

July 25, 2026

N ° 89

Cultivar *Semanal*®



Predation risk alters aphids

Table of Contents

Predator induces wing formation and dispersal in aphids	08
Plant diversity enhances biological control in crops	18
Agricultural Market - 24.Jul.2026	28
John Deere expands its Canoas factory to produce electronics	38
Amazone/MP Agro announces Leandro dos Santos as new CEO	43
Hydrocarbons reduce whitefly establishment	48
Nanozyme with cobalt reduces bacterial wilt in tomato plants	57
Fungi reduce root-knot nematode in tomato plants	68

Table of Contents

Superior Court of Justice (STJ) rules for the forfeiture of a tractor used in an environmental infraction	71
Bayer promotes Brazilian executive to leadership position in the US	79
Broflanilide reduces the growth of diamondback moths	82
Valtra invests in technology for family farming	90
Nanoformulation prolongs the action of lufenuron against caterpillars	96
Surfactin causes cell collapse in <i>Spodoptera exigua</i>	107
Extracts of <i>Berberis darwinii</i> affect <i>Drosophila suzukii</i>	116
Soil degradation widens gaps in agricultural productivity	120

Table of Contents

Protocol speeds up corn leafhopper egg count	124
Forest edges support pollination networks in vegetable crops	128
Coffee farming generates R\$ 3,3 billion in pesticide expenses.	138
Quatermon has expanded use in coffee and potato crops	147
John Deere expands seeding capacity with C1450T	152
Vespa is named in honor of Ernest Hemingway	157
Leaves can heat up 16% more than the air until 2100	166
Aeration increases the production of fungi that fight gray mold	176

Table of Contents

African snail gains prominence in inventory of invasive species	185
Coating protects beneficial fungus in chemical fertilizer	191
Gustavo Husak takes on new role at John Deere	203
TJMT reinstates collection of financial CPRs	206
Endophytic fungi reduce green aphids.	214
Bayer predicts fourth generation of Bollgard cotton by 2028	218
Genes in the nervous system influence rescue in ants	222
ADM appoints Jeff Rowe as Chief Operating Officer	226

Table of Contents

Heat reduces hormones and limits weevil development	230
---	-----

Nanocarrier enhances the effect of RNAi against whitefly	234
--	-----

Protein adjusts plant defenses to sulfur supply	238
---	-----

QUEM OLHA PARA UMA COLHEITA,
VÊ UM RESULTADO.



QUEM VIVE O CAMPO,

VÊ JORNADA
UMA



Vê planejamento.
Vê conhecimento.
Vê decisões tomadas
quando ninguém
estava olhando.

Atrás de cada saca, decisões solitárias, suor
silencioso e a coragem de quem transforma a terra.

O agricultor sabe: grandes conquistas não brotam
do acaso, são cultivadas com paciência e dedicação.

Neste Dia Nacional do Agricultor, a Nortox celebra a sua
consistência e o seu compromisso em cada etapa do
caminho. Cuidamos do seu legado hoje, porque sabemos
que o verdadeiro sucesso é o que permanece no tempo.

28 de Julho - Dia do Agricultor

 nortox.com.br

 [/nortoxbrasil](https://www.facebook.com/nortoxbrasil)

 [@nortoxsa](https://www.instagram.com/nortoxsa)

 [/nortox-sa](https://www.linkedin.com/company/nortox-sa)

Predator induces wing formation and dispersal in aphids

High density of *Harmonia axyridis* increased the production of winged forms of *Myzus persicae* in the laboratory

24.07.2026 | 15:12 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Whitney Cranshaw / Colorado State University - Bugwood

The presence of the ladybug *Harmonia axyridis* in high densities stimulated the production of winged forms of the aphid *Myzus persicae* and increased its dispersal. The effect occurred even without direct contact between predator and prey. The results indicate an adaptive response to the risk of predation and point to a possible challenge for biological control programs. Wing formation may favor the exit of insects from the treated area and the colonization of neighboring crops (<https://doi.org/10.1002/ps.71141>).

The study evaluated the non-consumptive effects of predation on the morphology, movement, and survival of *Myzus persicae*. Researchers tested four densities of *Harmonia axyridis*: zero, one, five, and ten adults. The predators

remained in a suspended container, two centimeters from the infested plants. This structure allowed the aphids to be exposed to signals associated with ladybugs, but prevented direct predation.

The trials began with fifty nymphs or fifty wingless adults. The team monitored the production of winged aphids for fourteen days. In the experiment initiated with adults, five and ten ladybugs increased the number of winged offspring. The presence of just one ladybug produced no difference compared to the control. In the experiment initiated with nymphs, a significant increase occurred only under the highest density, with ten predators.

Signal intensity

The data indicate a response dependent on the intensity of the signals emitted by the predator. The pattern did not follow a simple linear progression. In adults, five predators already triggered the response. In nymphs, the effect appeared only after ten. Scientists associate this difference with the aphids' developmental stage and the maternal programming involved in the formation of winged offspring.

Wing induction

Wing induction in *Myzus persicae* occurs across generations. Females exposed to risk produce offspring with greater dispersal capacity. In the trial initiated with nymphs, the winged individuals counted belonged to the next generation. This

result reinforces the hypothesis of a transgenerational response to predation risk.

The team also evaluated the movement of the two morphological types. Wingless aphids did not show a significant change in movement between plants after the increase in ladybug density. Winged aphids increased their dispersal under greater risk. The treatment with ten predators registered more movement compared to the control. The response took advantage of the flight capacity of these individuals.

Increased predation

In another experiment, an adult *Harmonia axyridis* was fed one hundred adult aphids for twenty-four hours. The tests included male and female ladybugs. Both consumed more wingless aphids than winged ones. The winged forms showed greater survival. The study did not identify the mechanism responsible for the difference. The advantage may involve flight, lower detectability, position on the plant, handling time, nutritional quality, palatability, or predator preference.

The results show a combination of morphological plasticity and behavioral change. Under high risk, *Myzus persicae* directs resources toward individuals capable of leaving the environment. This strategy reduces local vulnerability but

may come at a reproductive cost. Wing formation demands resources and tends to reduce investment in immediate reproduction.

Pest management

This phenomenon can affect integrated pest management. Ladybugs reduce the local population by consuming aphids, especially wingless forms. At the same time, high concentrations of predation signals can stimulate the formation of winged individuals. These insects can reach other plants and expand the infested area. Dispersal capacity also gains importance due to the role of *Myzus persicae* in the transmission of plant viruses.

Researchers caution against extrapolation. The experiments were conducted in cages and prevented direct contact during the induction phase. In the field, high predator densities would also increase aphid mortality. Part of the population could die before the formation of the winged generation. For this reason, the study does not recommend reducing the use of natural enemies. The data support the search for stable and balanced predator populations.

The study suggests the existence of a density range capable of maintaining consumption pressure without causing intense production of winged forms. This hypothesis still requires validation under field conditions. Habitat management, crop rotation, the use of resistant cultivars, and other cultural practices can complement

biological control and reduce the risk of induced dispersal.

[RETURN TO INDEX](#)



INDUTOR DE DEFESA

Luminus®

**A proteção
inteligente
para o seu
baixeiro**



Nova molécula bioquímica
que ativa a defesa natural
da planta.



**Compatibilidade em mistura
de tanque** facilita o manejo sem
perder eficácia.



**Proteção contra doenças
foliares** desde o início do ciclo.

uplcorp.com/br  [/uplbr](https://www.instagram.com/uplbr)  [/brasilupl](https://www.facebook.com/brasilupl)

ATENÇÃO

Produto de uso agrícola. Este produto é perigoso à saúde humana, animal e ao meio ambiente. Leia atentamente e siga rigorosamente as instruções contidas no rótulo, na bula e na receita. Utilize sempre os equipamentos de proteção individual. Nunca permita a utilização do produto por menores de idade.

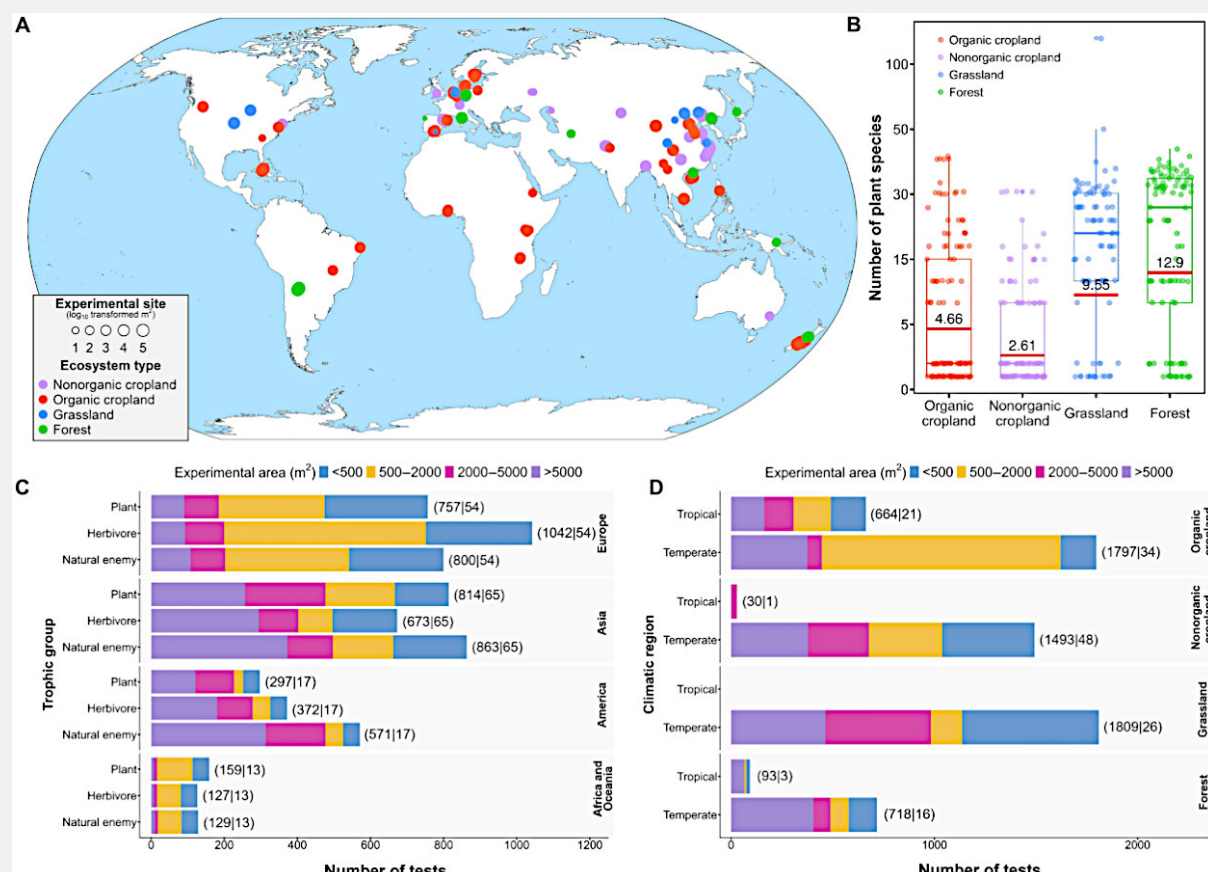
CONSULTE SEMPRE UM ENGENHEIRO AGRÔNOMO. VENDA SOB RECEITUÁRIO AGRÔNOMICO.

Plant diversity enhances biological control in crops

Analysis of 149 studies links diverse systems to a higher ratio between natural enemies and herbivores

24.07.2026 | 07:50 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.1126/sciadv.aeb8680

The increased diversity of plants has raised the proportion of natural enemies relative to pests in agricultural areas. The increase reached 846% in organic crops and 148% in non-organic crops. The results indicate greater potential for preventive biological pest control in diversified systems.

The information comes from research that compiled data from 149 field studies conducted in 27 countries across five continents. The study evaluated interactions between plants, herbivorous invertebrates, and their natural enemies in crops, pastures, and forests (DOI [10.1126/sciadv.aeb8680](https://doi.org/10.1126/sciadv.aeb8680)).

Data analyzed

The database included 55 studies on organic crops and 49 on non-organic crops. It also gathered 26 studies on pastures and 19 on forests. All agricultural studies adopted some form of pest management, with pesticides, alternative methods, or a combination of both strategies.

Researchers analyzed 120 studies with paired observations of herbivore and natural enemy abundance. This set generated 1.641 comparisons. Increased plant diversity showed a general association with greater abundance of predators and parasitoids.

The response of phytophagous fauna varied between the systems. In the crops, natural enemies increased at a higher rate

than insect pests. This pattern indicates a top-down effect in the trophic chain, known as "top-down" control. Predators and parasitoids limit pest populations and can reduce crop damage.

Natural enemies and pests

The relationship between natural enemies and pests has grown significantly when the plant community in agricultural areas has come to include two or more species. The effect appeared in both organic and non-organic systems. According to scientists, the magnitude of the response in crops points to crop diversification as an alternative for preventive pest

management.

More diverse plant communities can offer greater habitat complexity, alternative food sources, and chemical signals associated with the presence of pests. Pollen and other resources can also favor the reproduction and persistence of natural enemies in productive areas.

The results differed in grasslands and forests. In these environments, the ratio between natural enemies and herbivores increased by 4,73% and 21,2%, respectively. The changes were not statistically significant. The more proportional growth of the two groups showed a pattern consistent with upward processes in the food chain.

Increased diversity

In this mechanism, increased plant diversity expands productivity and biomass availability. The greater availability of resources favors herbivores. The growth of these populations then sustains a larger community of predators and parasitoids.

Plant diversity increased the average performance of natural enemies in all ecosystems analyzed. The improvement reached 56% in organic crops, 42,9% in non-organic crops, 17,2% in pastures, and 15% in forests. The result for forests did not show statistical significance.

The performance of natural enemies included indicators of abundance,

diversity, predation, and parasitism. The positive response occurred in temperate and tropical regions. It also appeared in communities dominated by herbaceous and woody plants.

Distinct effects

The research identified distinct effects of biodiversity on ecosystem functioning. In crops, diversification favored top-down pest control. In pastures and forests, increased plant productivity sustained herbivores and natural enemies through a bottom-up process.

Scientists emphasize the simultaneous action of both mechanisms. The predominance of each process depends

on the ecosystem and management practices. In agricultural areas, top-down pest control is of direct interest. The proactive action of natural enemies can limit the growth of pest populations before economic losses occur.

Productivity gains

The study also indicates a contribution from plant diversity beyond direct interactions between plants. Part of the productivity gains may involve changes at various levels of the food chain.

Diversification affects resource availability, habitat structure, and relationships between herbivores, predators, and parasitoids.

The results suggest the use of diversification as a component of integrated pest management. This strategy can enhance the conservation of natural enemies and reduce the vulnerability of crops to pest population outbreaks.

[RETURN TO INDEX](#)

QUANDO O PRODUTOR
PEDE MAIS,
A ESCOLHA É UMA SÓ.

**É SYNGENTA BIO.
LÓGICO!**

syngenta
Biologicals



c.a.s.a.
0800 704 4304

Syngenta Biologicals.
Completa, confiável
e inovadora. Porque sua
produtividade pede mais.

Agricultural Market - 24.Jul.2026

Grain market gains support from climate and conflicts

24.07.2026 | 07:41 (UTC -3)

Vlamir Brandalizze - @brandalizzeconsulting



The international grain market gained support from energy supply constraints, climate risks, and intensified conflicts

along trade routes. The rise in oil prices also increased interest in ethanol, biodiesel, and soybean oil. In Brazil, soybean prices advanced at ports and in the over-the-counter market. Corn and wheat received support from production and logistical difficulties abroad.

Soybeans are trading at their highest levels in almost three years. Contracts traded in Chicago are above \$12 per bushel. Positions for 2027 are exceeding \$12,50 per bushel. This scenario has opened up opportunities for operations aimed at hedging future prices.

In Brazil, producers increased sales during the week. Sales of the current harvest reached 74%. This result was close to the 74,5% recorded in the same period last

year and the average of 75%.

The new crop has approximately 27% of its production already traded. Last year, the figure was 30%. The average for this period is 32%.

Barter transactions gained traction. Producers also began to monitor the availability and prices of diesel and fertilizers. Rising oil prices and conflicts along shipping routes increased concerns about the costs of the next harvest.

In the United States, more than 70% of soybean crops have entered the flowering stage. At the same time last year, the rate was 65%. Pod formation reached 40%, compared to 30% in the previous season. Early planting accelerated crop

development. However, the northern part of the producing belt is facing irregular rainfall. The forecast indicates drier weather in the next two weeks. This situation is supporting prices in Chicago.

Corn situation

Corn is benefiting from erratic weather in the United States and losses in Europe. The reduction in European production could reach close to ten million tons. As a result, the European Union may import more than 30 million tons in the new season.

This movement opens up space for corn and sorghum from Brazil. Problems in the Black Sea also limit the movement of

wheat and corn from Russia and Ukraine. Attacks in the region hinder the entry of bulk carriers.

In the United States, 65% of corn crops have entered the flowering stage. The average for this period is 60%. Ear formation has reached 20%, compared to an average of 16%.

In Brazil, the second corn harvest is nearing 60%. Rain in Paraná, southern Mato Grosso do Sul, and parts of São Paulo have slowed the pace of work. The expectation of dry weather should allow for a new acceleration.

Mato Grosso concentrates areas in the final stages of harvesting. Brazilian production of the second crop is heading

towards 110 million tons. Observed yields remain within expectations. Losses were below initial projections.

Sorghum situation

Sorghum also finds support in the reduced quality of North American crops. Less than 45% of the areas are in good or excellent condition. Last year, that figure was 68%.

The Brazilian sorghum harvest has surpassed 55%. Some producers are holding onto the product and only delivering what has been contracted. At the Port of Santos, nominal prices range between 68 and 70 reais per sack.

Wheat situation

Wheat is trading above seven dollars per bushel in Chicago. Contracts for mid-2027 are reaching around 7,50 dollars per bushel. Lower international supply is supporting the price increase.

The United States wheat harvest is among the worst in the last two decades. Russian production is also facing difficulties.

Attacks on ships, terminals, and storage facilities in the Black Sea are restricting shipments.

In Brazil, the area planted with wheat totals two million hectares. Last year, the crop occupied 2,5 million hectares. Excessive rainfall is damaging crops in Rio Grande do Sul and Uruguay.

Rice situation

Rice prices are recovering in the main producing regions. In Rio Grande do Sul, prices have risen in the western border region and along the coast. In Tocantins, deals are exceeding 80 reais per sack. In Cuiabá, prices paid by the industry are approaching 100 reais per sack. Limited supply and restocking by packing companies are supporting the market. In Mercosur, Paraguay indicates a reduction in planted area after a season of prices below the cost of production.

Bean situation

Beans are moving in the opposite direction. The irrigated harvest of the third

crop has increased the supply of carioca beans. The highest quality lots, previously traded near 500 reais per sack, are now showing prices between 280 and 310 reais.

Commercial carioca beans range from 260 to 280 reais per sack. Supply exceeds buying pressure. The black bean market is also calm, with prices between 185 and 215 reais per sack.

[RETURN TO INDEX](#)

ALTO RENDIMENTO | TOLERÂNCIA SUPERIOR AO CMV

LANÇAMENTOS

QUALIDADE
& GENÉTICA
GDM



NO CAMPO COM VOCÊ

S7410-S9020

AgrisureViptera3

NA SEMEADURA DO VERÃO SUBTROPICAL, SURGEM
HÍBRIDOS DE ALTO RENDIMENTO PARA VENCEREM
OS DESAFIOS DE CADA SAFRA.

Acesse nosso portfólio pelo site:

www.suprasementos.com.br



Supra
Sementes

John Deere expands its Canoas factory to produce electronics

The R\$75 million project will involve the assembly of modules, GPS receivers, and monitors starting in July 2027

23.07.2026 | 17:02 (UTC -3)

Cultivar Magazine, based on information from Danielle Morcelli Romanelli



John Deere has announced the expansion of its industrial operation in Canoas, Rio Grande do Sul. The project includes an area dedicated to the assembly of electronic components for agricultural and construction machinery. The new operation is expected to begin in July 2027.

The investment totals R\$ 75 million. Production will only serve the Brazilian market. The unit already manufactures the 1025E sprayers.

The new line will handle the final assembly of intelligent control modules, high-precision GPS signal receivers, monitors, and navigation guides. Among the equipment planned is the StarFire receiver.

The modules control the electronic functions of the machines. The other systems support positioning, orientation, and the integration of digital resources into the equipment.

According to Joaquin Fernandez (pictured), John Deere's Vice President of Manufacturing for South America, the expansion strengthens the company's industrial and technological presence in Brazil. The executive also states that the change will increase the capacity to integrate electronic systems into the equipment and bring development closer to the demands of Brazilian customers.

The expansion is part of John Deere's global manufacturing strategy. The company aims to optimize its supply chain and improve logistical efficiency. The

project will also leverage the factory's technical capabilities and the availability of technology professionals in the region.

[RETURN TO INDEX](#)

Eficiência máxima do solo até a planta.

Isso é muito **Verango® Prime**.

Verango® Prime é uma solução referência no manejo de nematoides e no controle de fungos de solo, promovendo saúde da cultura e um sistema radicular mais vigoroso.

Única solução com:



Seletividade que **preserva organismos benéficos**.



Versatilidade com aplicação **via sulco ou barra**.



Carboxamida de **alto efeito fisiológico**.



Se é Agro, é Bayer.
Se é Bayer, é bom.

VERANGO
PRIME



ATENÇÃO

ESTE PRODUTO É PERIGOSO À SAÚDE HUMANA, ANIMAL E AO MEIO AMBIENTE; USO AGRÍCOLA: VENDA SOB RECEITUÁRIO AGRÔNOMICO; CONSULTE SEMPRE UM AGRÔNOMO; INFORME-SE E REALIZE O MANEJO INTEGRADO DE PRAGAS; DESCARTE CORRETAMENTE AS EMBALAGENS E OS RESTOS DOS PRODUTOS; LEIA ATENTAMENTE E SIGA AS INSTRUÇÕES CONTIDAS NO RÓTULO, NA BULA E RECEITA; E UTILIZE SEMPRE OS EQUIPAMENTOS DE PROTEÇÃO INDIVIDUAL.

Amazone/MP Agro announces Leandro dos Santos as new CEO

The executive takes the helm of the company with a focus on innovation, strengthening the portfolio, and expanding the business

23.07.2026 | 15:32 (UTC -3)

Cultivar Magazine



Amazone/MP Agro has announced Leandro dos Santos (pictured) as its new CEO. With 20 years of experience in the

agricultural machinery sector, the executive's mission will be to expand the company's portfolio and lead its next phase of growth.

According to Amazone/MP Agro, Leandro's appointment continues the legacy built by Douglas Peccin and reinforces the company's commitment to sustainable growth, innovation, and strengthening its presence in the Brazilian market.

“It is a great honor to assume the leadership of Amazone/MP Agro. First of all, I want to express my deep respect for the legacy left by Douglas Peccin, whose entrepreneurial vision was fundamental to building the company we know today. I take on this challenge with great

responsibility and enthusiasm, committed to working together with our team, dealers, customers, and partners to develop people, strengthen our portfolio, and prepare the company for its next phase of growth,” stated the CEO.

Throughout his career, Leandro held leadership positions in companies in the sector, most notably at Indústrias Colombo, where he worked for over 17 years and also served as CEO for North America. Before assuming the presidency of Amazone/MP Agro, he was executive vice president and general manager of LMC Ag.

Leandro holds a degree in Business Administration from Paulista University (Unip), and is also a technician in Agriculture and has completed the Global

C-Level Executive Program at Wharton Executive Education.

[RETURN TO INDEX](#)



O novo jeito de fazer negócios

AgriConnection conecta você às melhores oportunidades em insumos e soluções financeiras com praticidade e segurança.

Somos a **rede de acesso** que conecta produtores às indústrias globais, oferecendo amplo **portfólio próprio** de defensivos, nutrição, fertilizantes e biológicos, com negociações ágeis e logística eficiente. Nosso modelo inovador traz **conveniência e confiabilidade** para a melhor tomada de decisão, gerando resultados que fazem a diferença.

Conecte-se agora e ative o novo jeito de fazer negócios.



agricconnection



agricconnection.com.br



Conecte-se ao novo!

Hydrocarbons reduce whitefly establishment

Eicosane and squalane reduced the establishment of *Bemisia tabaci* by up to 83,4% in controlled trials

23.07.2026 | 14:20 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Sebastian José de Araújo

Herbivory caused by *Bemisia tabaci* altered the chemical profile of four

legumes and increased the relative abundance of long-chain hydrocarbons. In bioassays, some of these compounds reduced the establishment of whitefly adults. Eicosane and squalane showed the greatest effects and decreased insect landing by up to 83,4% under choice conditions. The results indicate potential for the development of semiochemicals aimed at the sustainable management of the pest (DOI 10.1016/j.napere.2026.100219).

The study evaluated soybean, mung bean, black mung bean, and cowpea. The plants were kept under controlled conditions and infested with adult *Bemisia tabaci* for 72 hours. Plants without insects formed the control treatment.

Chemical analysis

Chemical analysis employed dynamic headspace sampling and gas chromatography coupled with mass spectrometry. Infestation modified the profile of the four species. The main compounds associated with herbivory included eicosane, heneicosane, tetracosane, dotriacontane, and squalane. The intensity of the response varied among the crops.

Soybeans and mung beans showed similar induction patterns. Black mung beans accumulated a higher proportion of long-chain alcohols. Cowpeas produced a distinct profile, with substances absent in healthy plants.

The researchers selected 14 hydrocarbons and related compounds for the behavioral assays. The applications were made to the upper surface of soybean leaves. The tests used concentrations of 200 and 500 parts per million. Untreated plants and plants treated only with ethyl acetate served as controls.

No choice

In the no-choice trial, conducted with 200 parts per million, eicosane reduced adult establishment by 57,6% after 24 hours.

Squalane showed a reduction of 55,9% in the same period. After 48 hours, the rates reached 54,2% and 52,5%, respectively.

Increasing the dose to 500 parts per million amplified the response. Eicosane and squalane reduced establishment by 60% after 24 hours. Eicosane maintained the same result after 48 hours. Squalane showed a 55% reduction in the second evaluation period.

Octadecane, dotriacontane, and hexadecane produced intermediate responses. Other compounds showed moderate or low effects. Ethyl acetate caused only a slight alteration in insect behavior. This result attributes most of the action to the hydrocarbons tested.

With choice

The choice trials focused the evaluation on eicosane and squalane. At a concentration of 200 parts per million, eicosane reduced establishment by 83,4% after 24 hours. Squalane achieved a reduction of 74,3%. After 48 hours, the rates decreased to 45,3% and 42,6%, but remained higher than the controls.

The low volatility and hydrophobic nature of these compounds support the hypothesis of contact action. The whitefly uses physical and chemical stimuli during landing, exploration of the leaf surface, and the beginning of stylet insertion. Changes in the chemical composition of the leaf can interfere with acceptance by the host plant.

Natural concentrations

The study did not determine the natural concentrations of hydrocarbons in the leaves. The analysis measured the relative abundance of the compounds. The identifications also remain provisional until confirmation with authentic chemical standards.

Behavioral tests were conducted only on soybeans and under controlled conditions. The *Bemisia tabaci* colony was also maintained on this crop. The insects' prior experience with the host may have influenced their responses.

Researchers recommend further studies with absolute quantification, hydrocarbon mixtures, and different host plants. Trials

under semi-field and field conditions are also needed to assess persistence, formulation stability, and efficacy in the face of rain, ultraviolet radiation, wind, and temperature variations.

The results present eicosane and squalane as candidates for behavior modification-based tools. Practical application depends on chemical validation, understanding the sensory mechanisms of the whitefly, and demonstrating performance under agricultural conditions.

[RETURN TO INDEX](#)

Qualidade e proteção

na velocidade que sua lavoura **precisa**.



Adjuvantes



Herbicidas



Inseticidas



Fungicidas



Acaricidas



Reguladores

altadefensivos.com.br

alta

Nanozyme with cobalt reduces bacterial wilt in tomato plants

The material inhibited *Ralstonia solanacearum*, limited the disease in pots, and activated defense responses in the plants

23.07.2026 | 08:21 (UTC -3)

Schubert Peter, Cultivar Magazine

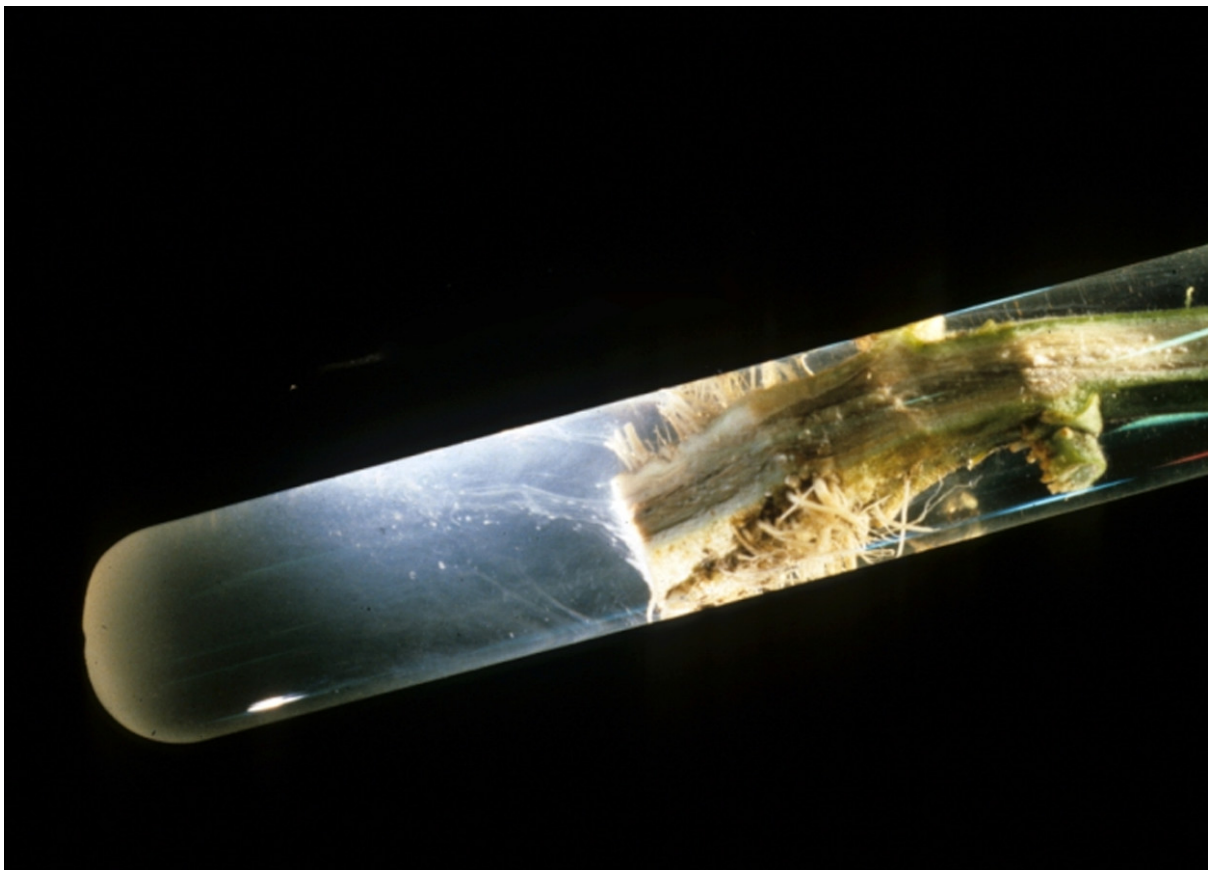


Photo: Florida Department of Agriculture and Consumer Services - CC 3.0

Carbon nanotubes doped with nitrogen and encapsulated with cobalt reduced bacterial wilt in tomato plants in laboratory and pot tests. The material, classified as a nanozyme, inhibited *Ralstonia solanacearum* by generating reactive oxygen species. The treatment also limited plant colonization and modulated genes linked to plant defense (DOI 10.1016/j.aac.2026.07.009).

Chinese researchers produced two structures of the material. One had a tubular shape. The other had a bamboo-like morphology. The synthesis occurred through pyrolysis at high temperature. The cobalt nanoparticles became associated with the nanotube structure.

Tubular shape

The tubular shape presented a larger surface area and a larger pore volume. This configuration also showed activity similar to the enzymes peroxidase and glutathione peroxidase. Both activities favor oxidative reactions. In the bacterial system, the process increased the formation of reactive oxygen species and reduced the antioxidant capacity of the cells.

In in vitro assays, the tubular nanozyme achieved an inhibition rate of 93,34% against *Ralstonia solanacearum* at a concentration of 100 milligrams per liter. A concentration of 200 milligrams per liter resulted in complete inhibition. The

bamboo-like structure showed an inhibition rate of 74,75% at a concentration of 100 milligrams per liter.

The higher activity of the tubular material led the researchers to select this structure for the following steps. Commercial nanotubes without the same cobalt arrangement and biochar derived from corn cob showed inhibition close to 30% at a concentration of 200 milligrams per liter. The result indicated a central role of the cobalt catalytic sites in the antibacterial effect.

Cellular analyses

Cellular analyses showed an accumulation of reactive oxygen species within the

treated bacteria. This oxidative stress caused membrane deformation and rupture. The treatment also caused leakage of cellular components, reduction of genomic DNA, and fragmentation of genetic material.

The nanozyme also reduced biofilm formation. This structure protects *Ralstonia solanacearum* and promotes the colonization of plant tissues. The loss of the biofilm increased the exposure of bacterial cells to oxidative damage.

Application timing

The researchers evaluated preventive application and application after inoculation with the pathogen. In the

preventive assay, the plants received 20 milliliters of a suspension with 200 milligrams per liter of the nanozyme. Inoculation occurred 24 hours later. The study compared the material with water and with Zhongshengmycin, a bactericide used as a reference.

After ten days, the group treated with water reached an incidence of 100%. The treatment with Zhongshengmycin registered 91,67%. The nanozyme showed an incidence of 80,56%. The disease rate reached 92,36% in the control group, 61,11% with Zhongshengmycin, and 60,42% with the nanozyme.

In the therapeutic trial, the pathogen came into contact with the plants before treatment. Symptoms appeared on the fifth

day in the control group. In the treated groups, symptoms appeared on the sixth day. After ten days, the incidence reached 100% in the control group and 91,67% in both treatments.

Bacterial counts in stem tissues showed a lower population of *Ralstonia solanacearum* in plants treated with the nanozyme. Malondialdehyde content also decreased in infected plants after treatment. This compound acts as an indicator of lipid peroxidation and oxidative damage in plant membranes.

Transcriptomic analysis

Transcriptomic analysis identified alterations in pathways linked to the cell

wall, carbohydrate metabolism, phenylpropanoid biosynthesis, hormonal signaling, and pathogen response. The treatment modified the expression of genes associated with defenses regulated by salicylic acid and jasmonic acid.

In infected stems, the concentration of salicylic acid increased. Application of the nanozyme after inoculation reduced this level to values ??close to those observed in healthy plants. The researchers linked the result to a lower bacterial load and a reduction in local immune activation.

In the leaves, the treatment increased the expression of several defense genes. This behavior suggests activation of responses in tissues distant from the site of infection. Jasmonic acid content did not show

significant differences between treatments.

Another target

The nanozyme also showed activity against *Xanthomonas oryzae* pv. *oryzae*. The assay recorded signs of oxidative stress and loss of cellular integrity. The result points to potential use against another phytopathogenic bacterium, although the study focused its agronomic evaluation on bacterial wilt of tomato.

Safety tests did not detect alterations in germination, height, fresh weight, dry weight, or chlorophyll and carotenoid content of the tomato plant under the evaluated conditions. Acute exposure for 48 hours also showed low toxicity to Italian

honeybees, *Apis mellifera ligustica*.

Researchers emphasize the need for further studies before large-scale agricultural application. Future assessments need to address persistence in the soil, accumulation, material transformation, cobalt release, and effects on non-target microorganisms.

[RETURN TO INDEX](#)



Herbicida

Thunder®

**Recupere o controle
do manejo de plantas
daninhas resistentes**



**Tecnologia exclusiva
com novo modo de ação**



**Alta eficácia no
controle da buva**



**Controla pé-de-galinha
com até 8 perfilhos**



**Não causa fitotoxicidade
quando aplicado 5 dias
antes da semeadura**

uplcorp.com/br



@uplbr



/brasilupl

ATENÇÃO

Este produto é perigoso à saúde humana, animal e ao meio ambiente. Leia atentamente e siga rigorosamente as instruções contidas no rótulo, na bula e na receita. Utilize sempre os equipamentos de proteção individual. Nunca permita a utilização do produto por menores de idade.

CONSULTE SEMPRE UM ENGENHEIRO AGRÔNOMO. VENDA SOB RECEITUÁRIO AGRÔNOMICO.

Fungi reduce root-knot nematode in tomato plants

Drechslerella dactyloides and *Drechslerella brochopaga* achieved greater efficacy in vessels and microplots

23.07.2026 | 06:52 (UTC -3)

Cultivar Magazine



Photo: George Barron - CC BY-NC-ND 40

Two species of predatory fungi reduced the population of *Meloidogyne incognita* in tomato plants by up to 74,1%. The study evaluated five species under in vitro conditions, in pots, and in field microplots (DOI 10.1002/ps.71139).

In laboratory tests, *Drechslerella dactyloides* caused 99,3% mortality of second-stage juvenile nematodes within 120 hours. *Drechslerella brochopaga* achieved 97,9%. The pea bran-based substrate favored greater sporulation, particularly for *Drechslerella dactyloides*.

In pots, *Drechslerella dactyloides* reduced the number of galls by 70,8% and the number of eggs and second-stage juveniles per plant by 74,1%. In microplots, the reductions reached 66% and 70,3%,

respectively.

Drechslerella brochopaga reduced galls by 68,3% and eggs and juveniles by 72% in pots. In microplots, the rates reached 64,6% and 68,1%.

The species *Arthrobotrys oligospora*, *Arthrobotrys musiformis*, and *Arthrobotrys conoides* showed moderate or low efficacy.

[RETURN TO INDEX](#)

Superior Court of Justice (STJ) rules for the forfeiture of a tractor used in an environmental infraction

The owner's good faith does not prevent seizure; forfeiture requires an administrative process

22.07.2026 | 16:27 (UTC -3)

Schubert Peter, Cultivar Magazine



The Second Panel of the Superior Court of Justice ruled that the seizure and forfeiture of machinery used in environmental offenses does not depend on proof of bad faith on the part of the owner. This understanding extends to equipment rented to third parties. However, the definitive application of forfeiture requires an administrative process with the right of defense for the owner of the asset, as stated in Special Appeal 2226768.

The trial involved a tractor used to deforest approximately 100 hectares of native forest in the Gurupi Biological Reserve, in Maranhão. The equipment belonged to a person with no proven involvement in the illegal activity. The owner had rented the machine.

The panel granted the special appeal filed by the Chico Mendes Institute for Biodiversity Conservation. The decision overturned a ruling by the Federal Regional Court of the 1st Region, which had authorized the definitive release of the tractor. The Superior Court of Justice (STJ) ordered the immediate return of the machine to the environmental enforcement agency and the reinstatement of the seizure.

Seizure of assets

According to the winning vote, article 25 of Law 9.605/1998 mandates the seizure of products and instruments used in environmental infractions. The rule does not condition the measure on the owner's

guilt, intent, or bad faith.

Minister Maria Thereza de Assis Moura presented the position accepted by the majority. According to the judge, the administrative responsibility of the offender is subjective in nature. A simple fine, for example, requires an evaluation of the conduct.

However, the situation regarding the equipment follows a different legal regime. For this regime, the seizure applies to the asset used in the illegal activity. The measure does not represent a personal punishment for the owner. The irregular use transforms the machine into an instrument of the infraction. This connection allows for seizure even when another person operated or hired the

equipment.

Seizure and forfeiture

The Superior Court of Justice (STJ) also differentiated between seizure and definitive forfeiture. The environmental agent can seize the machine at the time of inspection. The permanent loss of the asset depends on the conclusion of the administrative process.

The owner needs to participate in this procedure. The administration must guarantee the right to a fair hearing and full defense, as the outcome affects property rights. In the end, the authority may decide on the allocation provided for in the legislation.

Lack of awareness of the use

In the proceedings, the tractor owner claimed to be unaware of its illegal use. She alleged that she had rented the equipment for the repair of dams and roads. She also presented information regarding the absence of any prior environmental offenses. The first instance court denied the request for its return. The Federal Regional Court of the 1st Region overturned the sentence. The regional court considered the owner's good faith and ordered the definitive release of the machine. ICMBio appealed to the STJ (Superior Court of Justice). The institute argued that environmental legislation

provides for the seizure of instruments used in illegal activities. It also argued that the rental contract did not preclude this measure. The majority of the Second Panel accepted this argument.

The ruling also applied guidelines from STJ Themes 1.036 and 1.043.

Topic 1.036 establishes that seizure does not depend on the specific, exclusive, or habitual use of the equipment in the illegal activity. Proof of the use of the item in the infraction is sufficient.

Topic 1.043 removes the automatic right of the owner to the status of custodian. The public administration decides on the safekeeping and destination of the equipment, according to articles 105 and 106 of Decree 6.514/2008.

For most, requiring proof of bad faith on the part of the owner would reduce the effectiveness of inspections. Lease agreements could serve as asset protection against seizure. This scenario would decrease the economic risks associated with environmental violations.

[RETURN TO INDEX](#)

Bayer promotes Brazilian executive to leadership position in the US

Cauê Tavares will now lead the Nebraska, Colorado, and Wyoming Business Unit

22.07.2026 | 15:57 (UTC -3)

Cultivar Magazine



Bayer Crop Science has promoted Cauê Tavares (pictured) to the position of

"leader" of the Business Unit for the states of Nebraska, Colorado, and Wyoming in the United States. Based in St. Louis, Missouri, he assumes the new role after more than three years with the company and approximately 13 years of experience in agribusiness.

Until then, Tavares held the position of Director of Customer Marketing, Marketing Communications and Business Intelligence at Bayer, being responsible for market strategies, sales force excellence and customer experience. Before joining the company, he built a career spanning more than nine years at Syngenta.

Holding a degree in Biological Sciences from the "Luiz de Queiroz" Higher School of Agriculture (Esalq/USP), Tavares has an MBA in Business Management and

Administration and executive training from institutions such as Harvard Business School and the Massachusetts Institute of Technology (MIT).

[RETURN TO INDEX](#)

Broflanilide reduces the growth of diamondback moths

Exposure to low concentrations affected reproduction, development, and the next generation of the pest

22.07.2026 | 15:16 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: David Riley / University of Georgia - Bugwood

Low concentrations of broflanilide reduced fecundity and slowed the population growth of the diamondback moth, *Plutella xylostella*. The effects also reached the next generation. The insecticide prolonged the larval and pupal stages, decreased the weight of the pupae, and altered the regulation of juvenile hormone. The results indicate potential for pest management, but also reinforce the need to evaluate physiological effects after exposure to residues in the field (DOI 10.1016/j.pestbp.2026.107265).

Chinese researchers evaluated concentrations corresponding to mortality rates of 5%, 10%, and 30% of the population. Broflanilide showed the highest toxicity among three insecticides targeting

the gamma-aminobutyric acid receptor. The lethal concentration for 50% of the larvae reached 0,056 milligrams per liter. Fipronil registered 0,57 milligrams per liter. Endosulfan reached 47,60 milligrams per liter.

Third instar larvae

The experiment used third-instar larvae. Cabbage leaf discs were treated with insecticide solutions using the immersion method. Mortality was assessed after 72 hours. Surviving insects were kept in rearing for analysis of development, reproduction, longevity, and population parameters.

Exposure to broflanilide prolonged the larval stage by between 13,77% and 23,34%. The delay ranged from 14,95 hours to 25,34 hours. The pupal stage increased between 16,15% and 19,06%, with an increase of 13,46 hours to 15,89 hours.

The weight of the pupae decreased between 4,48% and 10,85%. In adult females, the treatment caused a reduction in ovariole length and oocyte count. Ovariole length decreased between 13,45% and 38,25%. The number of oocytes decreased between 25,12% and 47,15%.

Decline in fertility

Fertility decreased by 10,59% at the lowest concentration. The reduction reached 17,10% in the treatment equivalent to the lethal concentration of 30%. The longevity of females fell between 10,03% and 16,29%. In males, the reduction ranged from 8,70% to 16,73%.

Scientists have linked some of these changes to the youth hormone. The levels of this hormone increased between 16,15% and 34,31% after treatment. The level of 20-hydroxyecdysone did not show a significant change.

Molecular analysis

Molecular analysis showed a reduction in the expression of two genes linked to

juvenile hormone metabolism. PxBJSP2 expression decreased between 41,94% and 52,96%. PxJHE expression decreased between 52,43% and 60,19%.

The team confirmed the function of these genes through RNA interference. Silencing PxBJSP2 increased juvenile hormone levels by approximately 36% in the group without broflanilide. Silencing PxJHE promoted an increase of nearly 50%. The combination of silencing and the insecticide amplified the effects on development, fecundity, and longevity.

An experiment with a juvenile hormone synthesis inhibitor restored hormone levels close to control values. The treatment also eliminated the delay in larval and pupal stages. However, it did not restore pupal

weight or fecundity. In these two parameters, the combination worsened the losses. The researchers point to the involvement of other physiological mechanisms besides hormonal alteration.

Downward generation

The effects persisted in the descendant generation. Larval duration increased between 3,19% and 7,40%. The pupal stage was between 35,58% and 48,77% longer. The period before the adult stage advanced between 9,23% and 13,48%.

The fertility rate of the next generation fell between 7,19% and 12,41%. The intrinsic rate of population increase decreased between 6,90% and 17,24%. The finite rate of increase decreased between 2,24%

and 5,22%. The average generation time increased between 8,74% and 14,99%, with a maximum increase of 59,28 hours.

RETURN TO INDEX

Valtra invests in technology for family farming

Precision agriculture tools and connectivity help small farms gain efficiency

22.07.2026 | 14:15 (UTC -3)

Larissa Souza dos Santos



July 25th is celebrated as International Family Farming Day, a date that recognizes the dedication of producers who represent the foundation of food

production in Brazil. Valtra, an AGCO group brand recognized for its innovation and solutions geared towards rural producers, takes the opportunity to honor these families, highlighting that digital transformation and innovation in the field should not be restricted to large producers, but should be an accessible and transformative reality for small producers as well.

For small and medium-sized farms, modernization goes beyond increased productivity: it can also be the link that enables family succession. By transforming daily life in the field, technology contributes to the transfer of knowledge between generations and creates space for new family members to see the business as a modern, viable, and

attractive long-term activity.

“Family farming is built on tradition, but its continuity depends on evolution. For families to remain and prosper on the land, the sector needs to offer tools that facilitate daily work, transforming farming into a sustainable, efficient, and less physically demanding business,” emphasizes Claudio Esteves, Commercial Director of Valtra.

Valtra works to democratize access to technology, overcoming the idea that precision agriculture is restricted to large producers. Solutions such as the Valtra Guide guidance system and Valtra Connect telemetry are crucial for automating simple tasks, avoiding waste of inputs, and saving fuel. In practice, the technology allows the operator to monitor

the health of the operation in real time and more easily, transforming the person performing the task into a true intelligence manager in the field.

For producers seeking to maximize their growing window, the A4S Series, for example, stands out for its operational efficiency, allowing them to work 5% more hectares per hour. Another major technical advantage is the 15% fuel savings provided by the AGCO Power engine combined with the electronic fuel management system. In addition to requiring little maintenance, it is a highly robust line that can achieve up to 12% more service life than other market options. High-precision technology becomes fully accessible in the A4 Series, as producers can opt for the inclusion of

the Valtra Guide autopilot by Trimble, which generates savings of around 15% in broadcast application of inputs, eliminating waste of fertilizers and pesticides.

Since the routine in family farming often involves long working hours, the operator's health and comfort become priorities.

Investing in ergonomics, such as tractors equipped with comfortable factory-fitted cabins, intuitive controls, and sound insulation, reduces fatigue and protects the worker's physical integrity.

“We understand that the machine should be an extension of the worker. Therefore, under the global Farmer First strategy, we develop solutions that always prioritize the operational needs and well-being of the operator. Honoring family farming means providing them with tools that value their

health, improve their profitability, and guarantee the future of their business,” concludes Esteves.

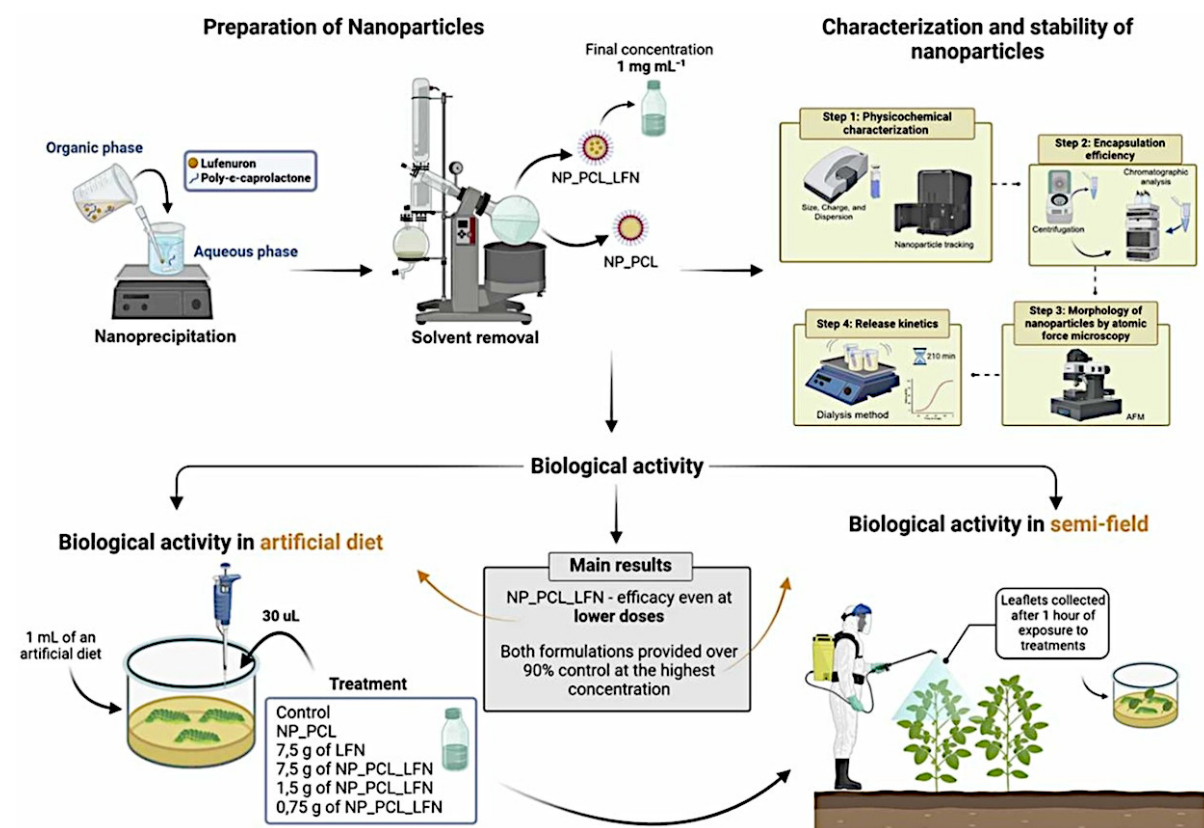
[RETURN TO INDEX](#)

Nanoformulation prolongs the action of lufenuron against caterpillars

PCL nanoparticles maintained stability for 90 days and controlled *Rachiplusia nu* in soybeans

22.07.2026 | 09:52 (UTC -3)

Cultivar Magazine



DOI 10.1016/j.plana.2026.100250

Brazilian researchers have developed a nanoformulation of lufenuron with controlled release and encapsulation efficiency greater than 99%. The system uses polycaprolactone nanoparticles, a biodegradable polymer known for its stability and slow degradation. In tests, the technology prolonged the release of the insecticide and maintained control of *Rachiplusia nu* (DOI 10.1016/j.plana.2026.100250).

The research evaluated the physicochemical properties of the formulation, the release kinetics of the active ingredient, and the biological activity in an artificial diet and under semi-field conditions.

Lufenuron acts as an insect growth regulator and inhibits chitin synthesis. The active ingredient has low solubility in water. This characteristic affects its distribution in biological systems and the environment. Nanoencapsulation aims to protect the compound, control its release, and increase the effectiveness of the applied dose.

The researchers produced the nanoparticles through nanoprecipitation. The formulation received polycaprolactone, lufenuron, and components used in the formation and stabilization of nanocapsules. The final system contained one milligram of lufenuron per milliliter. Higher concentrations showed precipitation of the active ingredient during preliminary tests.

The particles containing lufenuron showed an average diameter of 264 nanometers using dynamic light scattering.

Nanoparticle tracking analysis indicated a diameter of 205 nanometers. Atomic force microscopy identified spherical, uniform structures without apparent pores, with an average diameter of 94 nanometers after sample drying.

Encapsulation efficiency

Encapsulation efficiency exceeded 99% and remained stable throughout the analyzed period. Size, zeta potential, polydispersity index, and pH parameters showed little change over 90 days of

storage at 25 degrees Celsius. The polydispersity index remained below 0,2, a result associated with the uniformity and stability of the system.

The nanoformulation reduced the release rate of lufenuron. After one hour and 30 minutes, the unencapsulated compound had released 33,21% of the active ingredient. In the same period, the nanoparticles released 6,71%. The result represents a release approximately five times lower.

Mathematical analysis indicated a predominance of polymer chain erosion in the process. In this mechanism, the degradation of polycaprolactone regulates the release of lufenuron. Diffusion of the active ingredient through the matrix may

also play a role in the process.

Biological tests

Biological tests used caterpillars of *Rachiplusia nu*. This species causes defoliation in soybeans and may exhibit varying tolerance to insecticides. The researchers conducted two independent trials with an artificial diet.

In the first evaluation, the 7,5-gram dose of the product and the same amount of active ingredient in the nanoformulation caused 100% mortality. The nanoencapsulated doses of 1,5 grams and 0,75 grams reached 99% and 96%, respectively.

The second trial showed greater variation. The commercial formulation and the

nanoformulation at a dose of 7,5 grams maintained mortality above 96%. The nanoencapsulated dose of 0,75 grams reached 72%. Controls without lufenuron recorded mortality between 8% and 9%.

Treatment in plants

The team also evaluated the treatment on soybean plants of the BMX Valente cultivar, at the R5.5 stage. The application was carried out in 25-square-meter plots, with a spray volume of 100 liters per hectare and a pressure of 2,1 bar. One hour later, the scientists collected leaves from the upper third and offered the material to caterpillars in the laboratory.

In the first semi-field trial, the commercial product at the full dose caused 84% mortality. The nanoformulation achieved 76%. With the reduction of the nanoencapsulated dose to 1,5 grams and 0,75 grams, mortality dropped to 41% and 16%.

In the second trial, commercial lufenuron and the nanoformulation at the full dose achieved 92% and 93% mortality, respectively. Lower doses of the nanoencapsulated formulation resulted in 52% and 22% mortality. The data show similar performance between the formulations at the recommended dose, but also indicate loss of control after steeper reductions in near-field conditions.

Laboratory and semi-field

Researchers attribute part of this difference between laboratory and semi-field conditions to interactions between the plant, insect, insecticide, and environment. Temperature, humidity, ultraviolet radiation, pH, and leaf surface characteristics can alter the stability and availability of the active ingredient.

The study points to the potential use of nanoencapsulation in pest management and precision agriculture strategies. The technology can increase the stability of lufenuron and offer sustained release. However, defining lower doses requires further experiments under different

agronomic conditions.

The research also acknowledges limitations. The release trials covered a short period. Most of the assessments took place in a controlled environment.

Scientists recommend studies in multiple environments, prolonged monitoring of the release, and safety analyses for non-target organisms, soil, and water.

The work brought together scientists Marcos Lenz, Matheus Mota Lanzarin, Leonardo Marques de Almeida Mariano, Manoel Peres Zinelli, Jhones Luiz de Oliveira, Leonardo Fernandes Fraceto, and Adriano Arrué Melo, affiliated with the Federal University of Santa Maria, the São Paulo State University, and the National Institute of Science and Technology in Nanotechnology for Sustainable

Agriculture (INCT NanoAgro).

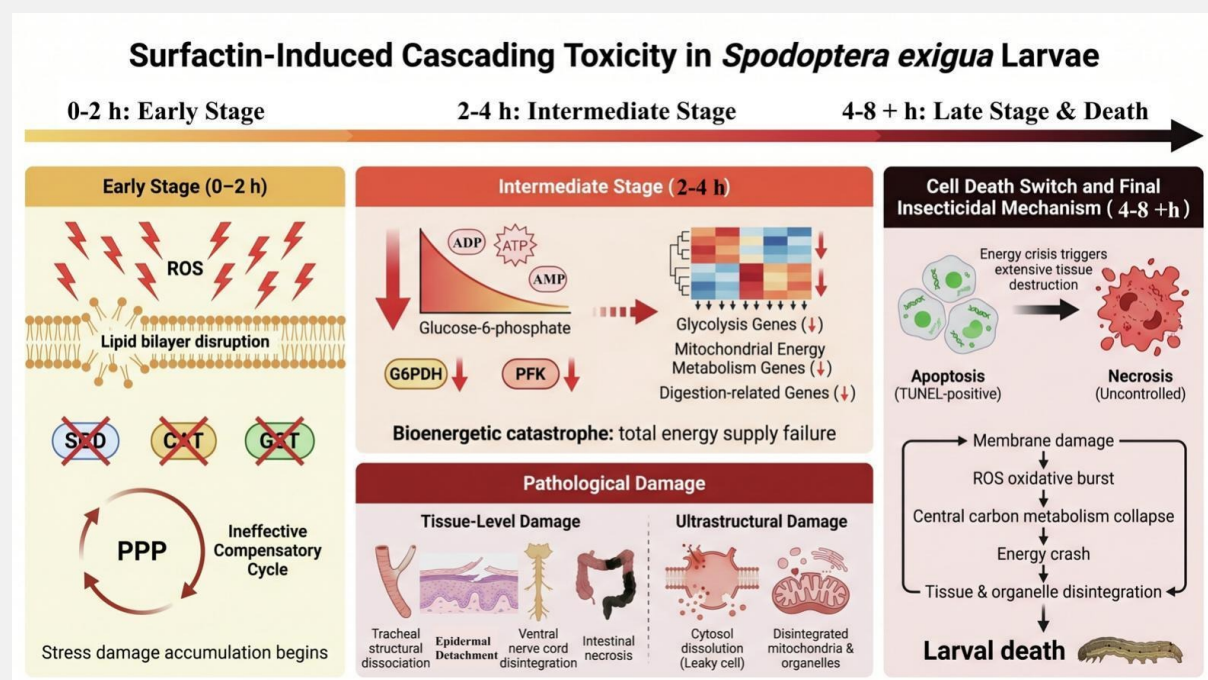
[RETURN TO INDEX](#)

Surfactin causes cell collapse in *Spodoptera exigua*

Lipopeptide from *Bacillus velezensis* outperformed three insecticides in a contact test and demonstrated multi-target activity.

22.07.2026 | 09:13 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.1016/j.pestbp.2026.107254

Surfactin caused oxidative stress, impaired energy metabolism, and tissue disintegration in *Spodoptera exigua*

caterpillars. In contact assays, the lipopeptide showed a median lethal concentration of 136,72 milligrams per liter. This value was lower than the results obtained for pyrethrins, avermectin, and clothianidin. The study points to the potential for the development of a bioinsecticide with action on various cellular targets (DOI 10.1016/j.pestbp.2026.107254).

The team evaluated third-instar caterpillars. Mortality increased with surfactin concentration. Treatment with 50 milligrams per liter killed 1,7% of the insects in 24 hours. A dose of 100 milligrams per liter caused 21,7% mortality. The rate reached 68,3% with 200 milligrams per liter and 100% with 300 milligrams per liter.

The median lethal concentration of pyrethrins reached 326,82 milligrams per liter. Avermectin registered 347,31 milligrams per liter. Clothianidin reached 416,87 milligrams per liter. The results indicate greater contact toxicity of surfactin under the experimental conditions. This comparison does not represent a recommendation for field use.

Cyclic lipopeptides

Surfactin belongs to the group of cyclic lipopeptides. Researchers extracted the substance from metabolites produced by *Bacillus velezensis*. The preparation contained C14 and C15 homologs of surfactin A, B, and C. Analyses did not detect contamination by other lipopeptides,

such as iturin and fengycin.

The study combined metabolomics, transcriptomics, biochemical analyses, histology, and electron microscopy. The team monitored the caterpillars' responses two, four, and eight hours after exposure. The design allowed them to reconstruct the sequence of damage.

Initial response

Within the first two hours, surfactin altered the phospholipid composition of membranes. The damage coincided with an increase in reactive oxygen species. The DUOX gene, linked to the production of these molecules, showed increased expression. Genes associated with

detoxification and antioxidant defense reduced their activity. The imbalance maintained oxidative pressure on the cells.

The initial response also involved the pentose phosphate pathway. This mechanism participates in the production of compounds used in defense against oxidation. However, the maintenance of stress compromised the central metabolic pathways between four and eight hours after treatment.

Glucose-6-phosphate levels fell. The activities of glucose-6-phosphate dehydrogenase and phosphofructokinase also decreased. These enzymes control important steps in the pentose phosphate pathway and glycolysis. The reduction limited carbohydrate utilization and energy

generation.

The relative amounts of adenosine triphosphate, adenosine diphosphate, and adenosine monophosphate showed a significant decrease after four and eight hours. Adenosine triphosphate functions as the main immediate source of cellular energy. The loss of this compound accompanied the progression of the lesions and the change in the pattern of cell death.

Gene expression

Gene expression analysis reinforced this process. Surfactin reduced the expression of genes linked to intestinal digestion, glycolysis, mitochondrial metabolism,

detoxification, and antioxidant response. At the same time, it increased the expression of APAF1, related to the initiation of apoptosis. The DNA fragmentation assay indicated a stronger signal after two hours. In subsequent stages, the lack of energy favored necrosis and cellular disorganization.

The damage affected different systems of the caterpillar. The trachea showed vacuolization, loss of organization, and disintegration. The epidermis lost adhesion and formed fissures. The ventral nerve cord suffered fiber degeneration and loss of definition. In the intestine, wall cells detached and left residues in the lumen.

Electron microscopy revealed membrane rupture, loss of microvilli, and leakage of

cellular contents. Mitochondria swelled, lost cristae, and ruptured their outer membranes. The endoplasmic reticulum and nuclear envelope also suffered degradation. After eight hours, part of the intestinal epithelium showed lytic necrosis and structural collapse.

Researchers describe a cycle of amplification. Surfactin damages membranes. The damage intensifies the formation of reactive oxygen species. Oxidative stress affects enzymes, defense genes, and organelles. Metabolic failure reduces energy production. The lack of energy prevents cellular repair and amplifies tissue destruction.

The study, however, did not evaluate agronomic performance in crops.

Researchers point to the need for a

formulation with efficacy and persistence compatible with commercial use. Studies on membrane receptors and specific molecular interactions are also lacking. The data support the potential of surfactin, but do not authorize direct extrapolation to integrated pest management programs.

[RETURN TO INDEX](#)

Extracts of *Berberis darwinii* affect *Drosophila suzukii*

Alkaloids reduced egg laying and pest survival in laboratory tests

22.07.2026 | 07:35 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Natalia Reyes Escobar - CC BY-SA 4.0

Alkaloid-rich extracts obtained from *Berberis darwinii* roots reduced *Drosophila suzukii* oviposition by more than 80% at the highest concentration evaluated. The treatments also increased egg, larval, and adult mortality under controlled laboratory conditions (DOI 10.1002/ps.71148).

Chilean researchers analyzed extracts from roots, stems, and leaves, as well as berberine, palmatine, and mixtures of the two compounds. The root extracts showed the highest concentrations of berberine and palmatine and elicited the most intense biological responses.

The median lethal dose of root extracts reached 4,23 milligrams per liter for eggs, 3,77 milligrams per liter for larvae, and 0,50 milligrams per liter for adults. Purified

berberine required doses of 44,00, 83,14, and 7,03 milligrams per liter, respectively.

Palmatina exhibited larvicidal activity, with a median lethal dose of 2,10 milligrams per liter. Leaf extracts produced lower biological activity, consistent with the low concentration of alkaloids in this tissue.

The study recorded a reduction in egg laying and an increase in mortality as concentrations increased. The results indicate the potential of *Berberis darwinii* as a source of bioactive compounds for the management of *Drosophila suzukii*.

Scientists emphasize the need for further studies on environmental stability, effects on non-target organisms, and field efficiency before practical applications in pest management.

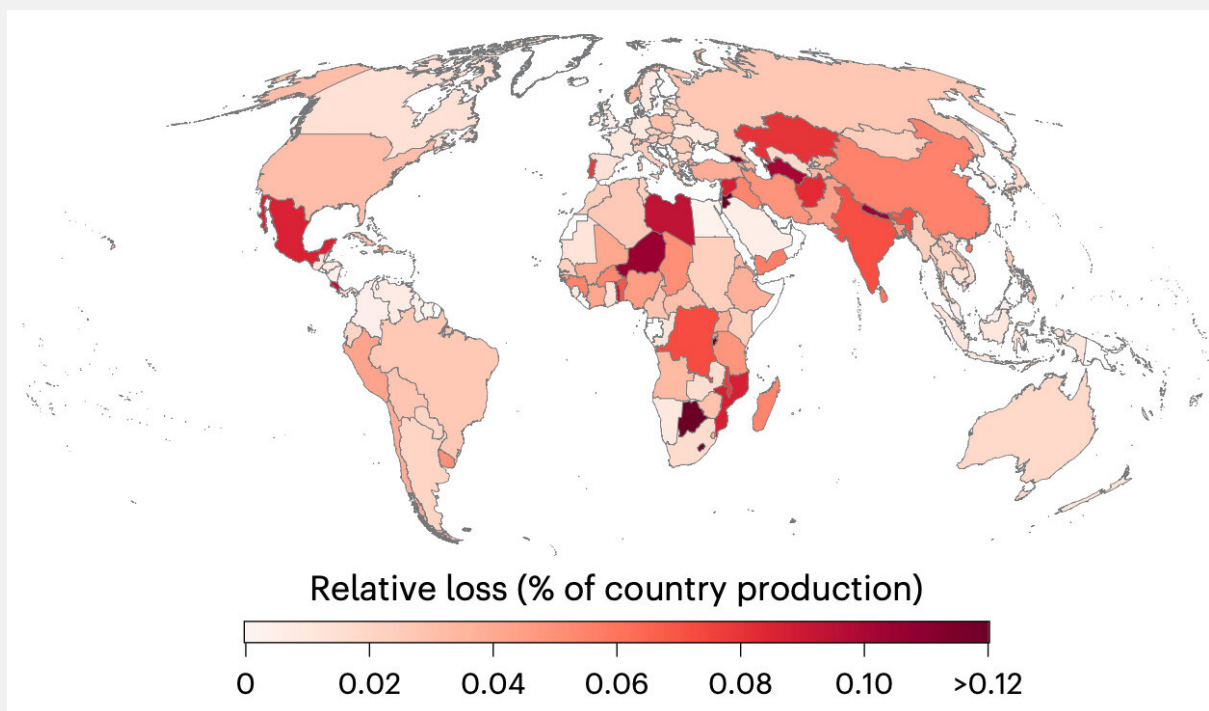
[RETURN TO INDEX](#)

Soil degradation widens gaps in agricultural productivity

Global study estimates annual food losses of 20 million tons

22.07.2026 | 06:14 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.1038/s43016-026-01382-5

The degradation of agricultural land widens productivity gaps on a global scale. A 10% increase in degradation is

associated with an average increase of 1,75% in the difference between achieved productivity and achievable productivity (DOI 10.1038/s43016-026-01382-5).

Scientists analyzed 405.084 cells with a resolution of ten kilometers. The study compiled data from wheat, corn, rice, barley, sorghum, cassava, soybeans, canola, oil palm, and sugarcane. These crops account for 83% of global calorie production.

The researchers evaluated five processes: erosion, compaction, loss of organic carbon, soil water deficit, and reduction in tree cover. The model also considered climate, topography, soil characteristics, fertilizers, irrigation, pesticides, labor, mechanization, and socioeconomic

factors.

The association with degradation represents estimated annual losses of 20 million tons of agricultural production. This volume corresponds to 52 trillion kilocalories, enough to supply approximately 71 million people for a year. The reduction in revenue reaches about four billion dollars per year.

The main areas of sensitivity are concentrated in northern and southern India, northeastern China, the Midwestern United States, and parts of Central and South America, particularly northern Argentina. Brazil is among the countries with the greatest absolute production losses.

According to the study, intensive agricultural systems are more sensitive to small reductions in soil quality. Scientists recommend policies for restoration, conservation agriculture, integrated fertility management, and standardized monitoring of soil health.

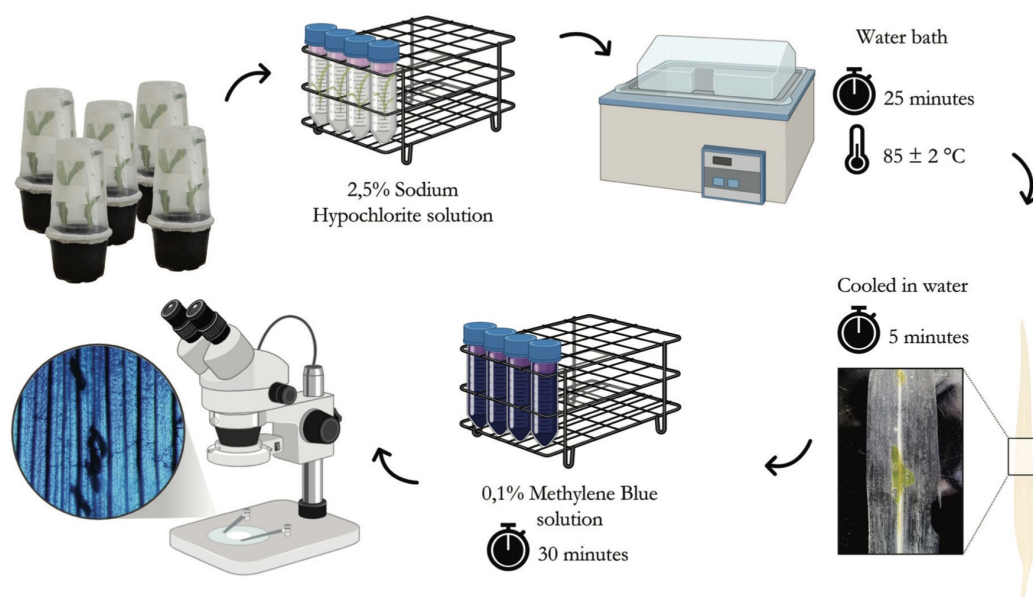
[RETURN TO INDEX](#)

Protocol speeds up corn leafhopper egg count

This method uses hypochlorite and methylene blue to reveal eggs in corn leaf tissue

21.07.2026 | 15:09 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.37486/2675-1305.ec08026

Researchers at the Luiz de Queiroz School of Agriculture have developed a fast and low-cost protocol to visualize and quantify *Dalbulus maidis* eggs in corn tissue. The

method reduces preparation steps and allows processing large volumes of samples (DOI 10.37486/2675-1305.ec08026).

The corn leafhopper lays its eggs inside the leaves. This pattern makes direct observation difficult and can lead to underestimation of fecundity. The species acts as a major vector for microorganisms associated with corn stunt diseases and corn viruses.

The protocol begins with the collection of leaves and stems at least 48 hours after oviposition. The tissues are then placed in tubes containing a 2,5% sodium hypochlorite solution. The material is kept in a water bath at 85 degrees Celsius, with a variation of two degrees Celsius, for 25

minutes.

After cooling in water for five minutes, the researchers transfer the samples to a 0,1% methylene blue solution, prepared in absolute ethanol. The staining lasts 30 minutes. Then, the tissues are washed with 70% ethanol and evaluated under a stereomicroscope at ten times magnification.

The validation involved approximately 3 corn plants between the V1 and V4 stages. Samples contained between five and 80 eggs per plant during a 48-hour oviposition period. Each batch required between one and one and a half hours from collection to counting.

The tissues can remain in the methylene blue solution for at least three weeks

before analysis. The immersion time in the hypochlorite solution needs to be adjusted according to the leaf thickness, the presence of trichomes, and the plant's stage of development. Young leaves require less exposure to avoid disintegration.

The study was developed by Gabriel S. Dias and Aline S. Guidolin.

[RETURN TO INDEX](#)

Forest edges support pollination networks in vegetable crops

Native vegetation reduced differences between organic and conventional farming systems in Alto Tietê

21.07.2026 | 14:50 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Paulo Lanzetta

Atlantic Forest edges near vegetable crops helped maintain interaction networks between bees and plants in areas under organic and conventional management. The landscape effect reduced expected differences between the two systems. Management influenced the organization of interactions more than species composition (DOI 10.1111/een.70125).

The study evaluated 12 rural properties in Alto Tietê, in the state of São Paulo. Six adopted conventional management practices. The other six had organic certification. All were approximately three hectares in size and located about 30 meters from fragments of native vegetation.

The farms cultivated similar vegetables, including pumpkin, lettuce, beetroot, broccoli, chives, carrots... The researchers conducted three campaigns between June 2019 and February 2021. The collections covered both dry and rainy periods.

Examples found

The team recorded 505 bee specimens, distributed among 33 species and four families. Apidae comprised 17 species. Halictidae presented 11. Megachilidae totaled four. Andrenidae included one species.

Organic areas contained 24 bee species. Conventional properties recorded 21. Total species richness did not show a

statistically significant difference between the management systems. However, organic areas had more unique species.

Shared species

The communities of the two systems shared 44% of the bee species. Among them were *Apis mellifera*, *Nannotrigona testaceicornis*, *Paratrigona subnuda*, *Plebeia droryana*, *Tetragonisca angustula*, and *Trigona spinipes*. There were no managed pollinator colonies on the properties. All the bees collected belonged to populations present in the landscape.

The survey also recorded 34 plant species from 13 families. Cultivated species represented 43% of the total. Native plants

accounted for 57%. Organic areas presented 25 plant species visited by bees. Conventional areas totaled 21. The composition of the plants did not differ significantly between the management systems.

The networks in organic areas showed greater diversity of interactions. The average index reached 2,71, compared to 1,63 in conventional properties. This result indicates a wider distribution of visits among the species present.

Opposite direction

Connectance followed the opposite direction. Conventional areas showed an average value of 0,52. Organic areas

registered 0,26. Connectance represents the proportion of interactions performed in relation to the total possible within the network.

According to the study, the greater connectivity in conventional management resulted from the dominance of supergeneralist species. *Apis mellifera* and *Trigona spinipes* accounted for a large portion of the visits. In organic areas, interactions were more distributed among different bees and plants.

In conventional settings, researchers collected 209 bees of 18 species during observation of interactions. *Trigona spinipes* participated in 22,2% of the interaction records. *Apis mellifera* accounted for 20,4%. The most visited

plants included *Leonurus japonicus* and *Ocimum basilicum*.

In the organic areas, the team collected 296 bees of 28 species. *Paratrigona subnuda* and *Apis mellifera* each participated in 17% of the interactions. *Trigona spinipes* accounted for 14,7%. *Bidens pilosa* and *Synedrella nodiflora* received the highest number of visits.

Other indicators

Other indicators, such as niche overlap, network nesting, and specialization, did not show significant differences. Modularity reached higher values ??in organic areas, but the result fell outside the adopted statistical limit.

The presence of flowering plants on the banks maintained active networks in both systems. Spontaneous plants played a significant role. Ruderal species served as food sources for pollinators. The study cites *Bidens pilosa*, *Synedrella nodiflora*, *Galinsoga parviflora*, *Conyza canadensis*, and *Sonchus asper* among the resources associated with these interactions.

The results indicate the agronomic and ecological importance of vegetation strips located between crops and forest fragments. These areas provide flowers, nesting sites, shelter, and favorable microclimatic conditions. They also facilitate the movement of bees between the forest and the crops.

Researchers conclude that conserving native vegetation on edges can support pollination processes even on conventional farms. Maintaining diverse floral resources can also reduce the local impacts of agricultural management. Complete elimination of spontaneous vegetation on edges tends to remove species with a relevant role in interaction networks.

The study recommends a joint assessment of species richness and the structure of ecological networks. Counting bees and plants in isolation did not reveal all the differences between the systems. Analysis of the interactions showed changes in the distribution of visits and in the dependence on generalist species.

The study was developed by scientists
Samantha Marx de Castro, Cauê

Nagatani, Vania Nobuko Yoshikawa,
Franciny Yuko Urushima, Kelli dos Santos
Ramos, Guaraci Duran Cordeiro, and
Maria Santina de Castro Morini.

[RETURN TO INDEX](#)

Coffee farming generates R\$ 3,3 billion in pesticide expenses.

A survey by Kynetec indicates a 22% increase in the 2025/26 harvest and a historical record for the market.

21.07.2026 | 14:41 (UTC -3)

Fernanda Campos



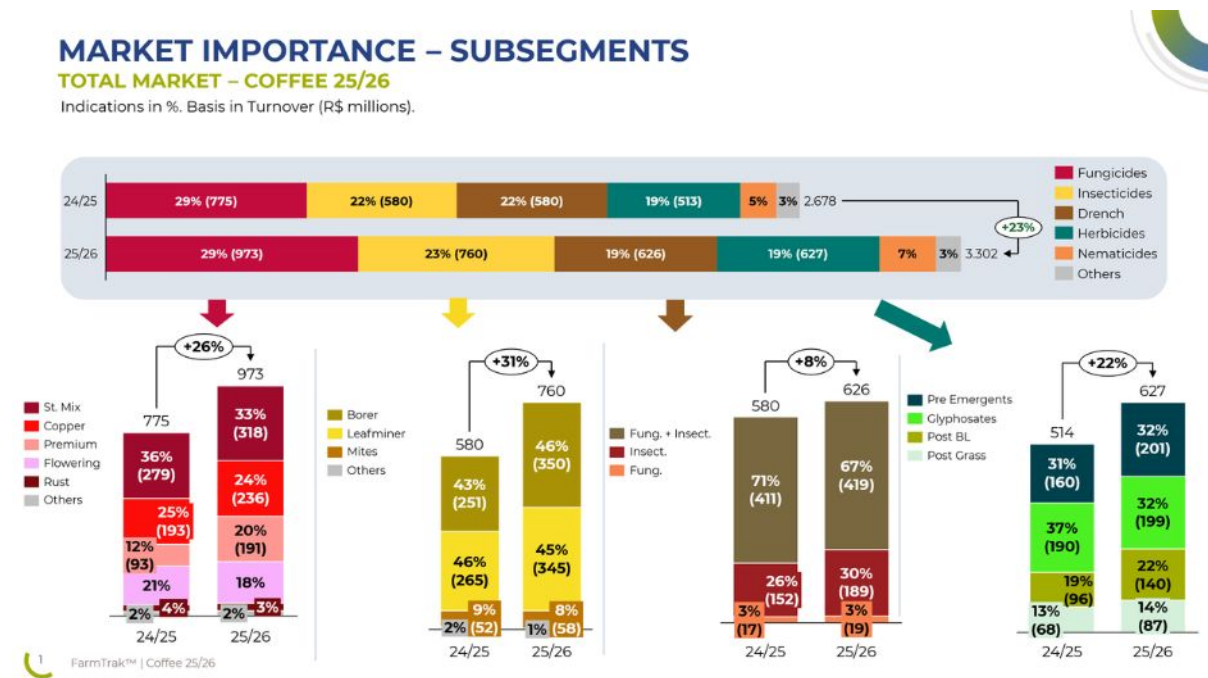
Kynetec Brasil has just released its FarmTrak Coffee survey for the 2025-26 crop year. The data indicates that coffee

farming generated R\$ 3,3 billion in agricultural pesticides during the period, a 22% increase compared to the 2024-25 cycle (R\$ 2,67 billion). This figure marks a record within the consultancy's historical series, according to research specialist Felipe Abelha.

According to the Kynetec executive, the potential treated area or PAT (an indicator that includes the sum of all product applications made during the crop season) reached 42,8 million hectares of coffee, compared to 35,3 million hectares in 2024-25 (+22%).

According to Abelha, coffee farming registered growth in practically all technological indicators of phytosanitary management in the 2025-26 season.

“After a series of harvests without significant expansion of cultivated area, the crop saw a 4% increase compared to 2024-25, reaching 2,186 million hectares,” Abelha explains. He adds that Kynetec's research also observed a 17% increase in the average number of treatments performed by coffee producers in 2025-26: from 16,9 to 19,8.



Robust growth of insecticides and nematicides.

The FarmTrak Café 2025-26 report shows the fungicide segment (foliar and copper-based) once again at the top of the market, with R\$ 973 million in business, equivalent to 29% of the total. This value exceeded by 25% the amount of R\$ 775 million recorded in transactions involving products of this type in the previous harvest.

According to Felipe Abelha, the adoption of so-called 'premium' fungicides intensified in the last cycle, rising from 21% in 2024-25 to 38%. These same products also saw an increase in the average number of treatments, from 1,45

to 1,65. "This was the sub-segment with the greatest expansion in the fungicide category," emphasizes the executive.

However, Abelha points out that the insecticide segment, second in the ranking of pesticides for coffee, appears in Kynetec's research as the main driver of the overall market performance. This category grew 30% compared to the 2024-25 cycle, reaching R\$ 760 million, corresponding to 23% of total transactions. Previously, it was R\$ 580 million. "In absolute terms, insecticides were the segment that expanded the most, with an increase of over R\$ 210 million," Abelha notes.

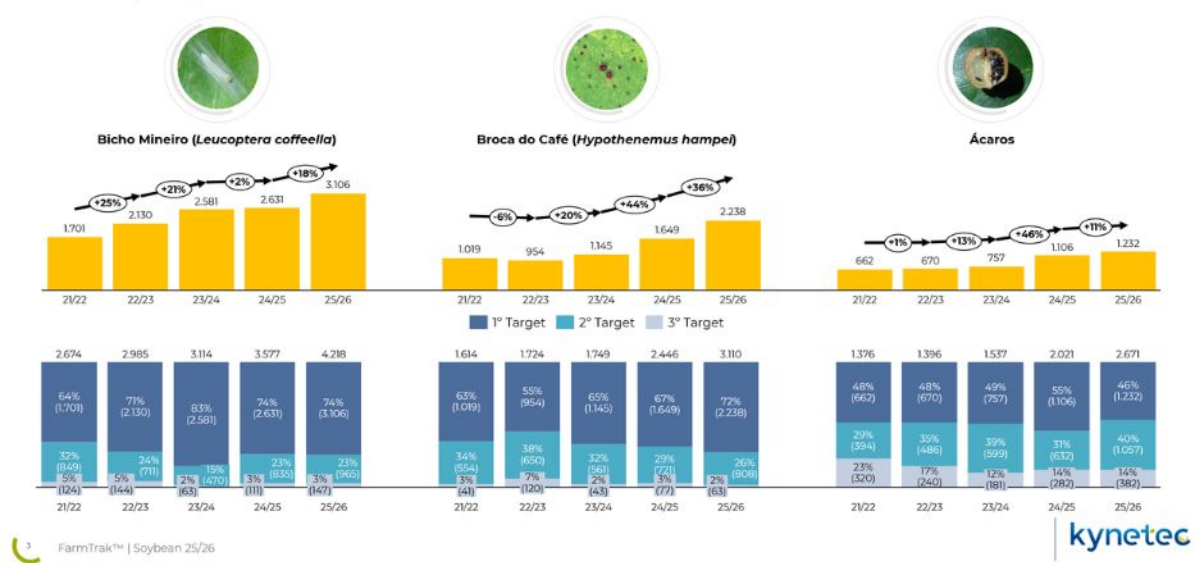
According to the executive, the surge in insecticide use is mainly explained by the

30% increase in the intensity of management of the two main pests of Brazilian coffee: the coffee berry borer (*Hypothenemus hampei*) and the coffee leaf miner (*Leucoptera coffeella*).

In the case of the coffee berry borer, the executive says, the Kynetec study detected a positive variation of 22% in the adoption of insecticides to control the pest, from 43% to 53%, in addition to a 7% increase in the number of treatments – from 1,82 to 1,95 – and a 10% increase in the total cost of management. Regarding the coffee leaf miner, he adds, the main boosts came from the 11% increase in treatment adoption rates – from 56% to 62% – and the 13% increase in treatment costs.

MAIN TARGETS – EVOLUTION FOLIAR INSECTICIDES – COFFEE 25/26

Basis in PAT (1.000 ha).



According to Abelha, the coffee berry borer demanded approximately R\$ 350 million in insecticides in 2025-26, compared to R\$ 252 million in the previous season (+38%). Meanwhile, control of the coffee leaf miner increased from R\$ 264 million to approximately R\$ 345 million (+30%).

In third place in the FarmTrak Café ranking, "soil/drench" (directed spray) products totaled R\$ 626 million, growing

8% compared to the 2024-25 season (R\$ 580 million). According to Kynetec's research, these inputs occupy practically the same market share as herbicides, at 19%. Herbicides generated R\$ 627 million, a figure 22% higher than the previous harvest: R\$ 513 million.

The fifth most representative category in FarmTrak Café, nematicides, registered the highest growth across all product segments: 51%, totaling R\$ 218 million. It also increased its market share from 5% in the 2024-25 crop year to 7%. Other inputs accounted for 3% of the market, or R\$ 99 million.

According to Kynetec, FarmTrak Café resulted from more than 1.110 personal interviews with coffee producers in the main coffee-producing regions: Bahia,

Espírito Santo, Minas Gerais, Paraná, and São Paulo, primarily.

[RETURN TO INDEX](#)

Quatermon has expanded use in coffee and potato crops

A product based on quaternary ammonium compounds has received registration for direct application to both crops

21.07.2026 | 10:48 (UTC -3)

Cultivar Magazine, based on information from Adriane Fonseca



Paulo Sardinha

Chemitec Agro-Veterinária announced that it has obtained registrations from Anvisa (Brazilian Health Regulatory Agency), Ibama (Brazilian Institute of Environment and Renewable Natural Resources), and the Ministry of Agriculture to expand the use of the Quatermon line in coffee and potato crops. This fungicide and bactericide uses quaternary ammonium compounds as its active ingredient and can be applied directly to plants.

The product was initially indicated for the disinfection of machinery, implements, harvesting tools, and vehicles used in citrus cultivation. The expansion of its use occurred after studies conducted by the company.

According to agricultural engineer Paulo Sérgio Sardinha, responsible for application studies and marketing of the product in the agricultural market, quaternary ammonium also induces local resistance in plants. At recommended doses, the product does not cause phytotoxicity and exhibits high degradability.

In coffee farming, the Quatermon It is indicated for the control of Fusarium wilt, the storage fungus *Penicillium digitatum*, and problems associated with coffee in the drying yard. Applications can occur during pre-harvest and post-harvest periods.

Quaternary ammonium compounds are also being studied for the control of coffee rust. Research is evaluating combinations

with other fungicides to increase efficiency and residual effect. Sardinha attributes the results to an increase in phenolic compounds, beta-1,3-glucanases, and chitinases. According to him, the product eliminates bacterial biofilms and reduces fungal biofilms by 70%.

In potatoes, the registration includes control of soft rot, caused by *Erwinia carotovora*, and blackleg, associated with *Pectobacterium carotovorum*.

Recommendations may vary depending on the disease, under the responsibility of the agricultural engineer and within current legislation.

Quatermon acts by contact and is not selective. Application should take into account the stage of the disease and the characteristics of the fungus or bacteria.

[RETURN TO INDEX](#)

John Deere expands seeding capacity with C1450T

The pneumatic trailer is equipped with five tanks, electric dosing systems, and integration with an agricultural management platform

21.07.2026 | 10:16 (UTC -3)

Cultivar Magazine, based on information from Derik Morgan



John Deere has announced the C1450T pneumatic trailer, the highest-capacity model in the C-Series line. The equipment aims to increase the area sown between refills and reduce downtime in large agricultural operations.

The C1450T combines AccuRate metering systems, the EZCal calibration system, and connectivity to the John Deere Operations Center. The platform calculates the remaining time and area before tank emptying. This feature requires seeders with G5 or G5Plus CommandCenter monitors and a G5 Advanced license. The function operates with fixed or variable rate application.

AccuRate dispensers utilize corrosion-resistant stainless steel. Each unit features

electric drive and individual speed control. The configuration allows for higher-resolution prescription execution, curve compensation, and section control via SectionCommand Pro.

The EZCal system performs calibration with a single button. This solution eliminates the need to access the underside of the trailer and reduces steps in the manual procedure. ActiveCal provides real-time data on product levels and application performance.

Five tanks

The new trailer has five tanks. The first includes a Flex Tank with a capacity of 105 bushels. This compartment can hold

seeds, fertilizers, canola, or inoculants. The combination of tanks allows for the transport of up to five products and the mixing of fertilizers within the equipment.

The EZLift system lifts big bags to fill the first three tanks. The mechanism reaches loads positioned on the ground, in trailers, dump trucks, or on the side storage platform.

A hydraulic conveyor, 40,6 centimeters wide, speeds up refueling. The assembly features a stainless steel hopper and more space in relation to the rear tires. The front platform has been fitted with steps to facilitate passage over the hitch.

John Deere also offers AccuRate metering systems as an upgrade for 1910 trailers with two or three tanks and for the C650

and C850 models. The RelativeFlow system monitors product flow in each line and issues blockage alerts in the cab.

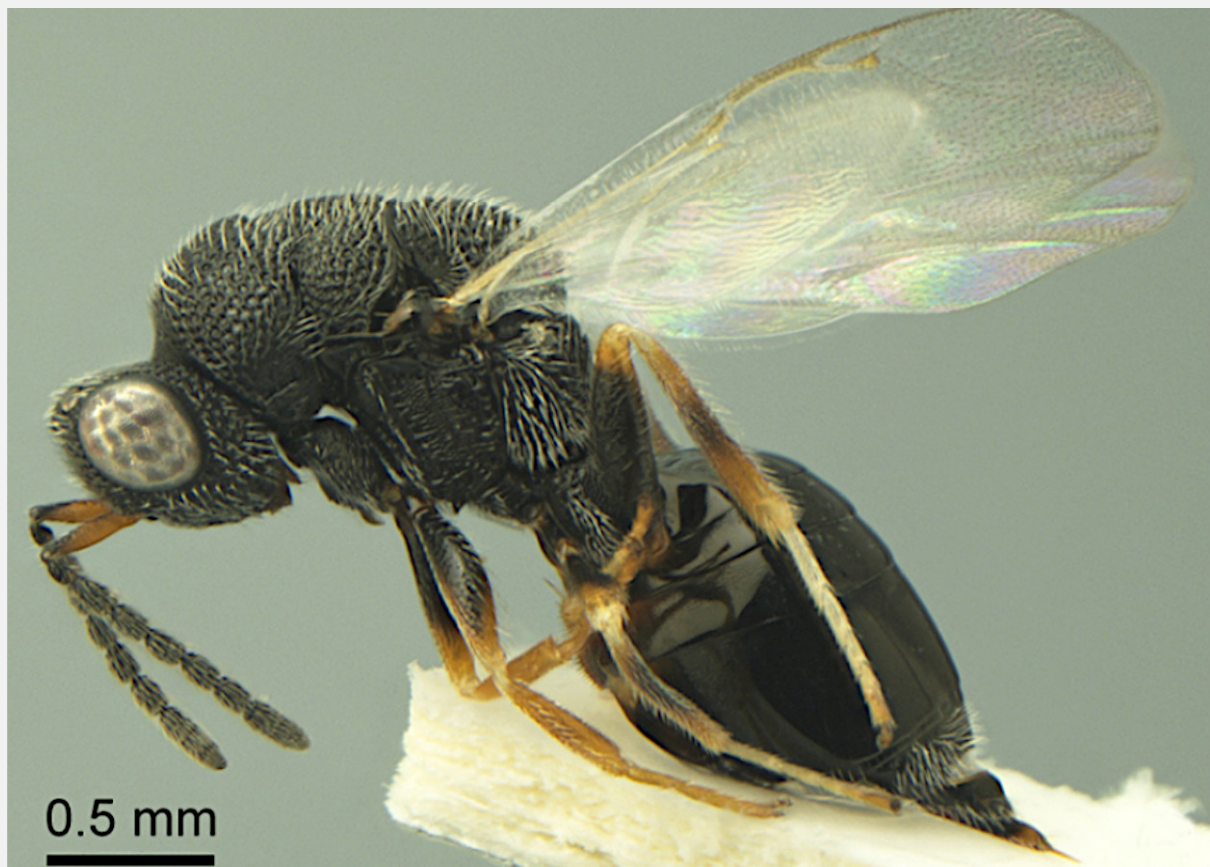
[RETURN TO INDEX](#)

Vespa is named in honor of Ernest Hemingway

A species described in China acts as a hyperparasitoid and may interfere with the biological control of *Lixus subtilis*

21.07.2026 | 08:57 (UTC -3)

Schubert Peter, Cultivar Magazine



DOI 10.3897/zookeys.1279.188643

Researchers have described a new wasp species associated with the complex of natural enemies of *Lixus subtilis*, a weevil responsible for damage to sugar beet crops. Named *Chlorocytus papahemii*, the species acts as a hyperparasitoid. Instead of attacking the pest, it parasitizes *Eurytoma curculionum*, a wasp capable of developing on weevil larvae. This relationship adds a fourth trophic level to the system and may reduce the action of a parasitoid with potential benefits for pest management (DOI 10.3897/zookeys.1279.188643).

The study also recorded *Eurytoma curculionum* for the first time in China. Researchers obtained specimens of the wasp from *Lixus subtilis* larvae found on

the petioles of sugar beet leaves. The work involved teams from Xinjiang University, the French Agricultural Research Centre for International Development, and the Zoological Institute of the Russian Academy of Sciences.

Crop damage

Lixus subtilis causes damage to agricultural crops, especially sugar beet. Its known distribution includes regions of Central and Eastern Europe, the Caucasus, Central Asia, Asia Minor, and China. Despite the insect's economic importance, science still has little information about its complete complex of parasitoids and hyperparasitoids. This gap limits the understanding of the natural

mechanisms involved in regulating pest populations.

The research took place in Yining and Qapqal Xibe Autonomous County, in the Xinjiang region of China. These areas have recorded recurring outbreaks of the weevil. In August 2024, the team randomly collected petioles showing signs of infestation from a crop field. Each segment was at least seven to eight centimeters long. In the laboratory, the scientists dissected the material to count insect larvae, as well as larvae and pupae of parasitoid wasps.

The organisms were kept in climate chambers with a temperature of 26 degrees Celsius, with a variation of two degrees Celsius, and relative humidity

between 60% and 70%. Monitoring their development confirmed the relationship between the three insects: *Lixus subtilis* feeds on beet tissue; *Eurytoma curculionum* parasitizes its larvae; *Chlorocytus papahemii* parasitizes *Eurytoma curculionum*.

New species

The new species belongs to the Pteromalidae family and the *Chlorocytus harmolitae* species group. The females analyzed measured between 2,8 and 3,6 millimeters in length. The body has a bluish-green hue, a metallic sheen, and coppery reflections. Researchers did not identify any males. The known distribution is limited to China.

The name *Chlorocytus papahemii* pays homage to the American writer Ernest Hemingway. The designation "Papa Hemingway" refers to the nickname associated with the writer. The taxonomic description included characters of the head, antennae, wings, mesosoma, metasoma, and ovipositor. The work also revised closely related species and presented an identification key for females of the group.

The record of *Eurytoma curculionum* expands its known distribution. The species acts as an ectoparasitoid of hidden larvae of beetles from the families Apionidae, Buprestidae, and Curculionidae. It also has records associated with dipterans of the family Cecidomyiidae and other parasitoids.

The presence of a hyperparasitoid requires attention in biological control programs.

Chlorocytus papahemii can kill the primary parasitoid before development is complete.

This can reduce the natural pressure exerted on *Lixus subtilis*. The study did not evaluate parasitism rates or measure the population impact of this interaction in the field.

Researchers advocate an approach based on complete food chains. Evaluating a single natural enemy in isolation can obscure relationships that alter its effectiveness. Knowledge about parasitoids, hyperparasitoids, and hosts provides a basis for biological management strategies with a lower risk of unforeseen outcomes.

Ernest Hemingway

Ernest Hemingway (1899–1961) was one of the most influential American writers of the 20th century, famous for transforming modern literature with his direct and concise writing style, known as the Iceberg Theory. Born in Illinois, he worked as an ambulance driver in World War I and as a war correspondent, experiences that profoundly shaped his work.

Author of universal classics such as "The Old Man and the Sea," "A Farewell to Arms," "For Whom the Bell Tolls," and "The Sun Also Rises," Hemingway addressed themes such as bravery, loneliness, and human resilience in the face of adversity. In 1954, he won the

Nobel Prize in Literature for his mastery of modern narrative.

Known by the affectionate nickname "Papa Hemingway," he became a world cultural icon, also famous for his adventurous spirit and passion for travel, hunting, and sport fishing—a legacy that possibly inspired scientists to honor him by naming the new wasp species after him.

[RETURN TO INDEX](#)

Leaves can heat up 16% more than the air until 2100

Study points to underestimation of plant heat stress in global climate models.

21.07.2026 | 08:33 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: University of Arizona

The temperature of plant canopies is expected to increase at a rate higher than the warming of the air throughout the century. The difference could grow by about 0,11 degrees Celsius, or 16%, by the period between 2085 and 2099. The result indicates an underestimation of the effects of heat on photosynthesis, transpiration, plant growth, and carbon absorption in current climate models (DOI 10.1038/s41467-026-73063-7).

The study, by scientists at the University of Arizona, combined simulations of Earth System Models from the CMIP6 project with observations obtained from satellites and meteorological databases. The team applied two emergent constraints. The method uses physical and statistical relationships present in the model set to

limit variables with less availability of direct measurements.

The analysis considered the land surface temperature over vegetated areas as an approximation of the canopy temperature. This indicator has a more direct relationship with plant function than the air temperature near the surface. Leaves receive direct solar radiation and can reach values ??higher than those recorded at weather stations.

Today, the average temperature of vegetated surfaces exceeds the air temperature by about 0,70 degrees Celsius during the growing season. Projections indicate that this difference will increase to approximately 0,81 degrees Celsius in the SSP5-8.5 high emissions

scenario. This increase is expected to occur in about 81% of vegetated areas. Some areas may register increases of up to 0,5 degrees Celsius in the difference between the canopy and the air by 2100.

Historical difference

The median set of climate models underestimated the historical difference in 54% of vegetated areas. In future projections, the proportion reached 60%. When comparing the change between the current period and the end of the century, the underestimation reached 66% of the areas analyzed.

The greatest increases are expected in arid and sub-humid regions subject to

reduced moisture. Areas cited in the study include grasslands in the central United States, southeastern Brazil, Venezuela, and Colombia, as well as agricultural zones in the northern United States, Canada, and Europe.

Press conference

Vapor pressure deficit is among the main factors associated with additional canopy warming. This indicator represents the atmospheric demand for water. Its increase amplifies water loss from plants. Under water limitation, stomata reduce their opening. Transpiration decreases, and evaporative cooling of the leaves diminishes.

This process alters the distribution of energy on the surface. Lower transpiration reduces latent heat flux. A larger portion of the energy passes to sensible heat flux. As a result, the canopy heats up and increases water stress. The mechanism can form a feedback loop between dry air, stomatal closure, reduced photosynthesis, and higher leaf temperature.

The leaf area index also showed a significant influence. Expansion of leaf area favored transpiration and surface cooling in the models, provided there was water available in the soil. Reductions in the index, on the other hand, increased canopy heating.

Tropical regions showed smaller absolute increases, generally below 0,2 degrees

Celsius. However, some rainforests achieved relative growth close to 70% in the current temperature difference.

Tropical forests have low seasonal temperature variation and less historical exposure to extreme fluctuations. Small changes can, therefore, generate significant physiological impacts.

Forest edges

The edges of tropical forests raise additional concerns. Transition areas between forest and savanna may exhibit less resilience to environmental changes. The study also highlights the central United States, parts of Canada, and southern Europe as regions subject to greater thermal and hydraulic stress.

Leaf temperature controls fundamental processes. Values ??above the optimum point reduce photosynthesis and can increase respiration. With less assimilation, vegetation removes less carbon dioxide from the atmosphere. This response can weaken the Earth's carbon sink and amplify climate warming.

The decrease in transpiration also interferes with the hydrological cycle. The vapor released by plants contributes to cloud formation and rainfall events. A reduction in this flow can decrease atmospheric humidity, alter cloud cover, and modify the radiation incident on the surface.

Conservative estimates

The researchers consider the estimates conservative. The calculations used monthly averages and regional spatial resolution. This procedure dilutes differences between leaves exposed to the sun and shaded leaves. It also reduces the representation of peaks recorded at midday, during heat waves, or during periods of drought.

The models evaluated do not yet account for several processes capable of raising plant temperature. These include thermal damage to leaves, leaf drop associated with stress, heat mortality, and interactions with fires, insects, and pathogens. Plant acclimation to higher temperatures also receives limited treatment.

In the intermediate SSP2-4.5 scenario, the projected difference reached approximately 0,75 degrees Celsius, below the 0,81 degrees Celsius estimated in the high-emissions scenario. This result indicates potential for reducing additional canopy warming by limiting carbon dioxide emissions.

The team recommends greater use of plant surface temperature in studies on plant responses to heat and vapor pressure deficit. Incorporating this indicator can reduce biases in projections of productivity, transpiration, energy balance, and carbon storage by ecosystems.

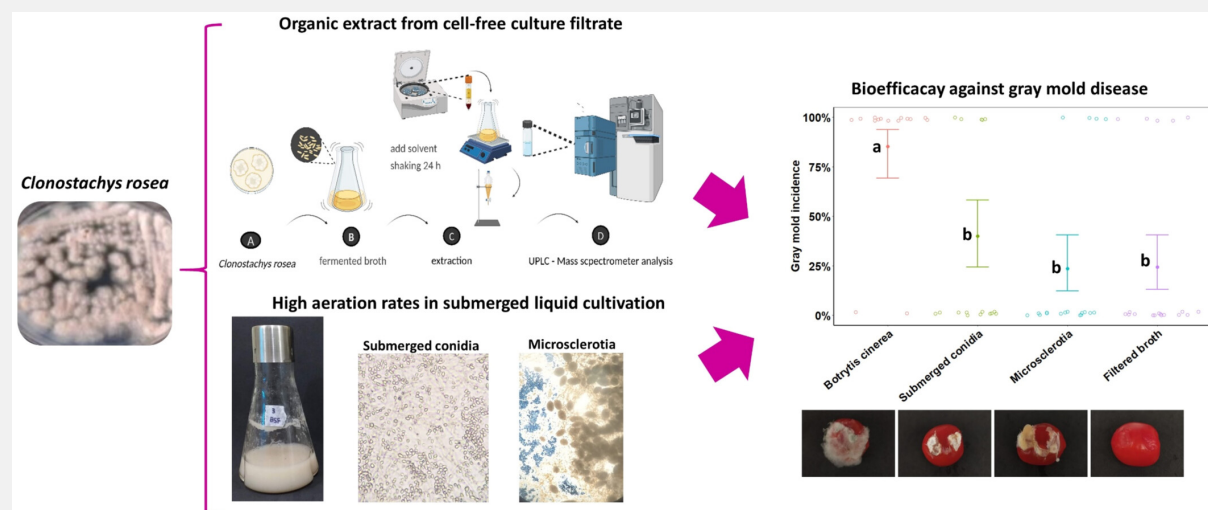
[RETURN TO INDEX](#)

Aeration increases the production of fungi that fight gray mold

Adjustments in the carbon-to-nitrogen ratio direct *Clonostachys rosea* propagules

21.07.2026 | 08:04 (UTC -3)

Cultivar Magazine, based on information from Cristina Tordin



Researchers at Embrapa Meio Ambiente demonstrated how aeration and the carbon-to-nitrogen ratio influence the production of *Clonostachys rosea* propagules in submerged cultivation. The

fungus showed potential for use in biofungicides against gray mold, caused by *Botrytis cinerea*. Formulations with conidia, microsclerotia, and metabolites reduced the incidence of the disease in cherry tomatoes (DOI 10.1002/mbo3.70162).

The study evaluated two aeration conditions. Scientists controlled oxygen availability by adjusting the ratio between the volume of the liquid medium and the volume of the flasks. The treatment with higher aeration used fifty milliliters of medium in flasks of two hundred and fifty milliliters. The treatment with lower aeration received one hundred milliliters in the same type of container.

Carbon and nitrogen

The researchers also compared carbon-to-nitrogen ratios of fifty to one and ten to one. The combination of higher aeration and a fifty-to-one ratio favored the production of submerged conidia. On the fourth day of fermentation, the concentration reached 1,31 billion conidia per milliliter. The conidia concentration remained higher in media with a fifty-part carbon to one-part nitrogen ratio, regardless of the aeration level.

The formation of microsclerotia followed a different pattern. These structures appeared only in media with a ratio of ten parts carbon to one part nitrogen. Greater aeration increased the concentration to 1,5

microsclerotia per milliliter on the third day and 2,2 per milliliter on the fourth day.

These values ??exceeded the results obtained under lower aeration by 29 and 27 times, respectively.

Resistance structures

Microsclerotia function as resistance structures. They favor the survival of the fungus under adverse conditions. After rehydration of the dried microgranules, the material produced under higher aeration yielded, on average, 12,2 billion aerial conidia per gram. The material obtained under lower aeration produced 1,73 billion per gram.

The team formulated the propagules into water-dispersible microgranules. The conidia used in the formulation came from a culture with higher aeration and a carbon-to-nitrogen ratio of fifty to one. The microsclerotia came from a medium with higher aeration and a ratio of ten to one. The work also evaluated the filtrate from the cell-free culture, composed of metabolites released during fermentation.

The trials used cherry tomato fruits of the Sweet Grape variety. The scientists applied the treatments preventively, before inoculation with *Botrytis cinerea*. On the fifth day, 79% of the lesions in the control group treated with the pathogen showed gray mold. Treatments with conidia, microsclerotia, and filtrate reduced the incidence to 40%, 24%, and 24%,

respectively.

On the seventh day, the control without *Clonostachys rosea* showed disease development in 85% of the lesions.

Biological treatments promoted suppression between 53% and 72%.

Conidia and microsclerotia colonized the lesions and limited the pathogen's progression. The filtrate kept the treated areas free of visible growth of the biocontrol agent.

Chemical analyses of the filtrate identified sorbicillinoids among the main metabolites produced during fermentation. These substances exhibit antifungal activity and may contribute to the protection observed in the fruits. The combination of live propagules and compounds produced by

the fungus opens up possibilities for strategies with more than one mechanism of action.

Clonostachys rosea

Clonostachys rosea acts as a mycoparasite and can attack phytopathogenic fungi. The microorganism also produces enzymes and metabolites, induces resistance in plants, and exhibits activity against some insects and nematodes. Despite this set of mechanisms, few commercial biopesticides use this species. According to researchers, the Brazilian market does not yet have a product based on this agent.

Gray mold affects more than two hundred plant species. Hosts include tomatoes, cucumbers, eggplants, grapes, and strawberries. The disease causes losses in the field and after harvest. The ability of *Botrytis cinerea* to develop resistance to different groups of fungicides increases the need for integrated management programs.

Controlling aeration and nutritional composition allows for directing fermentation towards the desired propagule. This definition can support industrial processes with standardized production, greater stability, and lower cost. Liquid culture also allows for regulating pH, oxygenation, temperature, water activity, and nutrient availability.

The technology still requires validation under commercial conditions. The next steps include scaling up the fermentation process, adjusting the formulation, conducting greenhouse and field trials, evaluating conditions under different temperatures and humidity levels, studying storage conditions, performing food safety analyses, and comparing cost and performance with available solutions.

The work was developed by Gabriel Moura Mascarin, Márcia Regina Assalin, Nilce Naomi Kobori, and Wagner Bettiol.

[RETURN TO INDEX](#)

African snail gains prominence in inventory of invasive species

Brazil records 82 exotic mollusks; researchers warn of agricultural risks and lack of data

21.07.2026 | 07:26 (UTC -3)

Cultivar Magazine, based on information from André Julião



Photo: LocoWiki / Wikimedia Commons

The African snail (*Lissachatina fulica*) is among the 20 invasive mollusk species recorded in Brazil. The animal can act as an agricultural pest and host the nematode *Angiostrongylus cantonensis*, which causes meningitis. Its wide distribution reinforces the need for field monitoring and measures to contain new areas of occurrence.

The first national inventory of non-native mollusks identified 82 exotic species. In 2011, the country counted 26. The increase reached 215% in 15 years. The list also includes 13 cryptogenic species, whose origin remains uncertain.

Terrestrial environments are home to 33 non-native and nine cryptogenic species. This group deserves attention from the

agricultural sector. Many species still lack studies on feeding, dispersal, hosts, and economic impact. Researchers state that they do not know the impacts of most of the mollusks detected.

The African snail arrived in the country as an alternative to escargot. The abandonment of snail farms favored its dispersal throughout the national territory. In addition to the potential damage to crops, the species poses a sanitary risk.

The inventory classified 12 species as contained, 18 as detected, 20 as established, 20 as invasive, and 12 as data deficient. Scientists recommend strengthening biosecurity, early detection, and long-term monitoring. These actions can identify species with the potential to

become pests before population expansion and the emergence of damage.

Further information at

doi.org/10.1007/s10530-026-03794-7

Lissachatina fulica in Brazilian agriculture

The giant African snail, *Lissachatina fulica*, was introduced to Brazil in the 1980s as an alternative to the European escargot and, after the commercial failure of its breeding, spread throughout the country as an invasive species, generating serious management problems in several regions (DOI 10.1590/s1984-46702009000400012).

Field studies show that the species prefers altered urban and rural environments, with greater abundance in humid locations and with poor sanitation infrastructure — conditions that also favor its advance into home gardens and orchards (DOI 10.1590/s1413-415220200415; 10.18067/jbfs.v2i4.62).

The population dynamics of the mollusk are strongly associated with climatic factors: warmer and wetter summers, especially in El Niño years, favor its reproduction and dispersal, which reinforces the importance of defining strategic periods for control actions (DOI 10.19180/1809-2667.v21n12019p109-124).

Among the management methods studied, the use of plant-based molluscicides stands out, as they have proven effective against the species and represent a more sustainable alternative than synthetic chemical products (DOI 10.1590/1808-1657001032013).

Research on popular knowledge indicates that manual collection and destruction of individuals are still the strategies most adopted by the population to control the pest in agricultural and residential areas (DOI 10.5007/2175-7925.2013v26n1p189).

[RETURN TO INDEX](#)

Coating protects beneficial fungus in chemical fertilizer

Technology increases the survival rate of *Trichoderma harzianum* and allows for combined application with fertilizers

20.07.2026 | 18:00 (UTC -3)

Joana Silva



Researchers from Embrapa Instrumentation (SP) and the Federal University of São Carlos (UFSCar) have

developed a technology that integrates mineral fertilizer and a biological agent in a single formulation, allowing for the simultaneous application of both. The technology consists of a biodegradable coating applied to the granules of a phosphorus and nitrogen-based fertilizer, which acts as a protective layer for the fungus *Trichoderma harzianum*, a beneficial microorganism widely used as a bio-input in agriculture.

Trichoderma harzianum has great potential for use in agriculture, but it is sensitive to unfavorable environmental conditions. The coating preserves the viability of the microorganism during storage and promotes its gradual release into the soil after fertilizer application, increasing its effectiveness in the field.

The technology takes into account the characteristics of the fungus and, by allowing the combination of inputs, makes it possible for them to be applied simultaneously, which was previously limited by the incompatibility between the components. This can contribute to greater efficiency in the use of resources and the reduction of waste and greenhouse gas emissions associated with agricultural operations.

The challenge now is to scale up the technology commercially and validate its performance in different crops and field conditions.

Solution increases viability

Researchers Cristiane Sanchez Farinas, coordinator of the study at Embrapa Instrumentation, Aline Medeiro Ferreira and Mariana Govoni Brondi, members of the team, encapsulated the fungus *Trichoderma harzianum* in a biodegradable cellulose-based polymer matrix. The polymer matrix acts like the dough in a cake to support the other ingredients. The result is a coating applied directly to fertilizer granules, capable of preserving the viability of the microorganism.

Experiments have shown that, after three months of storage at room temperature,

encapsulated spores—structures that fungi produce to multiply—maintained a high survival rate, while non-encapsulated spores lost up to a thousand times their vitality.

Fungi are an invisible ally of productivity.

Aline Ferreira, who holds a master's degree in chemical engineering from UFSCar and is the first author of the study "Encapsulation of *Trichoderma harzianum* in Carboxymethyl Cellulose Reinforced with Nanocellulose for Delivery as Fertilizer Coatings," published in February of this year by ACS Agricultural Science & Technology, explains that *Trichoderma*

harzianum is a well-known fungus in agricultural science. "It is a fungus widely used as a biocontrol agent, capable of combating phytopathogens, stimulating plant growth, and increasing nutrient absorption."

But despite this potential, its large-scale application faces an obstacle: low survival rates after storage and, especially, when in direct contact with chemical fertilizers.

Cristiane Farinas, who has been studying the subject for 12 years, explains that substances such as urea and monoammonium phosphate (MAP) – a mineral fertilizer rich in phosphorus and nitrogen – can harm the survival of soil microorganisms. "They are extremely fragile. Outside their ideal environment, they die quickly in the sun or in contact

with potent chemical fertilizers,” says the researcher.

According to her, these compounds can cause osmotic stress, a situation in which microorganisms lose water due to an excess of concentrated substances around them, in addition to altering the pH and causing chemical reactions that compromise their survival. In practice, this drastically reduces the effectiveness of biological inoculants – products containing microorganisms with beneficial action for plant development – ??limiting their adoption in the field.

The capsule protects the microorganism.



To overcome this problem, the researchers created a kind of microscopic "shield." The fungus was encapsulated in a polymeric matrix of carboxymethylcellulose (CMC), a cellulose derivative, reinforced with cellulose nanocrystals (CNC).

“This structure forms a resistant and biodegradable film that surrounds the fungal spores, protecting them against adverse conditions. Unlike traditional

systems, which quickly release the contents, the new material ensures that the fungus is continuously available in the soil," says Aline Ferreira.

Postdoctoral researcher Mariana Govoni Brondi, who also co-authored the article, emphasizes that this characteristic is considered ideal for preventative applications in agriculture because, by remaining active for longer in the region near the roots, known as the rhizosphere, the fungus can colonize the environment before the arrival of pathogens, creating a kind of natural biological barrier.

"Furthermore, the gradual release avoids direct contact with the fertilizer, further increasing the survival rate," she explains.

Brondi further emphasizes that coating the granule also impacts the release rate of the chemical fertilizer. According to her, the slower and more controlled release of the input means that the nutrients remain available to the plants for a longer period, which reduces the need for farmers to reapply fertilizer in the field, as well as costs and environmental losses, decreasing problems such as eutrophication and the release of greenhouse gases.

The researchers report that monoammonium phosphate (MAP) granules coated with the polymeric matrix showed consistent fungal growth even after 30 days of storage. Conventional methods, such as the use of sugar

solutions to fix microorganisms, showed a significant loss of effectiveness over time.

Environmental and economic impact

Microbial inoculants are emerging as an alternative to the intensive use of chemical fertilizers, but they depend on technologies that guarantee their effectiveness in the field.

Cristiane Sanchez Farinas says that carboxymethylcellulose is a low-cost and widely available material, while cellulose nanocrystals can be produced from agricultural waste, aligning with the principles of the circular bioeconomy.

Study presented

The scientific work was presented at the 20th European Biotechnology Congress, organized by the European Federation of Biotechnology (EFB) and held in Antwerp (Belgium) in June of this year.

It received funding from the São Paulo Research Foundation (FAPESP), the National Council for Scientific and Technological Development (CNPq), the Coordination for the Improvement of Higher Education Personnel (CAPES), and the National Agricultural Research System (SNPA).

[RETURN TO INDEX](#)

Gustavo Husak takes on new role at John Deere

Executive to assume the role of After-Sales and Customer Support Manager for the company in Brazil.

20.07.2026 | 14:50 (UTC -3)

Cultivar Magazine



Gustavo Husak (pictured) has taken on a new role at John Deere. With over 12 years of experience at the company, he will now serve as After-Sales and Customer Support Manager in Brazil.

Prior to his new role, he was Director of Operations at RZK Agro, a John Deere dealership, where he oversaw sales, after-sales service, technology, marketing, and supply chain management.

Gustavo is a mechanical engineer graduated from the Federal University of Rio Grande (FURG), holds an MBA in Project Management, a postgraduate degree in Soil Science and Agronomy, and an Executive MBA in Finance.

[RETURN TO INDEX](#)

TJMT reinstates collection of financial CPRs

The Chamber overturns the injunction and points to a lack of evidence of the requirements for extending rural debt

20.07.2026 | 13:35 (UTC -3)

Schubert Peter, Cultivar Magazine



PODER JUDICIÁRIO
MATO GROSSO

The 3rd Chamber of Private Law of the Court of Justice of Mato Grosso (TJMT) reinstated the enforceability of two Financial Rural Product Certificates (CPR-

F) issued by a rural producer. The panel also authorized the financial institution to adopt collection measures stipulated in the contracts. The decision is provisional and does not anticipate the final judgment of the case.

The judges unanimously granted the appeal filed by the bank. The ruling was made in an internal appeal related to a preliminary injunction. The first-instance proceedings are taking place in Canarana.

Suspension of charges

The lower court had suspended the collection of two CPR-F (Rural Product Certificates). The injunction also prevented collection actions and the inclusion of the

producer's name in credit restriction databases.

The producer cited difficulties in agricultural activity and defended the right to extend the payment of obligations. To support the request, he presented agronomic reports, accounting documents, sales invoices, extrajudicial notifications, and studies on the reduction in the price of soybeans in the 2024/25 harvest.

The financial institution appealed. The bank stated that it used its own free resources in the transactions. It also argued for the application of Law 8.929/1994, the regulation governing Rural Product Certificates. According to the institution, the transactions are not part of official rural credit and do not automatically

follow the extension rules stipulated in the Rural Credit Manual.

Second-degree analysis

In court, the judge deemed the evidence presented insufficient to maintain the preliminary injunction. According to the ruling, the analysis at this procedural stage should be limited to the requirements set forth in Article 300 of the Code of Civil Procedure. The definitive examination of the right to the extension will occur during the course of the main proceedings.

The judge highlighted the existence of a specific legal framework for financial CPRs (Rural Product Certificates). Law 8.929/1994 regulates these securities as

private financing instruments for agribusiness. This nature differs from operations linked to the National Rural Credit System.

According to the rapporteur, the use of unrestricted funds, in principle, precludes the automatic application of the rules of the Rural Credit Manual intended for operations with controlled funds. The allocation of money to agricultural activity, in isolation, does not alter the legal regime of the contract.

The ruling also analyzed Precedent 298 of the Superior Court of Justice (STJ). This precedent recognizes the extension of rural debt as a right of the debtor, according to applicable legislation.

However, the TJMT (Court of Justice of

Mato Grosso) considered the need to prove compliance with legal and regulatory requirements. Thus, the right does not arise solely from the existence of production difficulties.

Administrative request

The Chamber also raised doubts about the date of the administrative request for extension. The bank stated that it only received the request after the obligations had expired. The producer presented a contrary position. The determination regarding timeliness will depend on the production of evidence during the course of the process.

According to the panel, the jurisprudence of the TJMT (Court of Justice of Mato Grosso) requires a timely administrative request and demonstration of the conditions stipulated in the Rural Credit Manual for the preliminary suspension of rural debts. The presence of these requirements was not proven at this stage.

The technical documents presented by the producer allow the action to proceed, according to the ruling. However, in a preliminary analysis, they do not demonstrate sufficient probability of the alleged right. The judgment also cites the particular and unilateral nature of some of the evidence submitted.

With the appeal being granted, the two financial CPRs (Certificates of Receivables) will once again produce their

effects. The institution may resume collection and use the applicable contractual measures. The decision remains valid until a new judicial ruling or until the merits of the dispute are judged.

[RETURN TO INDEX](#)

Endophytic fungi reduce green aphids.

Study points to distinct effects on natural enemies, volatiles, and microbiomes.

20.07.2026 | 12:43 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: J Michael Moore / University of Georgia - Bugwood

The endophytic entomopathogenic fungi *Beauveria bassiana* GL-5 and *Cordyceps cateniannulata* H8 reduced the growth and

reproduction of *Myzus persicae* on tobacco plants. The study also identified alterations in the action of natural enemies, in the profile of volatile organic compounds, and in the microbial communities associated with the system (DOI 10.1002/ps.71134).

The effects varied depending on the strain. *Beauveria bassiana* GL-5 increased parasitism by *Aphidius gifuensis*.

Cordyceps cateniannulata H8, on the other hand, reduced this parameter.

Inoculation with the fungi increased the proportion of females to males of *Aphidoletes aphidimyza*. The treatment had the opposite effect on *Aphidius gifuensis*. The fungi also reduced the emergence of both natural enemies and decreased the predation capacity of

Aphidoletes aphidimyza.

Fungal colonization has increased the diversity of volatile organic compounds released by tobacco. Some compounds preliminarily identified have shown a possible relationship with the oviposition preference of *Aphidoletes aphidimyza*.

The treatments modified the composition and complexity of microbial networks in the gut of aphids and on tobacco leaves. The changes involved dominant taxa from the genera *Buchnera*, *Acinetobacter*, *Pseudomonas*, and *Bradyrhizobium*.

The analysis indicated potential associations between volatile compounds, microbiomes, aphid performance, and the behavior of natural enemies. The causal mechanisms remain undefined. Among the

strains evaluated, GL-5 showed the greatest capacity for aphid suppression and requires further studies for use in the sustainable management of the pest.

[RETURN TO INDEX](#)

Bayer predicts fourth generation of Bollgard cotton by 2028

Technology will include new proteins to combat caterpillars, enhanced weed management, and protection against thrips

20.07.2026 | 10:41 (UTC -3)

Cultivar Magazine, based on information from Roberta Soares



Bayer has confirmed the launch of the fourth generation of Bollgard biotechnology by 2028. The company presented the advancements during the Bayer Cotton House in Campo, held in Sorriso, Mato Grosso.

The new generation will combine proteins aimed at protecting against the main cotton caterpillars. The technology will also increase flexibility in weed management and incorporate ThryvOn, developed for integrated plant protection against thrips.

According to Bayer's Cotton Business Director, Fernando Prudente, the platform tracks the evolution of Brazilian cotton farming. He highlighted investments in productivity, sustainability, and competitiveness.

The program brought together producers, researchers, textile industries, exporters, and industry entities. Participants visited the Bayer research station and the Fazenda da Pedra farm. In the field, they watched demonstrations of Bollgard 3 XtendFlex and Deltapine varieties.

Bollgard 3 XtendFlex offers protection against caterpillars and tolerance to the herbicides glyphosate, glufosinate ammonium, and dicamba. The technology helps control weeds, including pigweed, in first and second crop areas.

Bayer also presented the XtendiMax 2 herbicide, available on the market. The product is suitable for pre-planting desiccation and early post-emergence applications in cotton and soybeans. The

formulation aims to reduce the risks of volatility and drift.

Mato Grosso accounts for approximately 68% of Brazil's cotton lint production. For the 2025/26 harvest, the company's estimate points to a state harvest of approximately 2,7 million tons, compared to the national forecast of 3,97 million tons.

Among the solutions under development, Bayer cited the insecticide Plenexos, the fungicide Iblon, and the pre-emergent herbicide Mateno Pre. Iblon is scheduled for launch in 2028. The other products remain in the registration phase.

[RETURN TO INDEX](#)

Genes in the nervous system influence rescue in ants

Study links *Cataglyphis nigra* response to immunity, sense of smell, and polyamine metabolism

20.07.2026 | 10:06 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Peterwchen - CC BY 4.0

The propensity of ants to rescue companions in danger depends more on the activity of the nervous system than on physical characteristics. This conclusion comes from a study with *Cataglyphis nigra* worker ants. The researchers identified differences in the expression of genes linked to immunity, odor perception, juvenile hormone, and polyamine metabolism (DOI 10.1242/jeb.252086).

The experiment compared worker ants exhibiting rescue behavior with unresponsive individuals in the presence of an immobilized companion. The rescue ants dug around the victim, pulled at its appendages, or bit at the material used for restraint.

The teams analyzed stalked bodies, optic lobes, midbrain, and antennae using RNA sequencing. Nine genes showed different expression across the tissues. Among them were genes associated with cytochrome P450 9e2, arginase, defensin, and serine snake protease.

The stalked bodies concentrated the strongest signal. In this region, linked to sensory integration and decision-making, 15 genes showed higher expression in the rescue worker ants. The functions involved immune response, odor processing, mitochondrial transport, and juvenile hormone signaling.

The worker ants from the two groups did not differ in brain size, body mass, lipid content, or average speed. The rescue

ants, however, reached their trapped companion first, reduced their speed in the vicinity, and explored a larger area around her.

According to the researchers, the results indicate greater sensitivity or response to chemical, visual, auditory, or vibrational signals emitted by a companion in danger. The study also points to the possible involvement of immune pathways in neural plasticity and in the response to social stimuli.

[RETURN TO INDEX](#)

ADM appoints Jeff Rowe as Chief Operating Officer

The executive will leave Syngenta to lead the company's commercial, industrial, and research areas

20.07.2026 | 08:03 (UTC -3)

Cultivar Magazine, based on information from Jackie Anderson



ADM has named Jeff Rowe to the new position of executive vice president and chief operating officer. He will assume the role on August 17, 2026. Rowe will report to Juan Luciano, chairman of the board and CEO of the company.

The new chief operating officer will lead commercial operations, global manufacturing, and research and development activities. ADM created the position to support its growth strategy and business priorities.

Rowe will join ADM after serving with the Syngenta Group since September 2016. He assumed the global presidency of the company in January 2024. Prior to that, he led Syngenta Crop Protection between July 2022 and December 2023, and

Syngenta Seeds between September 2016 and June 2022.

At Syngenta, Rowe led initiatives related to sustainable agriculture and the use of artificial intelligence in the development of agricultural solutions. The company employs more than 50 people in over 90 countries.

The executive also accumulated more than 20 years of experience at DuPont Pioneer. During that time, he held positions in the areas of strategy, international operations, biotechnology, regulation, and legal affairs.

Rowe is a fifth-generation farmer in his family. He is involved in the management of a rural property in Illinois, in the United States. The farm adopts regenerative agriculture practices aimed at reducing

environmental impact and increasing sustainability, productivity, and profitability.

The executive holds a degree in Agricultural Economics from Iowa State University, a law degree from Drake Law School, and a global executive MBA from NYU Stern School of Business and the London School of Economics.

[RETURN TO INDEX](#)

Heat reduces hormones and limits weevil development

Study indicates a drop in juvenile hormone and 20-hydroxyecdysone in *Callosobruchus maculatus* larvae

20.07.2026 | 07:49 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Clemson University/USDA Cooperative Extension Slide Series

Heat stress reduces the production of hormones linked to the development of *Callosobruchus maculatus*. This alteration compromises larval growth and female fecundity (DOI 10.1002/ps.71124).

Researchers evaluated different stages of the insect. Eggs and larvae showed greater sensitivity to heat compared to pupae. Prolonged exposure also reduced the reproductive capacity of females, despite increased longevity in adults.

Fourth instar larvae

The team focused their analyses on fourth-instar larvae, the main stage responsible for the damage. The work combined different omics approaches to investigate

physiological and molecular responses.

The results indicated a reduction in the activity of the insect hormone biosynthesis pathway at both the transcriptional and metabolic levels. This process decreased the concentrations of juvenile hormone and 20-hydroxyecdysone. Both regulate growth, molting, and development.

Hormone supplementation

Hormonal supplementation, at appropriate concentrations, reduced heat-induced growth inhibition. The result reinforces the relationship between heat stress, hormonal decline, and suppressed development.

According to scientists, the mechanism may support studies on *Callosobruchus maculatus* management strategies focused on hormonal signaling pathways.

[RETURN TO INDEX](#)

Nanocarrier enhances the effect of RNAi against whitefly

The C60/APG system increased gene silencing and reduced the survival of *Bemisia tabaci*

20.07.2026 | 07:20 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Pflanzenschutzamt Saarbrücken

Researchers at Henan Agricultural University in China have developed a double-stranded RNA delivery system using C60 nanoparticles and alkyl polyglycoside. The technology has expanded the silencing of two genes linked to the growth and survival of *Bemisia tabaci* (DOI 10.3390/insects17070737).

The study evaluated the genes *btCHS*, related to chitin synthesis, and *btG6PI*, involved in energy metabolism and chitin formation. Double-stranded RNA without a nanocarrier reduced the expression of *btCHS* by 70% and *btG6PI* by 60%. The combination with C60/APG led to the silencing of both genes by approximately 90%.

Larger transport

The researchers applied the formulations to the roots of tobacco plants. After absorption, the material traveled through the tissues to the leaves. The fluorescence recorded in the leaves indicated increased transport of double-stranded RNA in the presence of the nanocarrier.

Insect feeding on treated plants reduced survival after ten days. The groups with double-stranded RNA and nanoparticles showed survival rates close to 10% for btCHS and 25% for btG6PI. Treatments without nanocarrier recorded approximately 30% and 40%, respectively.

More intense effect

Silencing also reduced the length and width of the nymphs. The most intense effect occurred in the third instar.

Suppression of btCHS reduced the width by approximately 12,1% and the length by 6,5%. For btG6PI, the reductions reached 9% and 6,5%.

The isolated nanoparticles did not increase mortality at the concentrations evaluated.

Scientists point to the need for further studies on safety for natural enemies, soil arthropods, and other non-target organisms before field use.

[RETURN TO INDEX](#)

Protein adjusts plant defenses to sulfur supply

CDK8 directs immune responses and reduces nutrient expenditure in *Arabidopsis thaliana*

19.07.2026 | 09:40 (UTC -3)

Schubert Peter, Cultivar Magazine



Photo: Kurt Stepnitz / MSU

Researchers at Michigan State University have identified a molecular mechanism capable of adjusting plant defenses to sulfur availability. The CDK8 protein coordinates the response to jasmonate and modifies the production of defensive compounds in *Arabidopsis thaliana*. The process allows the plant to conserve the nutrient under deficiency conditions (DOI 10.1073/pnas.2609022123).

In plants with an adequate supply of sulfur, CDK8 stimulates the accumulation of glucosinolates, camalexin, and sulfur-rich defensive peptides. Under nutritional limitations, the protein reduces the synthesis of defensins and glucosinolates. At the same time, it increases the production of camalexin, a phytoalexin with a lower sulfur requirement.

The concentration of defensive compounds with only one sulfur atom increased almost eightfold in the deficient assays. The production of molecules with two or three atoms decreased. The adjustment preserves sulfur for functions without metabolic alternatives, such as the formation of amino acids.

Plants with inactive CDK8 showed lower levels of defensive sulfur compounds and reduced resistance to pests and diseases. The mutants also lost the ability to reorganize the immune response in the face of reduced nutrient levels.

Activation of CDK8 enhances jasmonate-induced immunity, but imposes costs on growth and seed production. The results indicate a central role for the protein in the

balance between growth, nutrition, and defense.

This study gains relevance given the reduction of available sulfur in soils. In the United States, this availability has fallen by up to 86% in the last two decades.

Researchers are evaluating this mechanism as a basis for developing crops that are more efficient in using this nutrient and less vulnerable to disease.

[RETURN TO INDEX](#)



Herbicida

Thunder®

**Recupere o controle
do manejo de plantas
daninhas resistentes**



**Tecnologia exclusiva
com novo modo de ação**



**Alta eficácia no
controle da buva**



**Controla pé-de-galinha
com até 8 perfilhos**



**Não causa fitotoxicidade
quando aplicado 5 dias
antes da semeadura**

uplcorp.com/br



@uplbr



/brasilupl

ATENÇÃO

Este produto é perigoso à saúde humana, animal e ao meio ambiente. Leia atentamente e siga rigorosamente as instruções contidas no rótulo, na bula e na receita. Utilize sempre os equipamentos de proteção individual. Nunca permita a utilização do produto por menores de idade.

CONSULTE SEMPRE UM ENGENHEIRO AGRÔNOMO. VENDA SOB RECEITUÁRIO AGRÔNOMICO.



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

Grupo Cultivar de Publicações Ltda.

revistacultivar.com

FOUNDERS

Milton de Sousa Guerra (*in memoriam*)

Newton Peter (director)

Schubert Peter

TEAM

Schubert Peter (editor in chief)

Charles Ricardo Echer (advertising manager)

Rocheli Wachholz

Nathianni Gomes

Sedeli Feijó

Franciele Ávila

Ariadne Marin Fuentes

CONTACT

editor@grupocultivar.com

comercial@grupocultivar.com