Innovation in Product Supply for Latin America.

In this role, he led initiatives related to the company's innovation portfolio. Bayer maintains more than 160 projects focused on the productive sector. Some of these initiatives involve startups and universities. Recent actions include the company's partnership with the Technological Park of the Federal University of Rio de Janeiro.

According to Trindade, the application of new technologies should prioritize results in processes and responses to the challenges of agriculture. The executive also advocates for a greater connection between ideas developed within the company and customer demands.

The Belford Roxo plant operates using energy from 100% renewable sources. The complex also has a Water Treatment Plant, installed in 2008. The structure supports the collection and use of water resources. Bayer has also modernized the storage infrastructure to reduce losses and rationalize water consumption in the production process.

[RETURN TO INDEX](#)

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HELM Crop Solutions reinforces its expansion in Brazil with the launch of ULTRON®.

Expansion of the portfolio of bio-inputs and herbicides was presented during the Andav 2026 Congress.

13.08.2026 | 09:57 (UTC -3)



Fabio Torretta, Vice President of Crop Solutions Brazil at HELM

At the Andav 2026 Congress, HELM Crop Solutions presented new products that reinforce its strategy of expanding and strengthening its presence in the Brazilian crop protection market. Key highlights included the launch of the fungicide ULTRON®, the expansion of its biological platform with the arrival of PROTECTIN®, and the strengthening of its herbicide portfolio, which will receive a further boost in 2027. This information was released by Fabio Torretta, Vice President of Crop Solutions Brazil at the company.

The company's main launch was ULTRON®, a fenpropimorph-based fungicide that is now part of HELM's portfolio for managing diseases in soybeans, wheat, barley, and bananas. This new product expands the company's

offering in a strategic segment for Brazilian agribusiness and reinforces its commitment to providing technologies that contribute to greater productivity and sustainability in the field.

In the bio-inputs segment, HELM announced the incorporation of PROTECTIN®, a microbiological fungicide formulated with... *Bacillus*

amyloliquefaciens The product is now part of the Plant Advantage® HELM platform, which brings together biological technologies developed to promote productivity, sustainability, and integrated crop management. The line already includes the microbiological fungicide THEA®, the microbiological nematicide NEMESIS®, and the bioinsecticide BANTON®, forming a complete portfolio

for different phytosanitary challenges. With the expansion of this platform, the company strengthens its commitment to offering integrated management programs, combining biological and chemical solutions to meet the diverse needs of production systems.

The Andav Congress also served as a platform to highlight the evolution of HELM's herbicide line. Currently, the portfolio includes solutions for different crops and management strategies, including the pre-emergent herbicides ALLUS® and HELVA®, as well as Ancosar® 720, an important ally in controlling goosefoot (*Eleusine indica*) in post-emergence applications in soybean, sugarcane, cotton, and citrus crops. These solutions reinforce the company's position

in one of the most important markets for Brazilian agriculture.

The company also previewed one of the main new products planned for the next harvest: the launch of BREAKDOWN®, a pre-emergent herbicide for soybeans and sugarcane that combines sulfentrazone and flumioxazin. The solution was developed to expand management options and contribute to more efficient strategies for controlling difficult-to-manage weeds. With this innovation, HELM expands its offering of solutions for pre-emergent management, contributing to more robust programs for controlling and preventing weed resistance.

With a global history spanning 125 years and over five decades of operation in Brazil, HELM continues to expand its

presence in key agricultural segments. The combination of chemical pesticides and bio-inputs in an increasingly comprehensive portfolio reinforces the company's strategy of supporting distributors, consultants, and farmers with innovative solutions aligned with the challenges of modern agriculture.



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[RETURN TO INDEX](#)

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Modified fungus enhances control of gray mold in tomatoes

Beauveria bassiana produces interfering RNA and reduces *Botrytis cinerea* infection

13.08.2026 | 09:51 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Gerald Holmes / Strawberry Center - Cal Poly San Luis Obispo, Bugwood

Researchers at Qingdao Agricultural University have developed a modified strain of *Beauveria bassiana* capable of producing double-stranded RNA against *Botrytis cinerea*, the causal agent of gray mold. This strategy reduced the disease in tomatoes and showed similar performance to the fungicide boscalid in potted and greenhouse trials.

The team used the QSE-F1 strain of *Beauveria bassiana*, isolated from tomato and capable of colonizing leaves after spraying. The fungus received a genetic construct to produce double-stranded RNA targeting the BcMucin gene, associated with the growth and pathogenicity of *Botrytis cinerea*.

Exclusion of BcMucin reduced mycelial growth and eliminated visible symptoms in detached leaves. External application of the specific double-stranded RNA reduced gene expression by more than 85% and decreased lesion area by approximately 65%.

RNA release

The modified strain, named Bb-dsMucin, released RNA via extracellular vesicles. The fermented broth reduced the germination of the pathogen's conidia. At a concentration of 50%, the rate was below 1%. In detached leaves, the treatment reduced lesions by approximately 95%.

The researchers obtained the best results with the complete fermented broth, composed of conidia and metabolites. Fermentation over four days combined greater antifungal activity and the production of approximately 32 million colony-forming units per milliliter.

In tomato plants, protection lasted for seven days after application. Even on the fifth and seventh day, the treatment maintained disease suppression between 75% and 85%. In a greenhouse, two applications, 14 days apart, provided control comparable to that obtained with boscalid at 10 milligrams per liter (doi 10.1093/hr/uhag348).

[RETURN TO INDEX](#)

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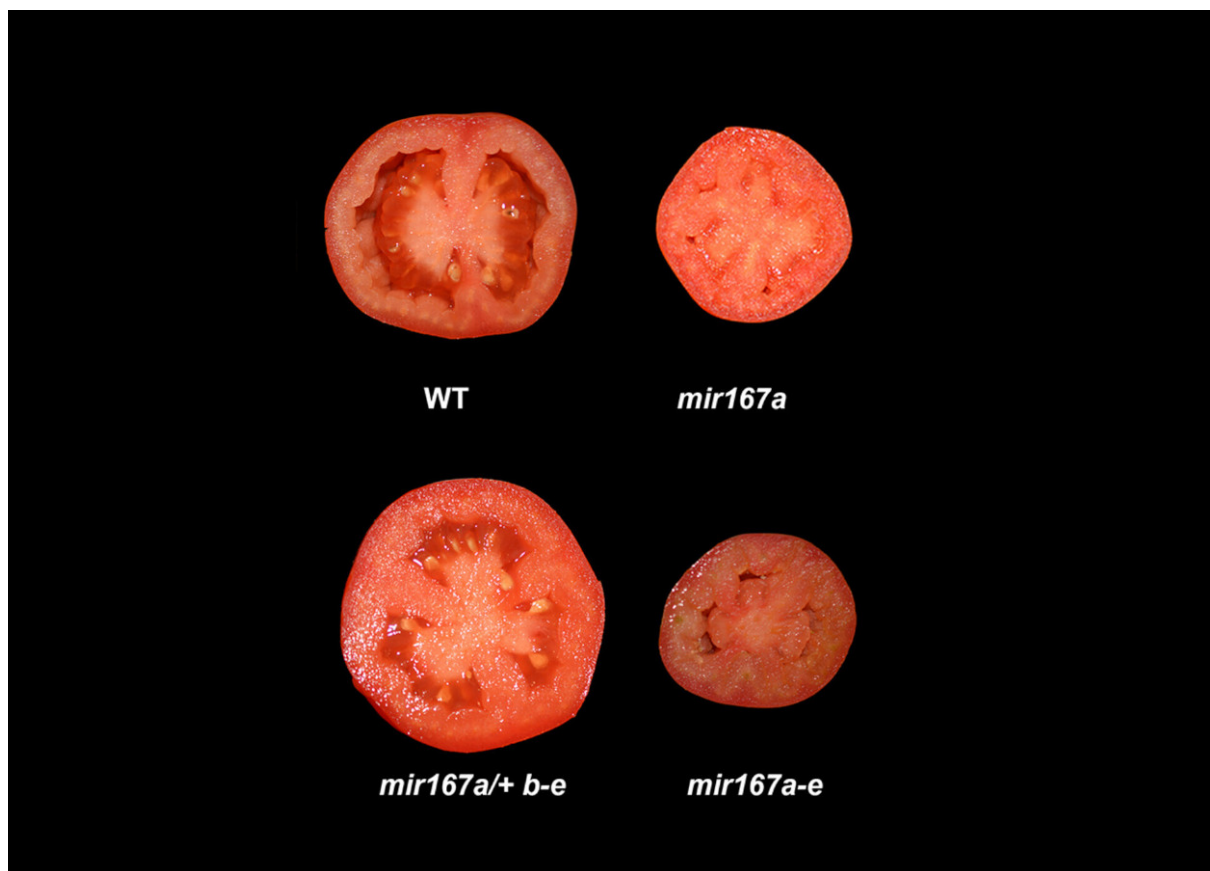


Genetic combination enhances tomato fruit set under cold conditions

A combined mutation brought forward fruit set without fertilization and increased the production of red fruits under low temperatures

13.08.2026 | 09:05 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.1111/nph.71503

Researchers have identified a central role for the SlmiR167-SlARF8 module in tomato floral development and fruit set. The system regulates stigma position, anther opening, and the onset of fruit development. A combination of mutations in SIMIR167a and SlARF8B also promoted early fruit set independent of fertilization, with increased yield under cold conditions. The study evaluated mutants in five genes: SIMIR167a and the genes SlARF8A and SlARF8B. The results indicated SIMIR167a as the main component of the family in reproductive development. Plants with a mutation in this gene showed exerted stigma, failure of anther dehiscence, and a significant delay in fruiting.

The failure to open the anthers involved an absence of detectable lignification in the endothecium and partial preservation of the septum and connective tissue. The alteration occurred mainly due to the dysregulation of *SlARF8B*. Manual pollination recovered some of the fruit formation, indicating deficient dehiscence as an important cause of the delay.

Another pattern

The combination *Slarf8b Slmir167a* produced another pattern. More than 70% of the emasculated flowers formed parthenocarpic fruits. The fruits grew and ripened rapidly and reached a final size close to the wild type.

In cultivation without temperature control during the winter in Israel, the plants faced nights close to 10 degrees Celsius. At 93 days after sowing, Slarf8b Slmir167a showed more than 18 times the number of fruits observed in the wild type. In the final evaluation, at 149 days, the genotype produced six times more red fruits and ten times greater red fruit mass.

The researchers concluded that the duplication of SLARF8 allowed for partially distinct functions in the two genes. This specialization broadens the adjustment of auxin signaling during reproductive development and points to new targets for studies on fruit set stability in tomato (doi 10.1111/nph.71503).

[RETURN TO INDEX](#)

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Brazil's Supreme Court upholds the Soy Moratorium and ends lawsuits regarding the agreement

The court also upholds laws in Mato Grosso and Rondônia that restrict incentives for companies that adhere to environmental agreements

13.08.2026 | 08:57 (UTC -3)

Cezar Camilo, Cultivar Magazine edition



Photo: Antonio Augusto

The Plenary of the Supreme Federal Court (STF) recognized, by majority vote, the constitutionality of the Soy Moratorium and ordered the dismissal of judicial and administrative proceedings questioning the legality of the agreement that restricts the purchase of soy produced in deforested areas of the Amazon. The decision was made this Wednesday (August 12), during the joint trial of Direct Actions of Unconstitutionality (ADIs) 7774 and 7775.

The Court also deemed constitutional the laws of Mato Grosso and Rondônia that restrict the granting of tax benefits and other public incentives to companies that participate in agreements with environmental rules that are more stringent than those stipulated in the legislation.

Soy Moratorium

Created in 2006, the Soy Moratorium is a voluntary agreement signed by companies in the sector that commit to not purchasing soy produced in areas of the Amazon biome deforested after July 2008. The objective is to decouple soybean production from deforestation in the region.

In ADI 7774, reported by Minister Flávio Dino, political parties challenged Law 12.709/2024 of Mato Grosso. This law prevents the granting of tax incentives and public land to companies participating in agreements aimed at restricting agricultural expansion in areas not protected by environmental legislation.

Meanwhile, ADI 7775, reported by Minister Dias Toffoli, deals with a similar rule provided for in Law 5.837/2024 of Rondônia.

The parties argued that the state regulations would harm companies that voluntarily adopt stricter environmental standards than those required by law, by removing incentives for participants in agreements such as the Soy Moratorium.

Free Initiative

In the ruling, Minister Flávio Dino's understanding prevailed that the Soy Moratorium is compatible with the Federal Constitution.

According to Dino, companies can establish stricter environmental criteria for selecting their suppliers, without the government being obliged to adopt the same parameters when granting incentives. For the minister, the moratorium results from the exercise of private autonomy and free enterprise combined with environmental protection.

Dino also highlighted that the decision seeks to increase legal certainty for the sector and prevent the continuation of processes that could generate liabilities in the billions, with impacts on credit, investments, and exports.

Minister Dias Toffoli dissented regarding the validity of the Soy Moratorium and the dismissal of lawsuits related to the

agreement. In his assessment, the Direct Actions of Unconstitutionality (ADIs) should be limited to the analysis of state laws, while any anti-competitive practices should be examined by the Administrative Council for Economic Defense (Cade). On this point, Toffoli was joined by Ministers André Mendonça and Luiz Fux.

State laws

By majority vote, the Supreme Federal Court (STF) upheld the validity of the laws of Mato Grosso and Rondônia that establish conditions for granting tax benefits and public land.

The plenary session, however, established limits for the withdrawal or reduction of tax

benefits. Unanimously, the ministers determined that any changes can only take effect after the tax deadlines stipulated in the Constitution have been met. As a rule, this means application in the following fiscal year and/or after 90 days, as the case may be.

The Court also preserved exemptions granted under conditions already agreed to by the taxpayer, as established by Precedent 544 of the Supreme Federal Court (STF). The adjustment was proposed by Toffoli and incorporated by Dino into the winning vote.

Environmental standards

The president of the Supreme Federal Court (STF), Justice Edson Fachin, deemed the state laws entirely unconstitutional, arguing that they harm companies that adopt higher standards of environmental protection.

Fachin, however, agreed with Dino regarding the compatibility of the Soy Moratorium with the Constitution and the dismissal of lawsuits related to the agreement.

The trial of the two ADIs began in March of this year. After the oral arguments, the controversy was referred to the Supreme Court's Center for Consensual Conflict Resolution (Nusol), but the attempt at conciliation ended without an agreement.

Famato expresses concern about the decision.

The Federation of Agriculture and Livestock of Mato Grosso (Famato) received part of the Supreme Court's decision with respect, but also with concern. The organization considers the preservation of states' autonomy to establish criteria for granting tax incentives to be positive, but questions the recognition of the validity of the Soy Moratorium and, especially, the dismissal of the proceedings discussing the agreement, including the procedure underway at the Administrative Council for Economic Defense (Cade).

According to Famato, any potential impacts of the Moratorium on free enterprise and free competition should be technically analyzed by Cade (Brazil's antitrust authority). The organization states that it will continue to monitor the issue and defend the right of producers who comply with the legislation to have legal security and be able to produce and market their products without additional restrictions imposed by private mechanisms. According to the Federation, in the Amazon biome, producers are subject to the requirement to preserve up to 80% of their rural properties, and compliance with the legislation must ensure equal treatment for the sector.

[RETURN TO INDEX](#)

Synthetic volatiles increase parasitism by *Bracon brevicornis*

A mixture of three compounds attracted parasitoids up to five meters away and increased parasitism in corn

12.08.2026 | 15:18 (UTC -3)

Schubert Peter, Cultivar Magazine



Synthetic volatiles induced by herbivory increased the attraction and parasitism promoted by *Bracon brevicornis*.

Researchers identified three compounds emitted by corn that elicited the greatest response from the parasitoid wasp. The combination showed superior performance compared to the isolated components.

The compounds evaluated included (3E,7E)-4,8,12-trimethyltrideca-1,3,7,11-tetraene (TMTT), (E)-4,8-dimethyl-1,3,7-nonatriene (DMNT), and geranyl acetate (GA). Olfactometer tests indicated a greater attraction of *Bracon brevicornis* to these substances.

The ternary mixture in a 1:1:2 ratio of TMTT, DMNT, and GA produced the greatest attraction. The minimum effective

concentration of 0,2 nanograms per microliter attracted parasitoids from a distance of five meters.

Extended release

The researchers also tested sustained-release formulations. Kaolinite maintained its attraction for 15 hours. Alginate spheres prolonged the effect for 21 hours.

Mesoporous silica MCM-41 extended the period to 54 hours.

In a laboratory study using cages, corn plants supplemented with the synthetic mixture showed greater parasitism of *Corcyra cephalonica* larvae by *Bracon brevicornis* compared to control plants.

The results indicate the potential of synthetic volatiles for integrated pest management programs, focusing on increasing the efficiency of biological control by parasitoids (doi 10.1002/ps.71191).

[RETURN TO INDEX](#)

Bees learn scents associated with the queen

Worker bees recognized a scent learned in the colony and altered their egg-laying patterns in the presence of brood

12.08.2026 | 14:59 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Imvenkat M on Unsplash

Worker bees of *Bombus terrestris* are able to learn an odor associated with the queen and use this stimulus as a social cue. This learning has modified the bees' attraction to the scent and influenced egg laying in the presence of brood.

Researchers from Pennsylvania State University and Tel Aviv University evaluated eight colonies. The queens received one milligram of anisyl alcohol or methyl anthranilate daily. Both compounds have floral aromas and had not been identified in samples of *Bombus terrestris*.

After the colonies developed, the worker bees underwent tests to choose between the scent associated with the queen and an alternative scent. In all the trials, 74% chose the known scent and 26% opted for

the alternative. The worker bees were three times more likely to choose the learned scent.

Reproduction of worker ants

The researchers also evaluated the reproduction of the worker bees after the queen was removed. Without offspring, exposure to the known odor did not alter the number of eggs. All three treatments produced an average of 12 eggs in seven days.

The response changed in the presence of brood. Worker bees exposed to the learned odor laid more eggs compared to those exposed to the alternative scent.

The quantity and developmental stage of the brood also influenced egg laying.

Young brood reduced the number of eggs produced by the worker bees.

The result contradicted the initial hypothesis. Scientists expected a reduction in egg laying if the learned odor acted as a chemical representation of the queen's presence. The mechanism remains undefined. The aroma may have acquired an association with the queen or with the nest environment.

According to the study, the data indicate greater flexibility in the chemical communication of social insects. The experiment can modify responses to signals linked to the social and reproductive context (doi 10.1038/s42003-026-10634-w).

[RETURN TO INDEX](#)

Aphids prefer the odors of individuals infected with fungus

Study indicates response of *Myzus persicae* to signals linked to *Beauveria bassiana* infection

12.08.2026 | 14:45 (UTC -3)

Cultivar Magazine



Photo: Jim Baker / North Carolina State University - Bugwood

The aphid *Myzus persicae* showed a preference for the odors of individuals of the same species infected with the entomopathogenic fungus *Beauveria bassiana* in a study conducted in the United Kingdom. The insect did not show a significant response to the odor of the fungus cultivated in isolation on agar. The results indicate an influence of the infection process on chemical communication between aphids.

Researchers at Harper Adams University evaluated adult wingless aphids using a four-arm olfactometer. An initial trial compared agar colonized by *Beauveria bassiana*, sterile agar, and two controls with filtered air. Twenty aphids participated in the test. The analysis found no significant difference between the

treatments.

The second trial evaluated the odors of infected aphids, healthy aphids, agar, and filtered air. The scientists performed 70 repetitions. Each test lasted 15 minutes.

Results of the study

Aphids remained, on average, 397,5 seconds in the region associated with infected individuals. This period corresponded to 47,1% of the time recorded on the arms of the equipment. The odor of healthy aphids accounted for 21,2% of the time. The agar and air controls received 15,4% and 16,3%, respectively. The differences between infected individuals and the other

treatments showed statistical significance.

According to scientists, the response depends on the context of exposure.

Infection can modify the profile of volatile compounds through the action of the fungus and through alterations in the metabolism or chemistry of the host.

Researchers consider a possible increase in contact between susceptible individuals and infectious propagules. This process could affect the horizontal transmission of the entomopathogen (doi 10.1111/afe.70078).

[RETURN TO INDEX](#)

Bayer presents information about Plenexos during the Andav 2026 Congress

The platform initially focuses on whitefly and is envisioned for use in different crops and target groups

12.08.2026 | 14:27 (UTC -3)

Cultivar Magazine



Bayer, during the Andav 2026 Congress, is presenting information about the Plenexos platform, developed for the management of sucking pests. The solution contains the active ingredient pidoxamate. It initially focuses on whiteflies and includes products intended for different crops. According to Erick Cancian (pictured), the company's insecticide leader, the technology aims to reduce the pest population by controlling it at the nymph stage. The product is in the final registration phase in Brazil.

Cancian explains that whitefly pressure has gained importance in recent harvests. High temperatures and dry spells favor shorter pest cycles and increase the number of individuals in the crops. According to him, the initial stages account

for the largest share of damage caused by the insect. The platform acts on all nymph stages, aiming to interrupt population growth.

Bayer also highlights the selectivity towards natural enemies. This attribute allows the tool to be integrated into integrated pest management programs and strategies with biological control. The company also reports systemic action in different parts of the plant and flexibility of use in management.

The portfolio includes applications in soybeans, cotton, citrus, tomatoes, potatoes, and beans. Targets include whiteflies, aphids, and citrus psyllid. In soybeans and beans, the indicated focus is on whiteflies. In cotton, the product covers whiteflies and aphids. In citrus, the

indication involves psyllid. Tomatoes and potatoes include combinations of whiteflies and aphids.

According to Cancian, different formulations of the platform could reach approximately 50 crops. He also highlighted the formulation's compatibility with mixtures and the proposal to combine control efficiency with the preservation of beneficial organisms.



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[RETURN TO INDEX](#)

Alta announces Petren and Avaris at the Andav 2026 Congress

Products expand the company's portfolio for weed and disease control.

12.08.2026 | 11:09 (UTC -3)

Cultivar Magazine



Alta will be showcasing products from its portfolio during the Andav 2026 Congress,

highlighting the new releases of Petren and Avaris. Petren is suitable for peanut, sugarcane, and soybean crops. Avaris is used for soybean disease management.

According to Daniel D'Andrea, CEO of Alta, the registration of Petren for peanuts represents one of the product's distinguishing features: "it is a crop that is becoming very important in some regions."

Petren contains diclosulam. It is a selective herbicide from the acetolactate synthase inhibitor group. It controls weeds in pre-emergence and is registered for use on peanuts, sugarcane, and soybeans.

For peanuts, the recommendation calls for a plant-and-apply application method.

Target weeds include morning glory, black jack, and fleabane. Doses vary from 20 to

60 grams of commercial product per hectare, depending on the species. For sugarcane, the label covers both plant cane and wet ratoon cane.

Another product launch, Avaris, combines picoxystrobin and prothioconazole. This systemic fungicide is indicated for preventive foliar application in soybeans against Asian soybean rust, septoria leaf spot, and leaf blight.

D'Andrea stated that the company is seeking to put together a management package for soybeans. He also mentioned Calitá, based on chlorothalonil, products with tebuconazole; and Evos, a mixture of flutriafol and azoxystrobin. According to the executive, the strategy aims to offer tools with different profiles for managing the main diseases of the crop.



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[RETURN TO INDEX](#)

Syngenta presents biological product at the Andav 2026 Congress

Avakitt Neo uses mycorrhizal fungi and, in tests in Brazil, indicated an average gain of up to 15% in productivity

12.08.2026 | 10:59 (UTC -3)

Cultivar Magazine



Syngenta is presenting Avakitt Neo at the Andav 2026 Congress, held from August 11-13 in São Paulo. The new biological product uses mycorrhizal fungi and aims to increase the efficiency of water and nutrient use in soybeans, corn, cotton, and sugarcane.

The formulation is intended for application in the planting furrow. The fungi establish a symbiotic relationship with the roots and form hyphae. These structures expand the area of ??soil exploration. The process favors the uptake of water, phosphorus, and nitrogen. The solution also contributes to soil structure and health.

Field tests conducted in Brazil indicated an average productivity gain of up to 15%, according to the company. Specific

evaluations recorded results exceeding five sacks of soybeans per hectare. The product inaugurates a new area for the company focused on nutritional and water efficiency.

Syngenta also offers chemical technologies for managing pests, diseases, and nematodes. The Olinazolin Technology platform, from IRAC Group 30, includes Frondeo, for sugarcane borer, with residual control for up to 90 days. Verdavis is used to manage stink bugs and caterpillars in soybeans and corn. Invencis combines Plinazolin and chlorfenapyr for pest control in cotton.

In root protection, Victrato, based on the Tymirium Technology platform, combines nematicidal and fungicidal action in

soybeans, corn, and cotton. Vaniva focuses on sugarcane, coffee, and fruits and vegetables.

At the congress, the company also reinforces the "Botina no Campo" (Boots in the Field) movement, aimed at working together with distributors to provide technical assistance to producers.

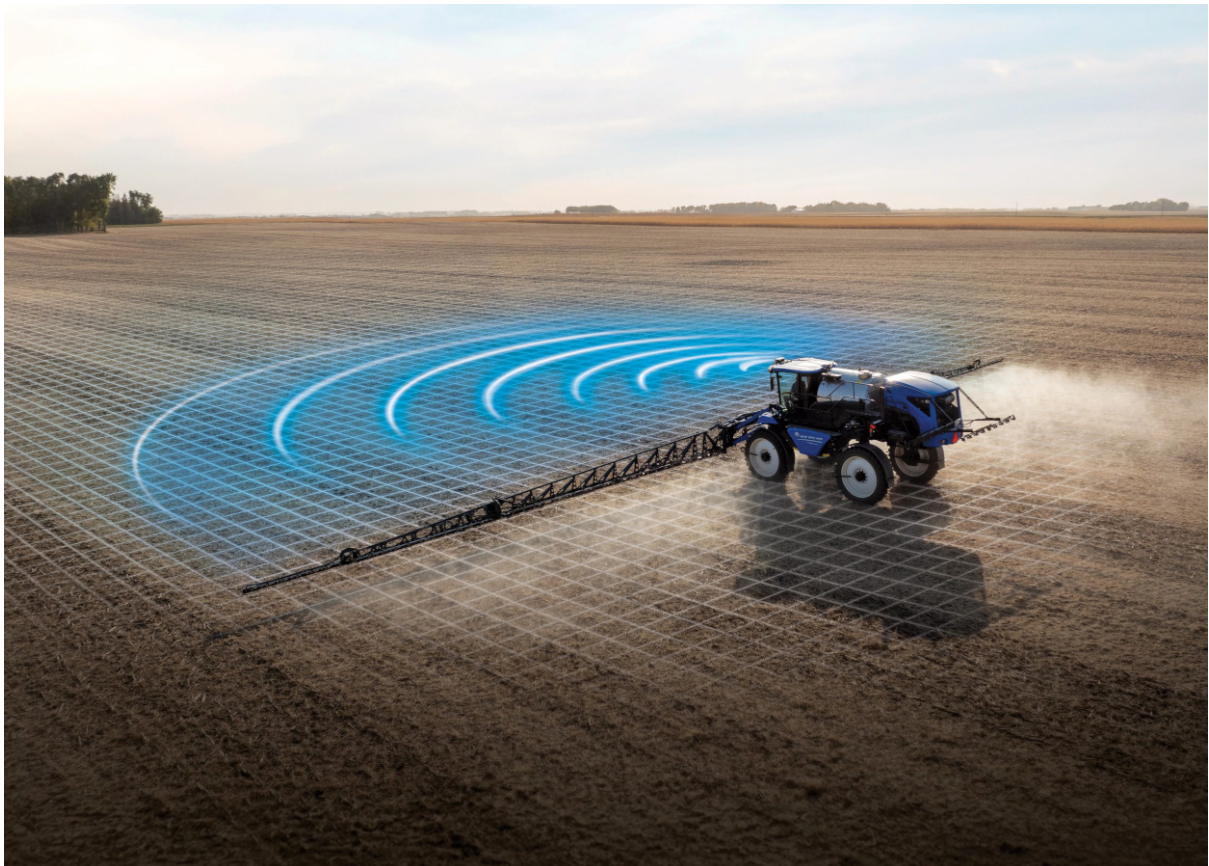
[RETURN TO INDEX](#)

Precision technology advances among North American producers

CNH survey indicates widespread use of autopilot and intentions for new investments in the next two years

12.08.2026 | 10:51 (UTC -3)

Cultivar Magazine



Precision agriculture is gaining ground in agricultural operations in North America. A CNH survey of 217 farmers and ranchers in the United States and Canada indicates that 89% of participants use automated guidance systems. Furthermore, 71% consider precision technologies important or very important to the success of their operations. More than half, 54%, intend to increase their investments in this area over the next two years.

This survey is part of the first edition of CNH Farmer Pulse, dedicated to the adoption of agricultural technologies. The research took place between May 14 and 31, 2026. Participants are part of the CNH Farmer Feedback research panel and are involved in decision-making or exert

influence over decisions on farms. Of the total, 82% operate in the United States and 18% in Canada.

Guidance systems

Guidance systems are the most widespread technology among respondents. This group includes GPS guidance, automatic steering, and mapping. Another 54% use precision application systems, capable of adjusting fertilizer or spray applications. The same proportion uses telemetry and connected agricultural management platforms for collecting, monitoring, and sharing data from machinery and production areas. AI-assisted automation systems appear in 14% of the properties surveyed.

The perception of value accompanies the expansion of these tools. Among all participants, 62% rate the precision technology used as moderately or extremely valuable. The proportion reaches 70% among commercial crop producers and 82% among users with the highest level of technology adoption. In the group classified by the research as most technologically advanced, 95% consider these solutions important or extremely important for their operation.

Cost of inputs

Reducing input costs is the leading reason for adopting or evaluating precision technologies, cited by 74% of participants. Time savings and increased labor

efficiency followed, with 70%. Increased crop productivity received 59% of responses. Fuel conservation reached 56%, while improved operational data collection reached 49%.

Investment intentions remain strong. Approximately 15% of respondents expect to invest additional resources in precision technology in less than a year. Another 38% project new investments within one to two years. Combined, these groups account for the 54% who plan to expand the use of these solutions within a period of up to two years. Another 25% indicated a timeframe of three to five years.

The incorporation of features directly into the machines also appears in the producers' preferences. Among the 85% of

participants interested in some future investment in precision technology, 43% expect to make their next purchase through new equipment with technological features incorporated from the factory. According to the survey, this demand favors integrated systems, with simplified configuration and greater reliability of operational data.

Main obstacle

Cost remains the main obstacle to wider adoption, cited by 56% of participants.

Uncertainty about return on investment was mentioned by 36%. The need for additional training reached 21%.

Connectivity issues represent a barrier for 13%, while difficulties related to ease of

use appeared in 11% of responses.

According to Eric Shuman, head of global precision technology product management at CNH, the next stage for the sector will depend on solutions that are simpler to operate, more reliable, and capable of demonstrating economic return. He believes the challenge involves reducing adoption barriers and enabling greater use of tools for productivity, cost reduction, and profitability.

The results also indicate a shift in the role of precision agriculture within the surveyed farms. Tools previously associated with early adoption groups have become integrated into routine activities, particularly in guidance systems. At the same time, the producers consulted link new investments to measurable economic

results, operational reliability, training, and integration between technology and machinery.

[RETURN TO INDEX](#)

Bayer creates program for purchasing soybean seeds in Rio Grande do Sul

The campaign offers a bonus of R\$ 40 per bag of certified seeds in the 2026/27 harvest

11.08.2026 | 16:48 (UTC -3)

Ana Livia Lopes, Cultivar Magazine edition



Bayer has just launched a new program exclusively for soybean farmers in Rio

Grande do Sul who are choosing and buying certified seeds for the 2026/27 crop season. This is the “Semente Certa” campaign, which offers a bonus of R\$ 40 per 200-seed bag purchased — the equivalent of R\$ 1.000 per 5 million-seed big bag.

This initiative, carried out in conjunction with entities and partners, reinforces the supply chain's commitment to strengthening soybean farming in Rio Grande do Sul, supporting producers in adopting technologies that generate greater productivity, competitiveness, and value for their properties.

“The state's situation is challenging, especially after recurring crop failures. That's why the company is making the best

technology and innovation in soybean seeds available to farmers in Rio Grande do Sul, bringing more security and predictability to crops, especially during El Niño periods,” highlights Luciano Bilhalva Centeno, Bayer's soybean sales manager in Rio Grande do Sul.

In addition to providing the best of Bayer genetics and biotechnology – Intacta RR2 PRO, Intacta2 Xtend and Xtend Biotech – the campaign transforms agronomic decisions into economic advantages. The company's commitment to producers in Rio Grande do Sul is also reflected in continuous investments in research, development and innovation.

At the experimental stations in Não-Me-Toque and Coxilha, the company also develops solutions aligned with the needs

of local agriculture, reinforcing its partnership with producers and its strategic vision for the state, focusing on innovation, productivity, and sustainability.

[RETURN TO INDEX](#)

BASF highlights credit and digitalization at the Andav 2026 Congress

During the event, the company forecasts R\$ 2,5 billion in financial solutions and points to the effects of El Niño on management

11.08.2026 | 15:52 (UTC -3)

Cultivar Magazine, based on information from Deusarina Alves Santana



BASF Agricultural Solutions is presenting, during the 15th edition of the Andav Congress, a set of initiatives aimed at

strengthening agricultural distribution, focusing on access to credit, digitalization, and the development of distributors and cooperatives. This strategy is taking place in a context of squeezed margins, financing restrictions, and a growing demand for efficiency in the field.

Among the main priorities is expanding access to financial resources. The company plans to make at least R\$ 2,5 billion available in credit solutions throughout 2026, through a combination of traditional and structured instruments developed in partnership with banks, agfintechs, and investment funds.

The strategy includes barter transactions and structures such as Fiagros and Investment Funds in Credit Rights

(FIDCs). According to BASF, diversifying financing alternatives helps to broaden access to resources and improve risk management in operations.

“We have two important fronts: productivity gains through the use of technology and structured access to credit. For these initiatives to generate consistent results, risk management, based on a deep understanding of the realities and challenges of each client, combined with the diversification of credit operations, is fundamental,” says Eduardo Gradiz, “leader” of Financial Operations at BASF Agricultural Solutions.

Digitization integrates credit and management in the field.

Digitization is another aspect of the company's strategy. Through the conecta.ag ecosystem, BASF brings together tools focused on sales management, financing, relationship building, and supporting decision-making in the field.

One of the solutions is Conecta Finance, a digital credit platform based on an exclusive fund structured and managed by Farmtech in the Fiagro format. The tool has already enabled approximately R\$ 280 million in credit operations.

With a fully digital process, the system centralizes steps such as analysis, documentation, and contracting. The goal is to facilitate credit, risk, and customer portfolio management for distributors, while simultaneously expanding producers' access to financing at the time of purchase.

BASF aims to expand the number of distributors served by the solution and its integration with conecta.ag, concentrating different stages of the commercial and financial journey in a single environment.

The ecosystem also includes Conecta Pontos, a relationship and loyalty initiative integrated into the Agrega program. Over the past two years, the platform has registered an average annual growth of

91% in the value redeemed. Redemptions of products geared towards agribusiness also increased by 94% compared to the previous year, according to the company.

Distribution is considered strategic.

BASF also seeks to expand its operations with distribution channels through four areas: governance, commercial effectiveness, innovation, and development.

Among the initiatives are training programs for leaders, managers, and sales teams of distributors and cooperatives, as well as actions focused on operational efficiency and the adoption of technologies in the

field.

“Distribution plays a strategic role in the evolution of Brazilian agribusiness.

Generating value for the sector goes beyond offering products: it means developing solutions that strengthen the supply chain, increase efficiency in the field, and contribute to sustainable growth,” says Gustavo Bastos, Senior Market Access Manager at BASF Agricultural Solutions.

El Niño demands attention to management.



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During the event, Bastos also commented on the potential effects of El Niño on the next Brazilian harvest. According to him, the phenomenon tends to increase the need for attention to management, with different impacts depending on the region and the crop.

In the south of the country, the expectation of higher volume and intensity of rainfall may increase the pressure of diseases in crops. In this scenario, the use of fungicides may become more important, especially in crops such as soybeans, corn, rice, and wheat.

“More intense rainfall implies more severe disease pressure. This likely indicates the need for more intensive use of fungicides to control these diseases. Now, which fungicide to use and when, the farmer will need not only good partners, like us and our distributors, but also a more critical eye on the property,” says Bastos.

For the Cerrado region, on the other hand, the possibility of drier periods could interfere with the planting window. The executive recommends that producers monitor the regularization of rainfall before starting sowing.

"Now is the time to take your time planting in the Cerrado. It's important for farmers to understand whether the rains have actually stabilized in the region where they produce

before starting planting," he says.

The reduced availability of rain can also favor the occurrence of some pests. In soybeans, Bastos mentions the possibility of greater pressure from caterpillars, stink bugs, and whiteflies, while in corn, attention should be focused mainly on leafhoppers and caterpillars. In cotton, the expectation is for greater pressure from pests such as caterpillars, aphids, and whiteflies.

In the south-central region, in addition to the increased disease pressure associated with humidity, crops such as rice and wheat may face additional difficulties in weed control.

Another point of concern, according to Bastos, is the increase in temperatures in

the Midwest. In this scenario, choosing products with greater selectivity and a lower potential to cause phytotoxicity may be important to preserve plant development.

“This is a time when farmers need to be more attentive and close to their crops, closely monitoring conditions. They can also count on BASF, the company's entire technical team, and its partners to help them make the best decision,” he says.

The company's assessment is that monitoring weather conditions and adjusting management strategies will be fundamental to addressing the expected regional differences for the harvest and to seeking productivity, quality, and profitability.

[RETURN TO INDEX](#)

Sumitomo Chemical unveils new phase of the YEN Program

The initiative brings together around 200 distributors and was announced at the Andav 2026 Congress

11.08.2026 | 15:50 (UTC -3)

Cultivar Magazine



Sumitomo Chemical presents the evolution of the YEN Program during the Andav 2026 Congress. The initiative reaches approximately 200 distributors and more than 5.500 professionals from technical and sales teams in the country.

Launched at the 2025 Andav Congress, the program seeks to strengthen the company's relationship with the distribution of agricultural inputs. The structure includes tools for managing goals, action plans, indicators, and results. Another front supports demand generation through training, tools, and resources aimed at bringing technologies closer to farmers and ranchers.

According to Everson Zin, Market Access Manager at Sumitomo Chemical, distributors account for approximately 50%

of the national agricultural input market. He believes this network connects industry innovations to producers.

During the event, the company also highlighted investments in BioRationals and physiological plant management. The Soja+ program brings together the growth regulators MaxCel and ProGibb, focused on plant architecture and the productive potential of soybeans.

The portfolio presented also includes the Excalia Max fungicide, for soybeans and corn; the ZethaMaxx EVO pre-emergent herbicide, with three mechanisms of action; the OpteraDuo insecticide, intended for the control of caterpillars and spider mites; and the Tempest E herbicide, indicated for weeds in pastures.

Sumitomo Chemical anticipates new products in September and October. The YEN Program also includes projects linked to ESG criteria. Approximately ten distributors developed initiatives in this area during the program's first year.



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[RETURN TO INDEX](#)

AgriConnection expands its portfolio and focuses on credit in distribution

The company incorporates post-patent assets, Fiagro, and develops new combinations of molecules

11.08.2026 | 15:00 (UTC -3)

Cultivar Magazine



AgriConnection has expanded its portfolio with recently acquired post-patent assets from Nutrien and products supplied by partner companies. The strategy aims to increase the company's presence in the distribution of agricultural inputs, according to Milton Paiva, Marketing Director of AgriConnection, who explained part of the company's strategy during the Andav 2026 Congress.

The company's portfolio includes its own brands, products under research and development, and solutions in the market entry phase. AgriConnection also seeks products with an already defined commercial structure. According to Paiva, the combination of these approaches aims to create a broad portfolio to serve distributors.

In distribution, AgriConnection operates with different models depending on the region. The South and Southeast regions show a strong presence of distribution channels. The Cerrado region also maintains a presence of these channels, but registers a higher percentage of direct sales.

The company also began offering credit to distributors. According to Paiva, AgriConnection maintains a partnership with a fund and created an Investment Fund for Agro-industrial Production Chains - Fiagro. The initiative seeks to finance operations related to chemical pesticides and fertilizers.

Another area of ??focus involves Agripedia, a company belonging to the AgriConnection group. This operation

works on engineering new products through the combination of active ingredients and the adjustment of concentrations.

Agripedia maintains partnerships with Chinese and Indian companies that own molecules and research. AgriConnection intends to use this information to apply for registrations in Brazil and develop new products for the national market.



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[RETURN TO INDEX](#)

Syngenta Seeds highlights new business model at the Andav 2026 Congress

Company expands operations in soybeans and tests technologies for corn protection and rust control

11.08.2026 | 14:33 (UTC -3)

Cultivar Magazine



Syngenta Seeds anticipates business growth in the coming months, following a period marked by falling soybean and corn prices, high interest rates, and restricted credit. The company is betting on a new business model to strengthen its relationship with producers and is preparing biotechnologies for corn and soybeans for the next decade.

According to Frederico Barreto, Commercial Head of Syngenta Seeds, who gave an interview during the Andav 2026 Congress, the current scenario has reduced profitability and slowed planting decisions. The company is monitoring possible changes in summer corn, second-crop corn, and soybean areas. For the coming months, Barreto expects greater

clarity based on planting windows and weather forecasts.

Market access

In 2024, the company began a shift in its market access strategy. Syngenta Seeds replaced its own sales force with franchises that offer commission-based compensation. The model prioritizes demand generation, field presence, and technical positioning of its products.

According to Barreto, the structure increased proximity to farmers and fostered knowledge of production environments. This factor gains importance in the positioning of hybrids due to the germplasm's response to growing conditions.

In the soybean sector, the company increased its investments in Golden Harvest, a brand focused on licensing. The strategy includes a sales force dedicated to supporting multipliers. Professionals associated with the NK brand also began promoting commercial opportunities for soybeans through an automated lead generation system.

New biotechnologies

Syngenta Seeds is also testing new biotechnologies. In corn, the company plans to launch, at the beginning of the next decade, a technology aimed at increasing protection against lepidopteran pests.

For soybeans, the projects have a longer horizon. The company is researching technologies with herbicide tolerance, broadening the spectrum of control, and protection against soybean rust. The materials undergo field testing before regulatory stages and a possible commercial launch.



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[RETURN TO INDEX](#)

EPA registers Silvec's technology for managing citrus greening

Platform uses citrus tristeza virus to produce spinach defensins in citrus plants

11.08.2026 | 06:01 (UTC -3)

Cultivar Magazine



The United States Environmental Protection Agency (EPA) has registered

Silvec Biologics' technology for unconditional commercial use to manage citrus greening, or Huanglongbing (HLB). The platform uses a non-transmissible version of the citrus tristeza virus (CTV), strain T36, to induce the production of spinach defensins in plants.

The product received registration under the United States Federal Insecticides, Fungicides, and Rodenticides Act. The company also announced plans to begin partnerships with citrus growers by the end of 2026 through the Florida Citrus Research and Field Trial program.

Three buildings

The technology employs three CTV T36 constructs modified to express the SoD2, SoD2-1, and SoD2* genes. The virus enters the phloem via bark grafting and begins to express defensin proteins.

According to the EPA, these proteins can form pores in the outer membrane of the bacteria associated with citrus greening, compromising its integrity and leading to the death of the microorganism.

The EPA also granted an exemption from the maximum residue limit requirement for CTV T36 containing SoD2, SoD2-1, and SoD2* proteins. The rule went into effect on April 7, 2026, and covers products in the citrus fruit group. Use must follow label instructions and good agricultural practices.

Data analyzed

The agency evaluated toxicological, exposure, and product characterization data. The analysis indicated an absence of toxic or adverse effects in an acute oral toxicity study with the SoD2 protein. The EPA also considered the allergenic potential of the three variants to be low. The agency concluded that there is reasonable certainty that there is no harm to the U.S. population from aggregate exposure to the active ingredients, including children.

Citrus hepatitis T (CTV) occurs frequently in citrus plants in different producing regions. According to the EPA, the virus can only multiply in plant phloem cells and

loses activity outside the plant or an insect vector. The expressed proteins are also subject to degradation by environmental conditions and microbial activity.

In the registration application protocol, the product names listed are Construct CTV-SoD2, Construct CTV-SoD2*, and Construct CTV-SoD2-1.

[RETURN TO INDEX](#)

Corn loses genetic variability in a key group for productivity

Study identifies low variance in yield in intermediate-cycle Stiff Stalk lines

11.08.2026 | 05:41 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: University of Illinois Urbana-Champaign

Researchers at the University of Illinois Urbana-Champaign have identified an absence of detectable genetic variance in grain yield in intermediate-cycle Stiff Stalk lines. This group forms one of the main bases of maize breeding in the United States and participates in the formation of hybrids cultivated in the Corn Belt.

The study evaluated 13 Stiff Stalk and 28 Non-Stiff Stalk lines. Researchers produced 162 single-cross hybrids and analyzed grain yield, plant height, ear height, days to style-stigma emergence, and days to anthesis.

The hybrids underwent multi-site trials as part of the Genomes to Fields initiative. The tests took place in the United States and Canada. The final analysis considered

data from 37 environments.

Main limitation

The main limitation appeared in the intermediate-cycle Stiff Stalk lines. The group did not show significant variance in overall combining ability for grain yield.

This variance indicates the potential of the parents to transmit additive genetic effects to the hybrids.

Intermediate-cycle Non-Stiff Stalk lines maintained variability in yield. Early and late-cycle groups also conserved significant genetic variance for different traits.

Repeated selection of the best-performing parents can reduce diversity within

heterotic groups. With less variability, breeding programs have fewer alternatives for achieving genetic gains and adapting materials to new environments, diseases, and climatic conditions.

Genetic basis

Researchers recommend expanding the genetic base available to the programs. One alternative involves the planned introduction of external germplasm into elite heterotic groups.

The study also evaluated genomic prediction models based on GBLUP. The models performed better in identifying superior hybrids when parental information was available (doi 10.1093/g3journal/jkag163).

[RETURN TO INDEX](#)

Fendt Ideal harvests 2.599 tons of corn in 24 hours.

The brand was certified by RankBrasil and surpasses records of 8 and 12 hours with a single harvester.

10.08.2026 | 15:17 (UTC -3)

Monica Pileggi



Fendt has created a new category in the ranking by harvesting 2.599 tons of corn (equivalent to approximately 43.323 60 kg

sacks), the largest volume of grain ever harvested in 8, 12, and 24 hours by a single piece of equipment. The record, achieved by the Fendt Ideal 9T combine harvester, with a GTS X25 corn platform featuring 27 rows and 50-centimeter spacing between each row, was set at Fazenda Recanto, owned by farmer Lúcio Basso, in Sidrolândia (MS), and certified by RankBrasil - the Brazilian book of records.

The new milestone for agricultural machinery in Brazil, which exceeded expectations, began in the first 8 hours with the harvesting of 912,72 tons (15.212 sacks) of corn. Then, after reaching 12 consecutive hours, the harvester broke a new record, harvesting 1.247,7 tons (20.795 sacks). During this challenging

period, the machine was operated by a single operator. RankBrasil was present to witness the achievement, awarding the title of "Largest Second-Crop Corn Harvest by a Single Combine Harvester in 24 Hours in Brazil".

“Brazil is the third largest producer and the second largest exporter of corn in the world, which reinforces its importance to Brazilian agriculture. For Fendt, this record proves that our technology is perfectly aligned with the needs of the high-performance farmer. Fendt Ideal has shown that it is capable of extracting maximum productivity from the field, preserving grain quality and reducing operating costs. This reinforces the brand's commitment to delivering excellence,

showing that our embedded technology is the differentiator that the field needs,” reinforces Fabio Dotto, Product Marketing Director of Fendt Latin America.

Technology and engineering put to the test.

The operation, which began at noon on Saturday (08/08) and ended at noon on Sunday (09/08), went far beyond a speed test: 24 uninterrupted hours that put the machine, technology, and engineering to the test. This was the ideal challenge for the German brand of high-tech and innovative machinery to prove, in practice, the resistance and technical precision that

is in its DNA.



“It’s gratifying to understand the level this product has reached, both in terms of reliability and durability. Today, the machine has just proven that it is ready for the Brazilian producer,” said Lúcio Basso, producer and owner of Fazenda Recanto.

Operating without pauses, the Fendt Ideal maintained a constant speed of approximately 9 km/h and harvested 235,2

hectares in a single continuous cycle. Even under extremely high operational demands—processing approximately 108 tons (1.805 sacks) per hour or 30 sacks per minute—analyses conducted throughout the harvest indicated negligible grain loss, a result that reinforces the robustness of the technology employed.

“The distinguishing feature of this record, certified by RankBrasil, is the proof of the robustness of the Fendt Ideal 9T operating in real and extreme conditions. Harvesting for 24 uninterrupted hours requires not only a machine with very high capacity, but also the certainty that it will have maximum physical availability. We have shown that the producer can accelerate the pace in the harvest window with total confidence in the equipment and our support,” highlights

Taylor Olbermann, After-Sales Director at Impact Fendt and operator of the harvester for the first 12 hours – the operator change occurred after the end of this category.



From left to right: the operators in the challenge Adilson Pereira and Teylor Olbermann; Lúcio Basso, owner of Fazenda Recanto, and Luciano Cadari, auditor of RankBrasil.

With a fuel consumption reduction exceeding 10%, the Fendt Ideal combine harvester delivers more than a 10% increase in productivity thanks to its combination of technical and technological

features. Among the machine's key differentiators is the Dual Helix processing system, with the largest rotors on the market (4,84 meters long), providing a 45% larger threshing area, delivering high threshing capacity, grain quality, and lower energy consumption. Combined with this processing technology, the Ideal features an efficient cleaning system – 25% larger – and up to 15% slope compensation, important for uneven terrain. The result is exceptional cleaning of the harvested material in the grain tank.

Official homologation data

- Total volume in 24 hours: 2.599 tons (approx. 43.323 60 kg bags)
- Total volume in 12 hours: 1.247,7 tons
- Total volume in 8 hours: 912,7 tons
- Average working speed: 9 km/hectare
- Fuel consumption: 9,17 liters/hectare
- Location: Recanto Farm - Fendt Impact (Sidrolândia/MS)
- Audit: RankBrasil

The Fendt Ideal 9T combine harvester was the subject of a test drive by the Cultivar Máquinas team. Read about it in “

[Exclusive test drive with the Fendt Ideal 9T combine harvester](#)”.

[RETURN TO INDEX](#)

Victor S. Leal assumes commercial leadership of EuroChem Brazil

Executive leaves ICL after 16 years and will now lead the company's commercial and marketing areas

10.08.2026 | 08:48 (UTC -3)

Cultivar Magazine



Victor Scotton Leal (pictured) assumed the position of Chief Sales Officer (CSO) of EuroChem Brazil in August 2026. The

executive will lead the company's commercial and marketing areas in the country, following a 16-year career at ICL South America.

Leal began his career at ICL in 2010 as a Technical Sales Representative (TSR). Throughout his time with the company, he held various positions, working in distribution and product management, regional leadership in different states, and commercial leadership roles.

According to the executive, his career at ICL also included participation in the restructuring of B2B and Animal Nutrition operations and the commercial vice-presidency of ICL in Brazil. His most recent position was Head of Commercial, leading the Northern Division of ICL South

America, with operations covering the Cerrado region and the ICL, Aminoagro, and Dimicron brands.

At EuroChem, Leal will be responsible for the commercial and marketing leadership of the fertilizer business in Brazil. The scope of the role includes national sales in the North, Cerrado, and Central-South regions, as well as demand planning, market intelligence, portfolio management, and the acquisition of third-party products.

The commercial activity includes direct sales to producers, distribution, cooperatives, and large accounts, with a portfolio of nitrogen, potassium, phosphate, and NPK blends. The operation is supported by the group's integrated production base, which includes

the Serra do Salitre (MG) unit.

Throughout his career, the executive has accumulated experience in sales and results management in Brazil and Latin America. According to his professional profile, he led the growth of sales teams from 26 to over 400 people and participated in the launch of more than 30 specialty products.

Leal holds a degree in Agronomic Engineering from the University Center of Patos de Minas (Unipam), an MBA in Marketing from the Getulio Vargas Foundation (FGV), and an MBA in Business Management from the University of São Paulo (USP/Esalq). In 2022, he completed a leadership and strategy program at Harvard Business School.

In announcing the change, the executive highlighted the experience accumulated over 16 years at ICL and stated that he is beginning a new professional phase with the goal of contributing to the development of agribusiness.

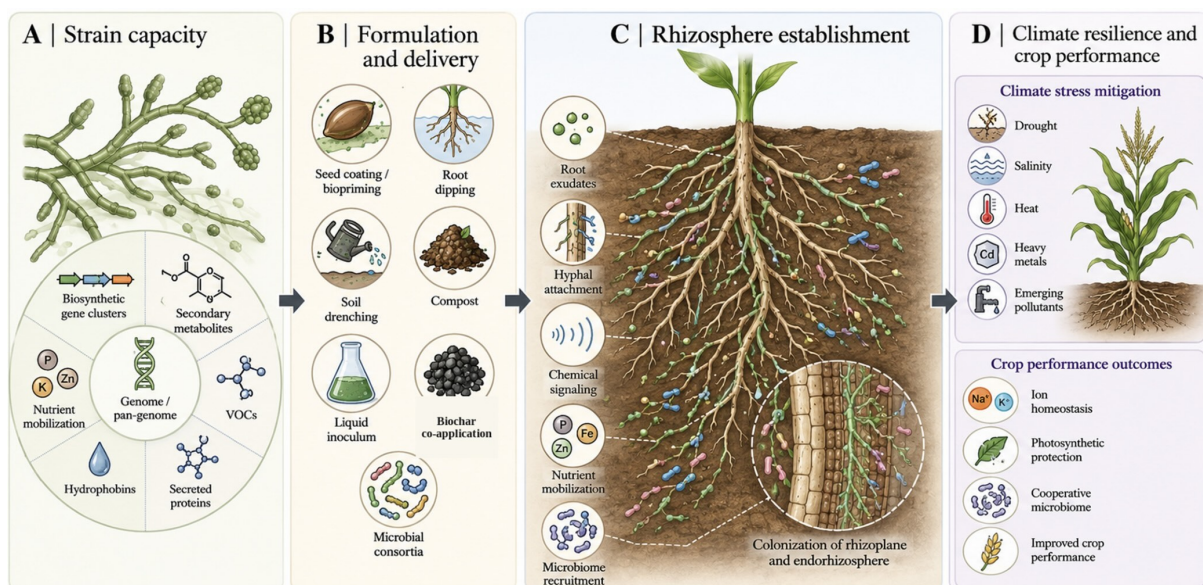
[RETURN TO INDEX](#)

Trichoderma increases crop tolerance to abiotic stresses

Researchers have gathered evidence on salinity, drought, and metals, and point to limitations for its use in the field

10.08.2026 | 08:22 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.3390/jof12080578

Fungi of the genus *Trichoderma* can increase the tolerance of agricultural crops to salinity, drought, and heavy metal contamination through alterations in the

root system, photosynthesis, ionic balance, and antioxidant defenses. Chinese researchers compiled results available up to June 2026. They pointed to a strong dependence on the strain used, the crop, the application method, and environmental conditions. They warn of the lack of broad field validation, especially in the face of extreme temperatures and combined stresses.

The study analyzed the use of *Trichoderma* as a biological control agent, biofertilizer, and microbial biostimulant. The synthesis encompasses salinity, water deficit, heavy metals, extreme temperatures, and emerging pollutants. The mechanisms described include changes in root architecture, antioxidant

regulation, osmotic adjustment, nutrient acquisition, ion homeostasis, hormonal balance, and the expression of genes linked to the stress response.

Fungus, plant and rhizosphere

The effects depend on the interaction between the fungus, the plant, and the rhizosphere. The strain needs to have suitable genetic and metabolic characteristics, survive storage and application, reach the root zone, and maintain functional colonization. The process is also influenced by the soil, the resident microbiota, the plant genotype, and the intensity of the stress.

Genetic diversity within the genus helps explain differences in results. An analysis of 25 agricultural and industrial lineages found 4.960 shared genes and an open pangenome. Researchers link accessory and lineage-specific genes to functions such as secondary metabolism, plant interaction, microbial competition, and environmental adaptation.

Root colonization

Root colonization plays a central role in this process. Species such as *Trichoderma harzianum*, *Trichoderma asperellum*, *Trichoderma virens*, and *Trichoderma atroviride* can act on the rhizosphere and superficial root tissues. Compounds

released by the fungi influence root branching, the formation of root hairs, and hormonal signaling. The increased root surface area favors the absorption of water and nutrients under adverse conditions.

Salinity results

Salinity provides some of the most consistent agronomic evidence. In Indian mustard, **Brassica juncea**, the application of **Trichoderma harzianum** to naturally saline soil increased chlorophyll, proline, oil content, and nutrient accumulation. The treatment also reduced sodium absorption and the sodium-potassium ratio.

Application via compost increased seed productivity by approximately 23%. Oil content increased between 19% and

23,4%.

Another experiment showed a reduction in the sodium-to-potassium ratio from 2,14 to approximately 0,92 in the Tori-7 genotype under the most intensive treatment with the compound. According to researchers, this result indicates the fungus's involvement in ionic stabilization, in addition to stimulating growth.

Results in citrus reinforce this mechanism. Inoculation with *Trichoderma harzianum* increased growth, biomass, photosynthetic rate, stomatal conductance, and chlorophyll content under saline stress. The plants accumulated less sodium and showed greater expression of genes associated with water transport and response to excess salt.

Data in drought

During drought, the results mainly involve maintenance of the root system, water use, photosynthesis, and control of oxidative stress. Inoculation with *Trichoderma asperellum* improved nutrition, chlorophyll and carotenoid concentration, photosynthetic rate, stomatal conductance, and water use efficiency in sugarcane. The treatment also increased the activity of antioxidant enzymes and the accumulation of proline.

In maize, a strain of *Trichoderma asperellum* applied to seeds maintained fungal populations throughout crop development and reduced the effects of water deficit. In rice, biopriming with

Trichoderma harzianum altered molecular responses associated with subsequent tolerance to water shortage.

Combined treatments

Scientists warn against interpreting combined treatments. One experiment with bell peppers used biochar incorporated into the soil and an independent suspension of Trichoderma harzianum. The study evaluated co-application but did not prove biochar as a vehicle for the fungus. Under irrigation corresponding to 50% of the evaluated regime, the combined treatment increased the activity of three antioxidant enzymes by more than 40% and reduced hydrogen peroxide by

approximately 25%. Another marker of oxidative damage, however, showed a divergent response.

Heavy metals

Heavy metals form another research front. In Indian mustard subjected to cadmium, the combination of *Trichoderma harzianum* and polyaspartic acid increased root volume by 30,65% and total biomass by 42,38%. Total cadmium accumulation rose by 79,11%. The concentration of the metal in the leaves increased by up to 71,12%. Researchers interpret the result as a simultaneous increase in the plant's tolerance and ability to remove the contaminant.

The same combination increased the efficiency of cadmium removal from the soil from 21,71% to 38,27% in another study. The analyses also detected changes in the rhizosphere microbial community. The review highlights a limitation: associations obtained through co-occurrence analyses do not prove causal relationships nor demonstrate functional recovery of the microbial network.

Heat and cold

Evidence regarding heat and cold remains more limited. Studies with *Trichoderma harzianum* after exposure to heat have demonstrated survival and adaptation of the fungus itself. This data does not prove

thermal protection of crops, maintenance of productivity, or stability in the field.

To broaden agricultural application, researchers recommend specific selection of strains for each crop, studies of genes and proteins involved in the responses, standardization of formulations, experiments with multiple stresses, and trials in different locations. The review also points to the need for biosafety assessments and economic analyses at the producer scale. Advancing these steps could define more precisely where *Trichoderma* inoculants deliver reproducible responses under commercial conditions (doi 10.3390/jof12080578).

[RETURN TO INDEX](#)

Viruses and parasitoid venom alter arthropods

Field trial links components of *Cotesia glomerata* to herbivore and parasitoid colonization

09.08.2026 | 14:26 (UTC -3)

Schubert Peter, Cultivar Magazine



Components inoculated by the parasitoid wasp *Cotesia glomerata* into its host

caterpillars can alter the subsequent colonization of cabbage plants by other arthropods. An open-field experiment identified effects of the parasitoid-associated polydnavirus and venom on species such as *Mamestra brassicae* and *Myzus persicae*. However, the effects on the total community composition remained small. The study also detected responses among aphid parasitoids.

The study was conducted by researchers at Wageningen University in the Netherlands and published in the journal *Ecological Entomology*. The team investigated a chain of interactions initiated by the parasitism of *Pieris brassicae*. This caterpillar is among the common herbivores of cabbages and also acts as a

host for *Cotesia glomerata*.

Components introduced

During parasitism, the wasp introduces components into the host capable of modifying its physiology. Among these are the polydnavirus and venom. The polydnavirus participates in the suppression of the caterpillar's immune response. The alterations caused by parasitism can also affect the host's feeding behavior, development, and saliva composition.

This process is of interest to plant ecology because the plant responds both to damage from feeding and to compounds

present in the insect's saliva. Changes in the caterpillar can therefore modify the plant's induced response. This response then interferes with the plant's relationship with new herbivores and natural enemies.

To test this effect under field conditions, the researchers used *Brassica oleracea* plants from the wild Kimmeridge population. The experiment comprised 48 plots, divided into eight blocks. Each plot contained nine plants. The plots were separated by three-meter strips of grass.

Six conditions

The team applied six experimental conditions. One remained herbivore-free. In the others, the plants received *Pieris*

brassicae caterpillars. The treatments included caterpillars injected only with phosphate-buffered saline solution, caterpillars parasitized by *Cotesia glomerata*, caterpillars injected with polydnavirus, caterpillars injected with poison, and caterpillars injected with a combination of polydnavirus and poison.

Each plant received four caterpillars during the induction phase. The researchers then monitored the arthropods present on the plants throughout the growing season. Monitoring took place between June and September 2022.

The composition of the herbivore community showed strong variation throughout the sampling dates. The treatment applied at the beginning of the

experiment produced only a marginal effect on the community as a whole. The analysis attributed 1,6% of the variation in herbivore composition to the treatment. *Myzus persicae*, *Aleyrodes proletella*, and *Mamestra brassicae* made a significant contribution to the observed differences.

Species analysis

The effects became more defined when the team analyzed species separately. The abundance of *Mamestra brassicae* caterpillars was 2,48 times greater in plants induced by caterpillars treated with a combination of PDV and poison, compared to plants without induction. This same combination also resulted in an abundance 2,43 times greater than that

observed in the treatment with PDV alone and 2,51 times greater than that observed in the treatment with poison alone. In other words, the combination of the two components significantly increased the abundance of *Mamestra brassicae* compared to the other groups; PDV and poison applied separately did not differ from the control without induction.

The frequency of plants occupied by *Mamestra brassicae* followed a similar pattern. The presence of the caterpillar was 2,67 times greater in plants treated with the combination of polidnavirus and poison than in plants without induction, and this same combination also surpassed the treatment with PDV alone by 2,54 times and the treatment with poison alone

by 2,69 times. Again, the components applied in isolation did not differ from the control group.

Responses in *Myzus persicae*

The response also appeared in *Myzus persicae*. Aphid abundance was 2,86 times higher in plants induced by caterpillars treated with poison, compared to plants induced by caterpillars injected only with saline solution. The combination of polydnavirus and poison increased abundance by 3,02 times compared to the same control.

The incidence of *Myzus persicae* showed even clearer differences. The aphid

appeared 3,18 times more frequently on plants treated with polidnavirus, 3,46 times more frequently after poison application, and 3,83 times more frequently after the combination of the two components. In these comparisons, the reference group received caterpillars injected only with saline solution.

Various results

Not all species responded to the treatment. The occurrence and abundance of *Evergestis forficalis*, *Plutella xylostella*, *Aleyrodes proletella*, and *Brevicoryne brassicae* varied throughout the monitoring rounds, but did not show a significant response to the induction treatments evaluated.

Among natural enemies, the overall community composition varied mainly with the sampling period. Researchers found no evidence of structuring of the total natural enemy community by the treatments. The study abstract, however, records greater colonization by aphid parasitoids in plants damaged by caterpillars subjected to the combination of polidnavirus and poison, compared to plants without induction or induced by non-parasitized caterpillars.

The results indicate a selective effect of the components associated with parasitism. The polidnavirus and the venom did not broadly reorganize the entire arthropod community, but they did modify the colonization of certain herbivores and natural enemies. This work

extends to the field evidence previously obtained under laboratory and greenhouse conditions (doi 10.1111/een.70129).

[RETURN TO INDEX](#)

Aphid protein activates citrus defense against psyllid

AsKE8 reduced phloem feeding and fecundity of *Diaphorina citri* in a study with sweet orange trees

09.08.2026 | 11:01 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Gerald Holmes / Strawberry Center - Cal Poly San Luis Obispo - Bugwood

A salivary protein from the citrus aphid *Aphis spiraecola* activated defense mechanisms in sweet orange trees and impaired the feeding and reproduction of the Asian citrus psyllid, *Diaphorina citri*. The compound, identified as AsKE8, reduced the insect's phloem sap ingestion time by 80% and its fecundity by 61,7%.

Researchers identified 69 proteins in the saliva of *Aphis spiraecola*. Among them, AsKE8 and AsTX1 showed the highest abundance. The team infiltrated the two proteins into young leaves of *Citrus sinensis*. Only AsKE8 significantly affected phloem feeding and the number of *Diaphorina citri* eggs.

Western blot analysis detected AsKE8 in leaves infested with *Aphis spiraecola* and

in the aphid's head. The result confirmed the release of the protein into the plant tissue during feeding.

Transcriptome analysis

Transcriptome analysis found 345 genes with differential expression after AsKE8 application. Of these, 111 showed increased expression and 234 showed reduced expression. The protein stimulated genes linked to the jasmonic acid pathway and alkaloid biosynthesis.

Subsequent tests confirmed increased expression of the five evaluated genes in the jasmonic acid pathway. Five of the six genes associated with alkaloids also responded to treatment. Treated leaves

accumulated more jasmonic acid and total alkaloids.

Researchers classify AsKE8 as a salivary elicitor. The mechanism broadens the understanding of indirect plant-mediated insect interactions. The study also points to the protein as a reference for research on plant immunity inducers against *Diaphorina citri* (doi 10.1127/entomologia/4086).

[RETURN TO INDEX](#)

Symbiotic virus reduces aphid survival in laboratory

Modified APV transported insecticidal protein and double-stranded RNA in *Acyrtosiphon pisum*

08.08.2026 | 17:26 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Clemson University - USDA Cooperative Extension Slide Series - Bugwood

Researchers have developed a modified version of the *Acyrtosiphon pisum* symbiotic virus capable of expressing molecules that act against the aphid itself. The system carried a chymotrypsin inhibitor protein and double-stranded RNA targeting a gene in the insect. In microinjection tests, the most efficient constructs reduced the relative survival of aphids by 48% and 45% after ten days. The work indicates the potential of symbiotic viruses as vectors of insecticidal effectors, but the results remain limited to experimental conditions with injection application.

The study used the *Acyrtosiphon pisum* virus (APV), a single-stranded, positive-sense RNA virus found in pea aphid

populations. The microorganism maintains a persistent association with the host and is highly abundant in these insects. The scientists used reverse genetics to construct an infectious copy of the viral genome and insert sequences with insecticidal function.

First strategy

The first strategy employed a cytomegalovirus promoter to initiate transcription of the clone within the aphid. The researchers combined the genetic material with the SPc nanocarrier before microinjection. The system allowed for the recovery of viral particles and the detection of positive- and negative-strand viral RNA, as well as the capsid protein. These

results confirmed the replication of the infectious clone in the insect.

The team inserted the Chy8 sequence, a variant of a chymotrypsin inhibitor with known toxic activity against the pea aphid, into the viral genome. The fragment encodes a 63-amino acid protein. The recombinant clone was named APV-Chy8. After microinjection, the scientists detected the Chy8 protein in the insects. After ten days, relative survival decreased by 34% compared to the control treated only with the nanocarrier.

Second building

A second construct received a 194 base pair double-stranded RNA fragment. The

chosen target corresponded to the gene of a serine protease with a clip domain, identified by the acronym SPLP. Direct application of this double-stranded RNA reduced gene expression and decreased aphid survival. The fragment was then incorporated into the APV genome to form the APV-dsSPLP clone. With the cytomegalovirus promoter-based strategy, SPLP expression did not show a significant reduction on day five. Even so, relative survival fell by 17% on day ten.

The researchers attributed part of this limitation to the promoter's efficiency in the aphid. Therefore, they tested a second approach. The viral genome underwent in vitro transcription with the T7 promoter before application. The RNA produced was combined with SPc and microinjected into

the insects. This method also allowed for the recovery of the virus and the detection of its replication in the host.

The change increased the effect of both constructs. The APV-Chy8 transcript in vitro reduced relative survival by 48% after ten days. The APV-dsSPLP reduced target gene expression on day seven and caused a 45% drop in relative survival by the end of day ten. The differences in survival curves were statistically significant.

Required elements

The study also evaluated elements necessary for constructing the viral clone. Scientists selected variants of the untranslated regions at the ends of the

genome with adequate replication activity. The clone received a cap structure at the five-line end and a poly-A tail with 28 nucleotides. The APV genome has approximately ten thousand bases and two open reading frames.

The SPc nanocarrier played a role in the delivery of nucleic acids. The structure has a hydrophobic core and a hydrophilic outer layer with positively charged groups. This characteristic favors association with nucleic acids, which have a negative charge. According to the study, the use of the material helped to circumvent the rapid degradation of free nucleic acids in the hemolymph of insects.

The research proposes a different approach from systems in which plant

viruses produce double-stranded RNA ingested by the insect during feeding. In this case, the vector is derived from a virus found in the aphid itself. The strategy seeks to transform a symbiotic virus into a platform for the production of molecules with insecticidal activity within the host.

Existing limitations

Scientists highlight remaining limitations. The ideal location for inserting external sequences into the APV genome remains undefined. The virus's ability to carry larger fragments also needs evaluation. The stability of the inserted sequences represents another relevant point for future applications. In the experiment, the 189 base pair sequence corresponding to Chy8

remained stable for at least ten days in the aphids.

The study did not demonstrate control by ingestion, contact, spraying, or transmission under field conditions. All efficacy results of the recombinant clones were obtained from microinjection into *Acyrtosiphon pisum*. Thus, the data confirm the ability of the modified APV to transport and express insecticidal loads under experimental conditions, but do not allow conclusions about agronomic viability or performance in aphid management programs (doi 10.1016/j.pestbp.2026.107298).

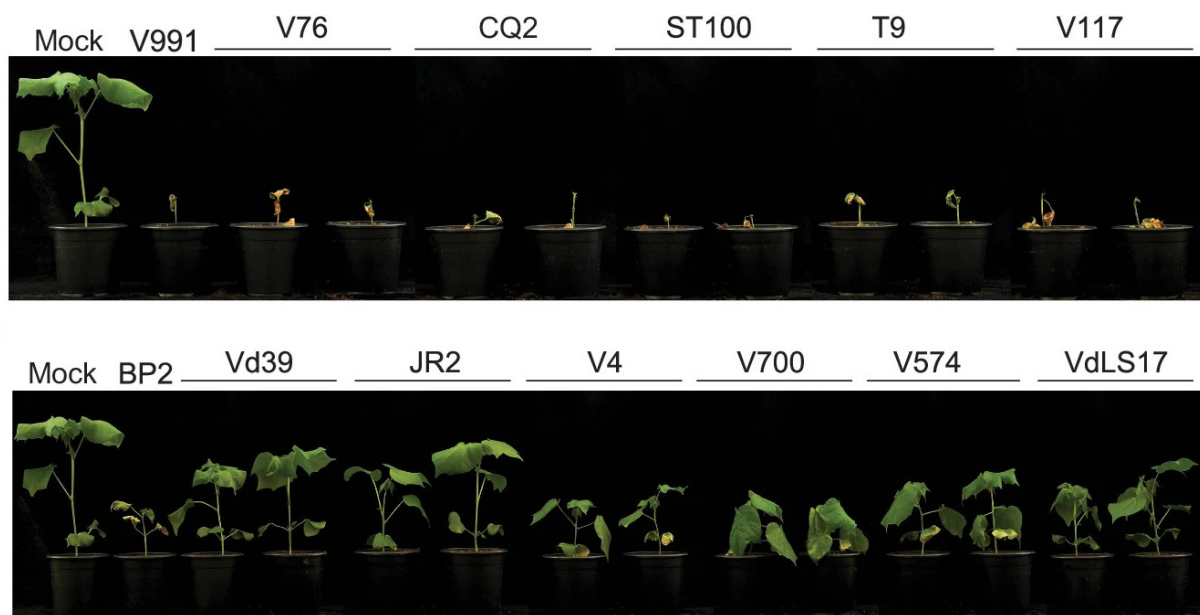
[RETURN TO INDEX](#)

Fungal effector causes defoliation in cotton and olive trees

A gene present in *Verticillium dahliae* controls pathogenicity and may have been transferred between fungi

08.08.2026 | 10:05 (UTC -3)

Schubert Peter, Cultivar Magazine



doi 10.1038/s41467-026-74504-z

A single effector secreted by *Verticillium dahliae* determines defoliation caused by defoliating pathotype strains in cotton and

olive trees. This conclusion comes from a joint study by researchers from universities in several countries. The simultaneous elimination of both copies of the gene, designated D, suppressed pathogenicity and defoliation in both crops.

Scientists identified the gene through comparative genomics. Initial analysis found approximately 200 kilobases unique to defoliating strains. Comparison with other genomes narrowed the candidate region to about 24 kilobases. Within this range, two identical genes encoded secreted proteins and were expressed during cotton infection.

Deleting only one copy of the gene reduced the aggressiveness of *V. dahliae*. Removing both copies prevented

symptoms and eliminated detectable fungal biomass in cotton. Reintroducing the gene restored the ability to cause disease. Inserting the gene into a non-defoliating line also increased aggressiveness and caused defoliation.

The purified protein D induced wilting, chlorosis, and leaf drop in cotton seedlings without requiring extensive colonization by the fungus. Assays with *Nicotiana benthamiana* and *Arabidopsis thaliana* indicated the effector's involvement in pathogenicity beyond defoliation.

Homologs of the D gene also occur in *Fusarium* species. Phylogenomic analyses have pointed to episodes of horizontal transfer between fungi. Researchers have linked this process to large transposable elements known as Starships. The three-

dimensional structure of a *Fusarium oxysporum* homolog also revealed a previously uncharacterized protein folding, supporting the existence of a new family of fungal effectors (doi 10.1038/s41467-026-74504-z).

[RETURN TO INDEX](#)

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