

Aug 30, 2025

N ° 45

Cultivar[®] *Semanal*

Wheat with less fertilizer

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Biological combination combats *Spodoptera litura*

Beauveria bassiana and *matrina* affect caterpillar development, reproduction, and genetics

29.08.2025 | 09:56 (UTC -3)

Cultivar Magazine



Photo: K Kiritani

Researchers have demonstrated that the combined use of entomopathogenic fungus *beauveria bassiana* and the plant compound matrine (alkaloid extracted from *Sophora flavescens*) causes lethal and sublethal effects in the caterpillar *Spodoptera litura*. In addition to reducing survival and fertility, the combination alters the insect's genetic expression, affecting metabolic pathways essential for its development.

The study compared the effects of isolated and combined applications of *B. bassiana* and matrine on eggs, larvae and subsequent generations of the pest.

The combination of the two agents resulted in higher mortality and a reduction in the number of emerged caterpillars,

even at lower concentrations.

Simultaneous use showed a synergistic effect, with mortality higher than expected from the combination of the treatments alone.

Sublethal effects

Exposing caterpillars to a mixture of the two agents prolonged the larval period, reduced the pupation rate, decreased pupal weight, and shortened adult lifespan. These effects compromised the pest's reproductive success and population growth, both in the treated generation (F0) and the subsequent generation (F1).

In the F1 generation, development time was longer. Fertility fell by up to 53,2%

compared to the control group. Life expectancy also decreased, being shorter in the group treated with the combination of matrine and *B. bassiana*.



Photo: Todd Gilligan, LepIntercept, USDA APHIS PPQ

genetic alterations

The study used RNA sequencing (RNA-Seq) to analyze gene expression in treated larvae. Differentially expressed genes related to cuticle proteins, transcription factors (zinc fingers), hormone receptors, and proteins linked to metabolism and reproduction were identified.

The presence of matrina and *B. bassiana* primarily altered genes related to xenobiotic metabolism, the peroxisome pathway, and protein processing in the endoplasmic reticulum. The data indicate that the pest activates molecular mechanisms to counter the effects of the applied agents, but with visible damage to development and reproduction.

Cuticle proteins

Genes linked to cuticle formation, such as LCP-22-like, were significantly activated, suggesting a structural reinforcement response against the applied agents. However, the overload on cuticle formation may have hindered molting processes, prolonging the larval stage and compromising the transition to subsequent stages.

Hormonal reduction

Genes related to vitellogenin proteins, essential for egg development, were repressed. Juvenile hormone was also altered, with reduced expression of binding proteins (JHBPs), affecting the pest's reproductive cycle.

The combination of agents initially caused a sharp decline in these genes, followed by a compensatory response. This dynamic may explain the decline in fertility and egg-laying success observed in the experiment.

Integrated management

The integration of biological control and natural compounds shows promise. The combined use of *B. bassiana* and matrine interferes with the main population parameters of the pest, with direct effects on mortality and fertility, and indirect effects on hormonal regulation and gene expression.

In addition to being efficient, the strategy is environmentally safe and compatible with integrated pest management (IPM), allowing for a reduction in the use of chemical pesticides and reducing the risk of resistance.

Further information at
doi.org/10.1016/j.pestbp.2025.106662

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Argentina aligns tomato quality standards with Mercosur

Senasa Resolution incorporates text from GMC Resolution 26/2017

29.08.2025 | 13:22 (UTC -3)

Cultivar Magazine



Photo: Cottonbro Studio

The National Agrifood Health and Quality Service (Senasa) has updated its Tomato Quality and Identity Regulations. This measure aligns Argentina's classification with the Mercosur standard and facilitates marketing within and outside the bloc.

Resolution 627/2025 incorporates GMC Resolution 26/2017 into the legal system and repeals Resolution 101/1995 of the former IASCAV. The regulation comes into force tomorrow (the day after publication).

The government emphasizes that harmonization reduces technical barriers. The measure increases competitiveness and market access.

Fresh tomato production is concentrated in Mendoza and San Juan in Cuyo; Salta and Jujuy in the Northeast; Corrientes and

Formosa in the Northeast; and Rio Negro and Buenos Aires. The main destinations for Argentine fresh tomatoes include Paraguay, Brazil, Uruguay, and Chile.



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Agricultural Market - August 29, 2025

US harvest sets the pace for the Brazilian
agricultural market

29.08.2025 | 12:56 (UTC -3)

Vlamir Brandalizzi - @brandalizzeconsulting



The US soybean harvest is practically
complete. Approximately 92% of the crops

have formed pods and 6% have reached maturity, both within historical averages. The weather remained mild. Productivity is considered good, although lower than last year. The current estimate points to 116,8 million tons, two million tons less than in 2024.

In Brazil, 123 million tons of soybeans from the 170 million-year harvest have already been traded. About 47 million tons remain in the hands of producers. Sales are below the 77% average for the period. The new harvest is also progressing slowly: only 18% has been traded, compared to the historical average of 25%.

The international market reflects this scenario. Chicago saw a drop in prices, and premiums fell between 15 and 20

points during the week. In Brazil, prices fell by an average of R\$2 per bag. Even so, exports remain strong. The estimate for August is 8,5 million tons shipped, a cumulative 86 million tons from January to date. Foreign exchange revenue could approach US\$5 billion for the month.

Corn situation

North American corn is also performing well. Almost 90% of the crops have formed ears, with more than half filling their grains. Maturity has reached 10%. The crop quality is excellent, with 71% of the areas rated as good or excellent. Production could reach 420 million tons, close to a record.

In Brazil, the second-crop corn harvest has reached 97%. Mato Grosso leads the way with 67%, below the 73% average. The national average is 55%. Summer crop planting remains slow: 18% of the area has been planted, compared to the expected 25%. Cold and frost conditions explain producers' caution. The area is expected to be reduced. Brazilian corn exports remain buoyant. The country could end August with over 6 million tons shipped and revenue approaching R\$7 billion.

Cotton situation

The cotton market is progressing with harvesting in Brazil and boll formation in

the United States. The American harvest is considered weak, with only 44% of crops in good condition. In Brazil, exports remain strong. The country is expected to remain the world's largest exporter.

Sorghum situation

Sorghum is also showing strength. In the US, 20% of the harvest has been completed, with an expected production of 10,6 million tons. In Brazil, the harvest is almost complete. Goiás, Minas Gerais, and Bahia still have areas in the field. Projections indicate a record harvest of up to 6 million tons.

Wheat situation

Wheat is experiencing a lull. High supply from Russia has put pressure on prices in Chicago. In Brazil, mills are buying cautiously. Prices per ton range from R\$1.280 to R\$1.480, depending on the region. Harvesting has begun in northern Paraná, with positive reports. Planted area, however, has fallen by 20% to 25%.

Rice situation

Rice is suffering from oversupply. The harvest reached 12,3 million tons, forcing price drops. At retail, promotional packages are reaching R\$15. Producers are suffering losses of up to R\$20 per bag. Industry and retail also report losses. Exports are expected to close August with

around 100 tons of processed rice.

Bean situation

Carioca and black beans, despite the lower supply of the third harvest, have not seen a price reaction. Sanitation issues and a reduced area are limiting the harvest. Retail replenishment is still not encouraging the market. Prices for noble carioca beans range between R\$205 and R\$240. Black beans are finding support in the reduced supply. The first harvest of 2025/26 is expected to have limited planting. September could bring a recovery, historically being the strongest month for the sector.

By Vlamir Brandalizze -
@brandalizzeconsulting

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Tomato moth develops high resistance to bioinsecticide

Research identifies polygenic inheritance and biological costs in resistance

29.08.2025 | 09:28 (UTC -3)

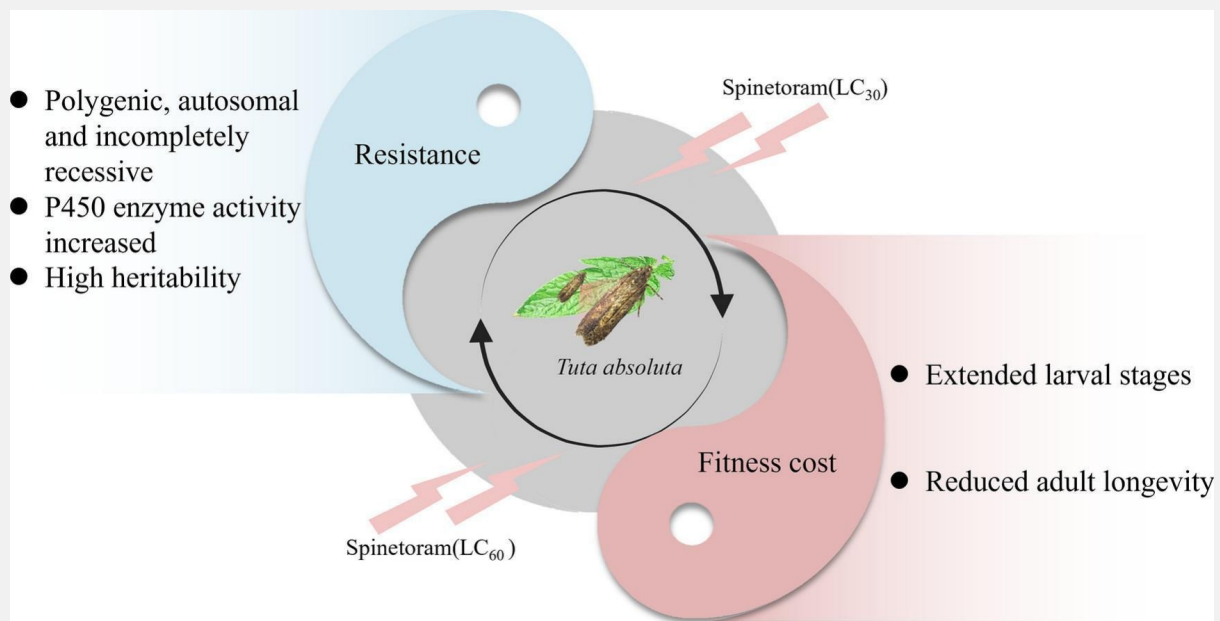
Cultivar Magazine



Photo: Marja van der Straten, NVWA Plant Protection Service

A study by Chinese scientists has shown that the tomato leafminer (*Absolutely all*) can develop high resistance to the bioinsecticide spinetoram when subjected to continuous use. After 20 generations of laboratory selection, the resistant strain (SPI-R) showed a 410-fold increase in tolerance to the product compared to susceptible populations.

Genetic analysis revealed that resistance follows a polygenic, autosomal, and incompletely recessive inheritance pattern, with high heritability. This indicates a strong potential for transmission of the resistance trait to future generations, increasing the risk of loss of field efficacy.



Biochemical tests showed that resistance is primarily related to increased activity of three detoxification enzymes: cytochrome P450 monooxygenases, glutathione transferases (GSTs), and carboxylesterases (CarEs). Among these, P450 played a predominant role, according to synergist assays.

Biological costs

Despite its resistance, the SPI-R lineage presented biological costs. Larval stages were prolonged, and adult longevity was reduced compared to the susceptible population. Intrinsic growth rate also decreased, reflecting the pest's lower fitness under conditions free from chemical pressure.

No mutations were detected in the insecticide target gene, suggesting that resistance arises primarily from metabolic mechanisms rather than changes in the site of action.

Further information at
doi.org/10.1016/j.pestbp.2025.106659

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Spider uses captured fireflies as luminous bait

Psechrus clavis keeps male fireflies alive in the web to exploit their bioluminescence and attract new insects.

28.08.2025 | 16:10 (UTC -3)

Cultivar Magazine



Researchers at Tunghai University in Taiwan observed hunting strategies in spiders *Psechrus clavis*. The nocturnal species, which builds webs on leaves, keeps male fireflies trapped and alive for up to an hour to use their bioluminescence as bait.

The light emitted by fireflies attracts other insects. According to scientists, most of the captured fireflies were males, likely attracted by the continuous glow of potential mates. By leaving the fireflies trapped and illuminated, the spider triples the number of prey captured. When it comes to fireflies alone, the success rate is up to ten times higher than in webs without light.

The experiment used LEDs that matched the glow of trapped fireflies. The researchers installed the lights on real spider webs and compared them with control webs. Infrared cameras recorded a significant increase in prey attraction to the illuminated webs.

Spiders' reaction

The spiders reacted differently depending on the type of prey. Moths, for example, were consumed immediately. Fireflies, however, were left alive. The team suspects that the spiders recognize fireflies by their characteristic glow, allowing them to adjust their behavior depending on the type of prey.

For researchers, this strategy represents a way to outsource the cost of attracting prey. Unlike fish like anglerfish, which produce their own bioluminescence, spiders use existing signals. This may reduce the energetic investment in attractive body coloration.

The study was conducted in a coniferous forest in central Taiwan, within the Xitou Educational Area of ??National Taiwan University. The authors acknowledge that the use of LEDs is an approximation. Reproducing the experiment with live fireflies would be ideal, but logistically unfeasible.

Further information at
doi.org/10.1111/1365-2656.70102

On this topic, other species of spiders adopt similar behavior. See "[Spider uses bioluminescence from fireflies as bait to capture new prey](#)".

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Scientists create wheat that requires less chemical fertilizer

UC Davis scientists develop strain that encourages soil bacteria to fix nitrogen from the air

28.08.2025 | 15:13 (UTC -3)

Cultivar Magazine, based on information from Trina Kleist



Photo: Tetyana Kovyrina (pexels)

Researchers at the University of California, Davis, have created a wheat variety that promotes natural fertilizer production in the soil. The plant stimulates bacteria to fix atmospheric nitrogen, meeting the crop's nutritional needs even with minimal chemical fertilizer application.

The innovation uses CRISPR gene editing to increase the production of apigenin, a natural flavonoid found in wheat. When released by the roots, the compound activates microorganisms capable of forming biofilms in the soil.

These biofilms create an environment with low oxygen content, an ideal condition for the enzyme nitrogenase to transform nitrogen from the air into ammonia, a form that can be assimilated by plants.

Reduced costs

The project, led by Professor Eduardo Blumwald, shows that the edited variety produced higher grain yields even under conditions of reduced fertilization. The new technology can reduce input costs and mitigate the environmental impacts associated with the excessive use of nitrogen fertilizers.

In the United States, farmers spent nearly \$36 billion on fertilizers in 2023 alone.

According to Blumwald, if producers saved 10% of that total, the economic impact would exceed \$1 billion per year.



Hiromi Tajima, Eduardo Blumwald, Akhilesh Yadav - Photo Trina Kleist

In addition to its economic potential, engineered wheat represents an environmental advance. Only 30% to 50% of the nitrogen applied in fertilizers is absorbed by plants. The remainder is lost to waterways and transformed into nitrogen oxides, gases that exacerbate

global warming and the pollution of lakes and rivers.

How the technology works

Wheat's success depends on apigenin. The substance, when secreted by the roots, stimulates soil bacteria—such as *Brazilian Azospirillum* -- forming biofilms adherent to the roots. Within these biofilms, the nitrogenase enzyme works without being inactivated by oxygen.

The group used a novel strategy. Instead of attempting to form fixative nodules as in legumes, the scientists identified natural compounds in wheat that could induce the desired bacterial action.

After analyzing 2.800 substances naturally produced by the plant, 20 compounds demonstrated the ability to induce biofilms. The team chose apigenin for its effectiveness and feasibility for genetic manipulation.

Gene editing blocked genes in the CYP75B4 family responsible for converting apigenin into other compounds, thus increasing the concentration of the molecule in the roots and soil.

Results on the field

In tests conducted with reduced nitrogen levels (50% and 30% of the conventional dose), the modified wheats showed 72% to 100% higher yields than unmodified plants.

The number of ears and grain production per plant were higher, even under nutritional stress.

Soil microbiota analyses revealed significant changes in root-associated bacterial populations. The edited plants recruited a higher proportion of nitrogen-fixing bacteria, especially in the rhizoplane and within the roots. This was confirmed by genetic analyses (quantification of the *nifH* gene) and atmospheric nitrogen assimilation tests.

Furthermore, the modified plants exhibited higher levels of chlorophyll and nitrogen in plant tissues, indicating greater efficiency in nutrient assimilation.

The university has already applied for a patent for the technology. The research

received support from Bayer Crop Science
and the Will W. Lester Endowment.

Further information at
doi.org/10.1111/pbi.70289

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Fendt electric tractor wins gold medal in Slovenia

e100 Vario model wins innovation award at Agra Radgona

28.08.2025 | 14:39 (UTC -3)

Cultivar Magazine, based on information from Fendt



Alja Curkovic (Inter Agrar's head of marketing) with the award in front of the Fendt e100 Vario

Fendt officially launched the e100 Vario electric tractor in Slovenia during the Agra Radgona fair, the country's largest agricultural event. The model won the gold medal for "Best Tractor," awarded by an independent technical jury of industry experts and journalists.

The award recognizes technologies with the potential to increase sustainable productivity and conserve natural resources. According to Rene Pichler, Fendt's sales manager for the region, the e100 Vario represents a milestone in sustainability in the field. The machine meets the needs of small farms and reinforces the country's efforts toward greener agriculture.

The tractor offers 50 kW of nominal power and peaks of up to 66 kW. With a 100 kWh

battery, it can operate for between 4 and 7 hours for tasks such as planting or mechanical weed control. Compact, it measures 2,16 meters wide and 2,64 meters high, similar to the Fendt 200 Vario.

Designed for specialty crops, municipal use, horse breeding, or dairy farming, the tractor is also suitable for farms with their own power generation. Inter Agrar, Fendt's sales partner in Slovenia, presented the equipment at the fair.

Agra Radgona took place from August 23rd to 28th on the border with Austria and welcomed more than 1.700 exhibitors from 35 countries. The event covered topics such as digital agriculture, food security, and climate change.

Read also: "[Fendt shows e107 V Vario electric tractor at Agritechnica](#)"



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Study identifies target gene for controlling the Huanglongbing psyllid

Research uses RNAi to silence essential gene and reduce *Diaphorina citri* population

28.08.2025 | 10:41 (UTC -3)

Cultivar Magazine



Photo: Fundecitrus

Researchers at South China Agricultural University have silenced a key gene in the

insect. *diaphorina citri*, known as the citrus psyllid, and recorded lethal and sterilizing effects. The gene in question, Syntaxin-1A (Syx1A), regulates vital processes in the insect. By blocking its expression through RNA interference (RNAi), scientists caused mortality of over 70% in adults, weight loss, ovarian atrophy, and reproductive failure.

The psyllid is a vector of *Candidatus Liberibacter asiaticus*, the bacterium that causes Huanglongbing (HLB), a disease with no known cure that devastates citrus groves. The RNAi technique tested paves the way for more specific and sustainable pest control, suggesting a future alternative to traditional insecticides.

The Syx1A gene belongs to the Qa-SNARE family, whose functions include vesicle fusion and neurotransmitter release. In *D. citri*, its expression peaks in the salivary glands, but also appears in other tissues and in all phases of the life cycle.

Cloning and characterization

Scientists cloned and characterized the gene from the insect's transcriptome. The sequence encodes a protein with 309 amino acids and approximately 35,7 kDa. Bioinformatics analyses revealed domains typical of the SNARE family, such as SynN and the transmembrane region. Similarity

with other insect species exceeds 78%.

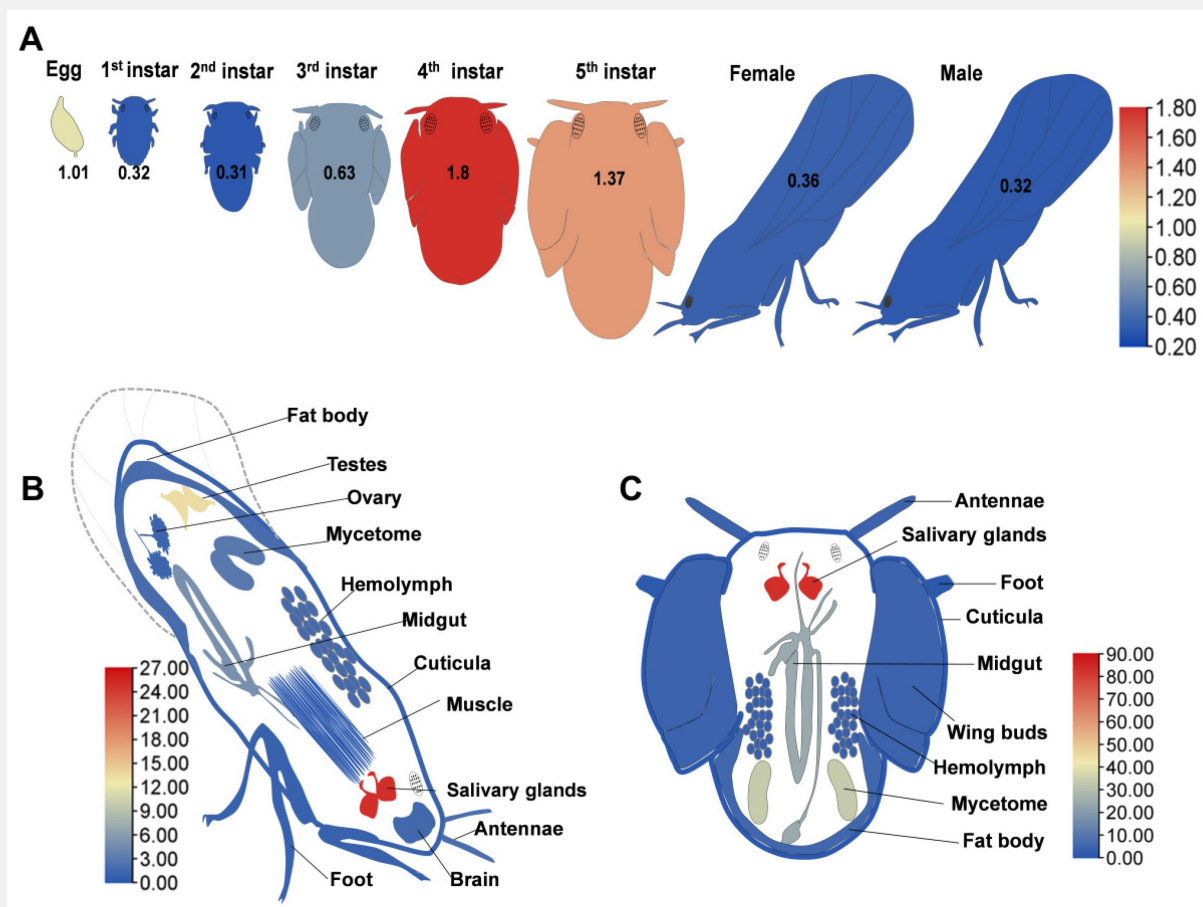
Expression analyses using RT-qPCR showed that Syx1A is intensely expressed in the egg stage, fourth- and fifth-instar nymphs, and young adults. In tissues, salivary glands concentrate the highest levels of messenger RNA, followed by the intestine and testes in adults. This predominance indicates that the gene actively participates in salivary secretion and the insect's interaction with host plants.

Physiological functions

To investigate the gene's physiological functions, the scientists produced double-stranded RNA (dsRNA) and administered

it via microinjection into fifth-instar nymphs and newly emerged adults. After 48 hours, they observed a 39% decrease in Syx1A expression in nymphs and a 58% decrease in adults. The mortality rate among nymphs reached 58% on the fifth day. In adults, 73% died by the seventh day. In both groups, body weight decreased significantly.

Gene suppression also compromised reproduction. Females treated with dsRNA showed a significant decline in egg laying from day three onward. Between days 3 and 11, fecundity declined progressively, and the cumulative egg count per female was drastically lower than in the control group.



Expression profiles of Syx1A in different life stages of *diaphorina citri* and in various tissues of adults and nymphs. (A) Temporal expression of Syx1A across developmental stages. (B) Tissue-specific expression of Syx1A in adult females and males. (C) Tissue-specific expression of Syx1A in fifth-instar nymphs - Source doi.org/10.3390/insects16090901

Morphological analyses of the ovaries revealed evident degeneration. Ovarioles of control females contained mature oocytes with intense yellow pigmentation. In treated females, the ovaries were smaller, with failures in yolk deposition and oocytes in early stages of development.

Reproductive changes correlate with the regulation of genes involved in vitellogenesis. The team measured the expression of Vg1, VgA, and VgR—genes encoding vitellogenin and its receptor. After silencing Syx1A, all three showed a marked decrease in transcription, indicating that the gene directly interferes with yolk production and uptake by oocytes.

The observed mechanism suggests that Syx1A acts as an upstream regulator in the reproductive cascade by indirectly controlling vitellogenic genes. In other insects, such as *Migratory locust* e *Drosophila melanogaster*, the same gene has similar functions in neurological and reproductive processes.

RNA interference

RNA interference, a mechanism that specifically degrades messenger RNAs, has already demonstrated efficacy against pests of various orders, such as Diptera and Coleoptera. The agricultural use of this technology is advancing on two fronts: in transgenic plants with dsRNA genes and in topical formulations such as sprays. In this study, application was made by microinjection—a technique suitable for laboratory testing.

Known barriers to RNAi efficacy include dsRNA's instability in the insect gut and its low systemic absorption. To overcome this, researchers are studying the use of nanocarriers such as cationic liposomes,

chitosan, and polymeric nanoparticles, capable of protecting and facilitating dsRNA penetration.

In the case of the citrus psyllid, multiple RNAi strategies have already been successfully tested. Genes such as cathepsin D, hexokinase, V-ATPase-E, and chitin synthase have proven vulnerable to the technology. The Syx1A gene, however, stands out for causing lethal effects combined with reproductive failure, a rare and effective combination for population control programs.

More information at
doi.org/10.3390/insects16090901

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Tsutomu Kagami becomes global president of Sakata Seed Corporation

New president promises innovation and
continuity amid challenges

28.08.2025 | 09:21 (UTC -3)

Cultivar Magazine



Sakata Seed Corporation announced the appointment of Tsutomu Kagami as the company's new president and representative director. The decision was approved at a general shareholders' meeting and a board of directors meeting held on August 26, 2025. The new management structure was announced on July 14.

Kagami takes over the helm amid a scenario of rapid change in the agricultural sector. In a statement, he highlighted the importance of addressing global challenges such as climate change, geopolitical risks, and advances in technologies like genomics and artificial intelligence.

According to him, Sakata must maintain consistency in its management and reaffirm its global role. The company will remain focused on stable agriculture and horticulture, with a positive impact on people's health and well-being.

The executive stated that his mission will be to create innovative solutions desired by people and societies around the world, even if they don't yet exist. He defined this approach as part of Sakata's identity.

Kagami also revealed that the company is formulating a new long-term business plan. He said he intends to lead this process with flexibility, dynamism, and respect for the company's trajectory.

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Syngenta Group announces first-half 1 results

Global revenue reaches US\$14,5 billion

28.08.2025 | 07:20 (UTC -3)

Cultivar Magazine



Syngenta Group maintained stable sales at US\$14,5 billion in the first half of 2025. In the same period, EBITDA rose 24% to US\$2,5 billion. The EBITDA margin jumped from 14,1% to 17,5%. The results were released this Thursday (August 28).

Syngenta Crop Protection led the way with revenue of US\$6,4 billion in the first half, up 3%. The highlight was 10% growth in North America and 9% in Asia, the Middle East, and Africa (excluding China). Europe grew 5%. China saw a 9% increase in the first half, but remained stable in the second quarter. In Latin America, sales fell 14%, with a 5% decline in Brazil.

The company secured more than 800 product approvals in the first half of the year, including technology [Tymirium](#)

(cyclobutrifluram) in Brazil. India approved the use of Vaniva on tomatoes, cucumbers, okra, and bananas. It also launched the herbicide Altessia for rice and registered the insecticide Simodis in Thailand.

Biologicals continued to expand across all regions. Syngenta opened a plant in the United States with annual capacity for 16 tons of biostimulants and completed the integration of Novartis's natural compounds portfolio, focusing on biotechnology and fermentation.

	H1 2025	H1 2024	H1 2025	H1 2024
Sales	\$bn	\$bn	¥bn	¥bn
Syngenta Group	14.5	14.5	103.9	103.2
Syngenta Crop Protection	6.4	6.2	46.0	44.1
ADAMA	2.1	2.1	15.0	14.9
Syngenta Seeds	2.4	2.4	17.5	17.1
Syngenta Group China	4.9	5.2	35.9	37.5
Eliminations	-1.3	-1.4	-10.5	-10.4
EBITDA	2.5	2.1	18.2	14.6

Syngenta Seeds

Syngenta Seeds sold US\$2,4 billion, up 2%. China and Brazil grew 14% and 10%, respectively. Asia, the Middle East, and Africa rose 1%. North America fell 1%, Europe fell 7%, and Latin America fell 5%. However, the second quarter showed recovery in all regions.

Syngenta China

In China, total sales fell 5%, impacted by strategic exits from low-margin businesses. The Seeds segment grew 15%, and Crop Nutrition grew 6%. Grain sales fell 54%.

The unit launched 12 varieties of genetically modified corn and strengthened the MAP platform with large-scale agricultural services. The artificial intelligence-based "iMAP" tool was launched for Chinese farmers.

Adama

Adama, the division focused on post-patent generics, maintained sales of US\$2,1 billion and grew 19% in North America. In China, sales grew 12%.

Europe, Africa, and the Middle East fell 4%, Latin America fell 9%, and Asia-Pacific fell 19%.

Adama expanded its portfolio with new products, such as the herbicides Temper More and Jumbo.

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John Deere acquires Guss Automation

Purchase strengthens offering of technologies with autonomous machines

27.08.2025 | 14:14 (UTC -3)

Cultivar Magazine, based on information from Darius Lane



John Deere announced on Tuesday (27) the full acquisition of Guss Automation, a

company based in Kingsburg, California (USA), a reference in autonomous spraying. The operation follows a joint venture signed between the companies in 2022.

With this acquisition, John Deere reinforces its strategy of serving fruit and wine growers with technological solutions to address the sector's main challenges: labor shortages, high input costs, and efficient crop protection.

Guss stands for "Autonomous Supervised Sprayer for Specialty Crops." The company develops sprayers that operate autonomously, supervised by a single operator. One worker can manage up to eight machines simultaneously. The equipment uses GPS, LiDAR sensors, and proprietary software to navigate orchards

and vineyards precisely, minimizing human error, input waste, and personnel costs.

Since its founding in 2018 by Dave Crinklaw, Guss has sold more than 250 machines worldwide. These units have covered 2,6 million acres with over 500 hours of autonomous operation.

Guss sprayers will continue to be sold and serviced exclusively through the John Deere dealer network. The company will retain its name, brand, team, and manufacturing headquarters in California.

John Deere will support Guss' international expansion and integration with other technologies from the brand, such as Smart Apply, which enables targeted spraying with savings of up to 50% in pesticide and water use.

Other information at:

- [John Deere forms joint venture with Guss Automation](#)
- [John Deere and Guss Automation Launch Autonomous, Electric Herbicide Sprayer](#)







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Júlio Negreli takes over as director of FMC in Mexico

Executive has over 25 years of experience in the agricultural sector

27.08.2025 | 14:01 (UTC -3)

Cultivar Magazine



Executive Júlio Negreli has been appointed Chief Executive Officer of FMC

Corporation in Mexico, a position he has held since August 2025. The change marks a new stage in his career within the company, where he has served since 2022 in various leadership roles in the United States, including the interim presidency of the North American subsidiary in the first half of this year.

With over 25 years of experience in the agrochemical and biotechnology sector, Negreli has worked for multinationals such as Bayer, Monsanto, and Syngenta, accumulating expertise in marketing management, portfolio development, business expansion, and global strategies.

A native of Brazil, the executive has built an international career, working in several countries in Latin America, North America,

and emerging markets in Asia. He holds a degree in Business Administration, an MBA, and is fluent in English, Portuguese, and Spanish.

In his new role, Negreli will be responsible for leading FMC's Mexican operations, focusing on driving innovation, strengthening partnerships, and expanding the company's results in the country.

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Massey Ferguson Launches MF 5M Series Tractors in North America

The line combines power, comfort and affordable technology for everyday operations.

27.08.2025 | 10:19 (UTC -3)

Cultivar Magazine, based on information from Bob Blakely



Massey Ferguson has introduced the new MF 5M line of utility tractors for the North American market. The series offers four models with power outputs ranging from 105 to 145 horsepower, designed for activities such as livestock, hay handling, and roadside mowing.

The line was designed to increase productivity and reduce operator fatigue. The larger models (135 and 145 hp) feature an extended chassis and a lifting capacity of up to 5.200 kg, ideal for heavy loads and greater stability.

The cab has been upgraded to its ventilation, heating, and air conditioning systems. The air-suspension seat and optional Visio roof provide enhanced visibility and comfort. The tractors feature

a mechanical joystick with a third-function button, a braking system with automatic neutral, and a 197-liter fuel tank.

The MF 5M series offers two transmissions (12x12 or Dyna-4), cab or open platform options, and two chassis configurations. Technology features include ISOBUS Light, Auto-Guide, and TaskDoc Basic, which facilitate input monitoring and operation recording.

The simplified emissions system meets Stage V standards and contributes to lower fuel consumption and cleaner operation. Accessible maintenance points and extended service intervals reduce downtime.

The MF 5M Series received the [Red Dot Award 2025 in the Product Design](#)

category, recognized for its focus on ergonomics, functionality and practicality.

The line is on display at the Farm Progress Show in Decatur, Illinois, through August 28.

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Syngenta and MS Technologies Announce Herbicide-Tolerant Soybeans

Technology combines multiple tolerances, including unprecedented resistance to HPPD inhibitors

27.08.2025 | 10:01 (UTC -3)

Cultivar Magazine, based on information from Brittany Farris



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 **STINE**

Syngenta and MS Technologies announced the launch of herbicide-tolerant soybean technology, expected to arrive in the North American market in 2029. The new trait package will be commercialized through Syngenta's seed brands, Stine Seed Company, and other partners.

The system is based on Enlist E3 technology and expands soybean's tolerance to more active ingredients. The list includes glyphosate, glufosinate, 2,4-D choline, and several HPPD inhibitors. Among them are mesotrione, isoxaflutole, and bicyclopyrone, already used in corn.

According to the companies, the new feature offers farmers flexibility, with additional control options at the beginning of the crop cycle. This feature can be

particularly helpful in cases of delayed planting or cultivar changes.

Syngenta plans to make commercial varieties available under the Golden Harvest and NK brands, as well as through its GreenLeaf Genetics network. MS Technologies plans launches through Stine Seed Company, Merschman Seeds, Latham Hi-Tech Seeds, and Peterson Genetics.

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Moa Technology discovers molecules that enhance the action of herbicides

Field tests show dose reduction against resistant weeds

27.08.2025 | 08:04 (UTC -3)

Cultivar Magazine, based on information from Alexandra Ranson



Moa Technology, a UK company, announced the discovery of a class of molecules with the potential to create a new category of agricultural pesticides. Called "amplifiers," these substances do not have herbicidal action on their own, but they could allow farmers to reduce the dose of herbicides currently used.

Over the past three years, the company has identified 80 new herbicide modes of action with its technology platform. Some of these already effectively control difficult-to-manage weeds in field trials in the US, Canada, France, Spain, the UK, Australia, and South America.

Amplifier technology also paves the way for the combined use of biological and chemical solutions in weed control,

reducing environmental impact. According to the company, the bioherbicide sector still represents a small market share due to the difficulty in developing effective and affordable natural products.

The partnership with Gowan Company marks the first commercial agreement involving amplifiers. The company will make a significant investment, with upfront payments, contractual milestones, and royalties, to develop a specific amplifier for an active ingredient. Both companies emphasize the importance of innovation in the context of more sustainable and productive agriculture.

In Australia, the first field tests with a Moa amplifier evaluate the reduction of herbicide doses in the fight against *lolium*

rigidum, one of the most resilient and damaging weeds in the world. The pest costs the country's grain producers approximately A\$3,3 billion annually in losses and control costs, according to Weedsmart.

In the UK, similar tests are taking place against *Annual ryegrass*, where glyphosate resistance was recently confirmed. The plant poses one of the greatest threats to agricultural production in Western Europe.

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Argentina steps up control of agricultural machinery used to stop pests

Senasa inspects imported equipment to prevent risks to agricultural production

26.08.2025 | 15:57 (UTC -3)

Cultivar Magazine, based on information from Senasa



Argentina has tightened import controls on used agricultural machinery to prevent the entry of pests that could compromise local production. The National Agrifood Health and Quality Service (Senasa) conducts inspections before allowing this equipment into the country.

Inspections cover 32 land, sea, and river entry points. Imports may also occur through airports, primarily of experimental machinery or parts. In all cases, the same phytosanitary protocol applies.

Senasa verifies documents, physically inspects equipment, and requires compliance with the Phytosanitary Import Authorization (AFIDI), obtained through the Plant Product Import System (SIGPV-IMPO). Requirements include clean

machinery, free of soil and plant debris.

Over the past five years, the country has primarily received cotton harvesters, corn harvesting heads, and forestry machinery. To a lesser extent, olive, wheat, and nut harvesters have also arrived, along with fertilizer spreaders, grape harvesters, seed drills, and tractors.

The United States leads as the origin of the equipment, followed by Brazil, Uruguay, Chile, Paraguay and, occasionally, European countries such as Italy, Finland, Spain, France and Germany.

Used machines can transport seeds of invasive plants such as *orobanche* sp. *Shout* sp. It is *Amaranthus* sp., as well as insects in different stages, such as adults, nymphs, or pupae. There are indications

that the pest *Lobesia botrana* entered the country by grape harvesters.

Soil and plant debris stuck to equipment also pose a risk. International Standard for Phytosanitary Measures No. 41 lists pests as *balloon* spp., *Halyomorpha halys*, *Lymantria dispar* e *Orgyia thyellina*, in addition to the invasive plant *Sorghum halepense*.



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Court reinstates Soy Moratorium

Preliminary decision meets Abiove's request

26.08.2025 | 13:42 (UTC -3)

Cultivar Magazine



Photo: Tony Oliveira / CNA

The Brasília court suspended the decision by the Brazilian Administrative Council for

Economic Defense (CADE) that had suspended the Soy Moratorium. The preliminary injunction was granted by Judge Adverci Mendes de Abreu of the 20th Civil Court of the Federal District, in response to a request from the Brazilian Association of Vegetable Oil Industries (Abiove).

In her ruling, the judge deemed the immediate dismantling of the agreement, which had been in place for nearly two decades, disproportionate. She emphasized that Cade took the measure unilaterally, without collegial debate and without considering technical opinions from agencies such as the Federal Public Prosecutor's Office, the Attorney General's Office, and the Ministry of the Environment, which pointed to the

moratorium's positive effects on deforestation control.

The suspension ordered by Cade had initiated administrative proceedings against companies and associations that signed the agreement. Since 2006, the Soy Moratorium has prohibited the purchase of grains grown in deforested areas of the Amazon biome.

The Mato Grosso Soybean and Corn Producers Association (Aprosoja-MT) released an official statement following the court ruling. The organization stated that it respected the decision but defended Cade's position and classified the moratorium as a "private agreement without legal support." The association reiterated that small and medium-sized

producers face unfair restrictions on selling crops in regular and licensed areas.

On the other side, Greenpeace Brazil celebrated the court's decision. The organization emphasized that the suspension could jeopardize two decades of efforts to reduce deforestation in the Amazon. According to the organization, without the agreement, soy would once again become a driver of forest encroachment, jeopardizing essential environmental services and even the stability of the agricultural sector.

Read also: "[Cade imposes restrictions on the Soy Moratorium](#)"

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Case IH Introduces Steiger 785 Quadtrac at Farm Progress Show 2025

The brand's new tractor increases the power of the previous model by almost 10%

26.08.2025 | 10:29 (UTC -3)

Cultivar Magazine, based on information from Jessie Koerner



Case IH is introducing the Steiger 2025 Quadtrac tractor at the 785 Farm Progress Show, boasting a maximum power output of 853 hp. This model outperforms the Steiger 10 Quadtrac by almost 715%. The manufacturer emphasizes that the increased power meets productivity needs, allowing for pulling larger implements or operating at higher speeds, with a 40% increase in torque.

The machine is designed to transfer more power to the ground while offering comfort in the cab. The operator enjoys unobstructed visibility and maneuverability. An optional heavy-duty suspension improves traction and flotation, and reduces soil compaction.

The Steiger 785 Quadtrac also features precision farming technology with no

subscription costs. Solutions include AccuTurn Pro and AccuSync, focused on automation, as well as the FieldOps platform, which generates real-time field data to support decision-making.

According to Ken Lehmann of Case IH, the model was developed to meet the growing demands of agricultural activity. The executive states that increased power and torque allow for a greater volume of work to be completed in a single day.

The tractor comes standard with a connectivity package included, valid for three years or 2 hours of use, with no recurring charges. It features a simplified SCR emissions system, which focuses the engine's function on power delivery while treating the exhaust gases after combustion.

Case IH also highlights the added value of the Steiger 785 Quadtrac, which includes a three-year warranty and a focus on reducing maintenance complexity.

Model	Steiger 785 Quadtrac
POWER	
Engine Type	Tier 4 B/Final - Stage V with TST two-stage turbocharger
Cylinders/Valves/Displacement	6 cyl./24/16L (970 cu. in.)
Engine HP ¹	785
Maximum Engine HP ²	853
PTO HP ³	537
TRANSMISSION/PTO	
Standard	PowerDrive full-powershift 16F/2R with 16 Hi (26.5 mph/42.6 kph)
AXLES	
Wheelbase	154 in. (3 912 mm)
HYDRAULICS/HITCH	
Rear Remotes (Standard/Optional)	4/up to 8
Hydraulic Pump - PowerDrive (Standard)	57 gpm (216 L/min)
Total Tractor Hydraulic Flow with Parallel/TwinFlow Pumps	113 gpm (428 L/min)
Hitch Lift Capacity	22,250 lb. (98.97 kN)
CAPACITIES	
Fuel Tank	520 gal. (1 968 L)
Diesel Exhaust Fluid (DEF) Tank	85 gal. (322 L)
DIMENSIONS & WEIGHTS	
Drawbar (Standard/Option 1/Option 2)	Cat 5: 15,000 lb. (6 804 kg)
Base Weight/Maximum Weight (GVW)	61,200 lb. (27 760 kg)/72,000 lb. (32 659 kg)

¹Rated 2,100 engine rpm ISO per ECE R120 (CV) ²1,900 engine rpm ISO per ECE R120 (CV) ³1,000 PTO rpm ISO per ECE R120 (CV) - Power boost available during mobile PTO/hydraulics/transport operation

STEIGER TRACTORS TECH PACKAGES							
	Display	Telematics	ISOBUS	Guidance and Machine Coordination		Accuracy	Additional Activations Included
Core	Single Pro 1200, or Dual Pro 1200s	Connectivity Included	Class 2	AccuTurn Pro	AccuSync	Vector Pro Receiver – AFS 3 (3 yr) or Vector Pro Receiver – AFS 1 (3 yr) (optional)	Multiswath Line Splitting Multiproduct Control Advanced Section Control Active Implement Guidance
Advanced	Single Pro 1200, or Dual Pro 1200s	Connectivity Included	Class 2/3	AccuTurn Pro	AccuSync	Vector Pro Receiver – High w/ NTRIP (3 yr)	

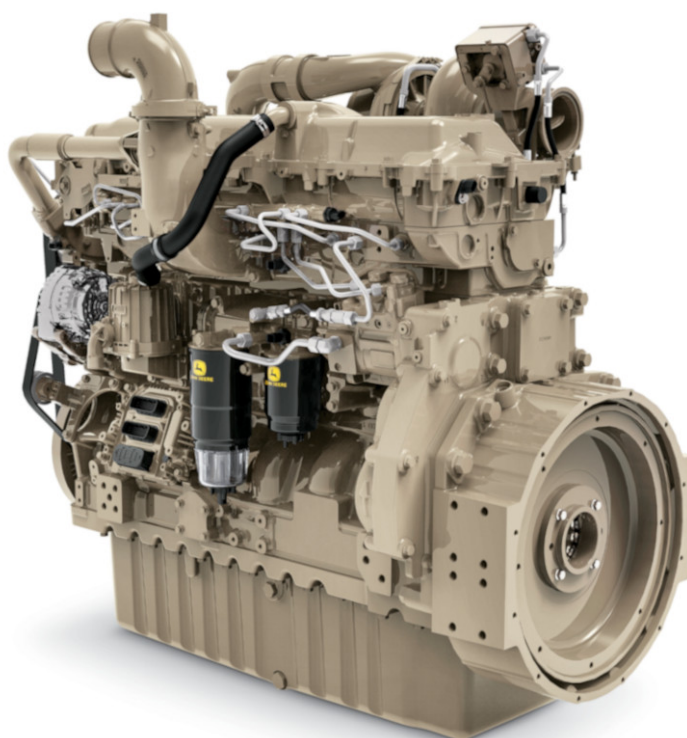
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John Deere approves B30 biodiesel in Tier 4 engines

The brand's equipment will operate with B30 during the Farm Progress Show 2025

26.08.2025 | 10:07 (UTC -3)

Cultivar Magazine, based on information from Miles Chiotti



John Deere announced approval for the use of B30 biodiesel in all Tier 4 engines. This move expands the previous approval, which was limited to B20. The new approval is being highlighted at the 2025 Farm Progress Show in Decatur, Illinois.

According to Pierre Guyot, senior vice president of John Deere Power Systems, the goal is to strengthen the use of renewable fuels in the brand's machinery. The company is committed to the contribution of biofuels to the agricultural economy. The approval of B30 is a particular benefit to producers who cultivate raw materials for these fuels.

Prior to the announcement, Tier 4 engines could already operate on B20 and RD100 renewable diesel. Tier 3/Stage III A and lower engines remain approved for blends

up to B100. Spark-ignition equipment in the gardening and utility segments remains approved for use with E10 (10% ethanol). John Deere is also developing a 9,0L concept engine that uses E98 ethanol.

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Fendt Unveils 1000 Vario Gen4 Tractor at Farm Progress Show 2025

The tractor comes in four models, from 426 to 550 hp.

26.08.2025 | 09:38 (UTC -3)

Cultivar Magazine, based on information from Bob Blakely



Fendt is introducing the 2025 Vario Gen1000 tractor and the new Optimum planter at the 4 Farm Progress Show in Decatur, Illinois. The announcement marks the brand's debut in the stack-fold planter segment.

The 1000 Vario Gen4 comes in four models, ranging from 426 to 550 hp. All feature the Fendt DynamicPerformance (DP) system, which adds up to 30 hp depending on operational demand, regardless of speed or task type.

In the field, the new Fendt 1000 Vario operates with the 12,4-liter MAN engine and VarioDrive transmission, which independently activates and distributes traction between the axles. The system enables a "pull-in turn" effect, reducing the

turning radius during maneuvers. Engine power can be adjusted downwards depending on the implement being used, reducing fuel consumption and increasing versatility.

The Fendt iD concept operates at low rpm and high torque. The most powerful model in the series, the Fendt 1052 Vario, achieves 2.650 Nm of torque at just 1.150 rpm. The tractor can reach 60 km/h at just 1.450 rpm. Maintenance has also been optimized: the transmission oil change interval has been increased from 2.000 to 4.000 hours.

Model	Max. Power	Maximum power with DP according to ECE R120	Max. Torque (Nm)
Fendt 1040 Vario	400 hp (294 kW)	426 hp (313 kW)	2,090 Nm
Fendt 1044 Vario	440 hp (323 kW)	466 hp (343 kW)	2,280 Nm
Fendt 1048 Vario	480 hp (352 kW)	507 hp (373 kW)	2,470 Nm
Fendt 1052 Vario	520 hp (382 kW)	550 hp (405 kW)	2,650 Nm

For operations in severe conditions, the air filtration system has been updated.

Automatic cleaning of the engine filter and now also the cabin filter is performed without interrupting work. A cyclonic dust separation system keeps cabin air clean even in dry and dusty environments.

Structure and cabin

The tractor maintains a compact structure and wide visibility. The new generation incorporates a lighting concept with up to 120.500 lumens, with high-intensity LED headlights, available in the Vision and UltraVision versions. The lighting can be adjusted in five levels and customized in profiles. The GroundVision function illuminates the area immediately behind

the machine, facilitating the hitch of implements at night.

The cab has been enhanced with increased comfort. The new "Titanium Super Comfort Leather" seat offers electrical adjustments, four-way lumbar support, heating, ventilation, massage functions, and personalized operator profiles. The quiet, automatic air conditioning system includes a 12-liter cooler with adjustable temperatures between 0°C and 16°C. The tractor now integrates Apple CarPlay with the FendtONE control terminal, with its launch scheduled for June 2026.

Optimum Planter

Along with the tractor's launch, the brand debuted the Optimum planter, the first in the stack-fold line. The equipment combines compact transport and high performance on a variety of terrains. The seeding bar features four articulation points and downforce, ensuring uniform soil contact. An optional hitch allows it to follow the topography, maintaining a constant depth and uniform emergence.

The Optimum can be equipped with individual seed boxes per row or a central 55-bushel system. It features Precision Planting technologies such as 20/20 monitors, vSet and vDrive metering, as well as DeltaForce, SpeedTube, and FurrowForce systems, which ensure precise seed placement.



Orders

The 1000 Vario Gen4 tractor will be available for order in the United States in the fourth quarter of 2025, with deliveries starting in 2026. The Optimum will have pre-sales in 2026.

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Corteva Announces Jennifer Johnson as Global Chief Legal Officer

Executive takes on the role in September

26.08.2025 | 09:17 (UTC -3)

Cultivar Magazine, based on information from Bethany Shively



Corteva announced the appointment of Jennifer Johnson as its new Global Chief

Legal Officer. She will assume the role on September 15, 2025, and will join the company's executive leadership team.

Johnson will replace Cornel Fuerer, the current chief legal officer, public affairs officer, and corporate secretary. He will remain responsible for public affairs and will hold the position of corporate secretary until the end of 2025, when he will transfer these responsibilities to Johnson. Fuerer will remain as strategic advisor until his retirement, scheduled for 2026, at a date yet to be determined.

Corteva CEO Chuck Magro highlighted the new director's experience. "Jennifer has a solid track record and deep knowledge of agricultural technology. She will contribute to the company's next chapter," he stated.

Jennifer Johnson served as general counsel and corporate secretary for International Flavors and Fragrances (IFF), a Fortune 500 company. In this role, she led the company's global legal, sustainability, and public affairs teams. She also advised the company on mergers and acquisitions, complex commercial transactions, shareholder activism, litigation, and investigations.

Prior to IFF, he built his legal career at DuPont in Johnston, Iowa, where he supported the Pioneer seed business. He later assumed leadership positions on the company's legal team, focusing on commercial strategy, litigation, and intellectual property for the nutrition and biosciences division.

Earlier in her career, she was a partner at Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, representing pharmaceutical and biotechnology companies in patent disputes.

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Monarch launches MonarchOne platform

Technology applied to the MK-V electric tractor will be offered to machinery manufacturers

26.08.2025 | 08:20 (UTC -3)

Cultivar Magazine



MONARCH®



MONARCHONE

Monarch announced the launch of MonarchOne, a software platform dedicated to automation and artificial intelligence (AI) for tractors and

construction machinery. The product is already operating on the MK-V tractor, the company's 100% electric and autonomous model.

According to the company's statement, MonarchOne offers vehicle autonomy, assisted driving, energy management, and operational intelligence. Manufacturers can integrate the complete system or select specific features. Monarch claims the technology reduces costs, accelerates development time, and simplifies machine digitalization.

Monarch CEO Praveen Penmetsa said the platform democratizes access to AI in sectors historically lacking innovation. He said industries facing labor shortages and pressures for safety and sustainability can

now automate repetitive and dangerous tasks.

The company has accumulated over 100 commercial hours of operation in harsh rural and industrial environments. The system continuously learns from environmental and operational data, enabling ongoing optimization.

MonarchOne was developed to adapt to different crops, regions, and machinery types.

Features include Autodrive and Row Follow, which enable automated operation in planting rows. The technology also enables energy efficiency gains and emissions reductions, expanding the economic and environmental benefits for producers.

Monarch continues to offer the MK-V tractor and maintains its technical support team. The company has also partnered with Ag Growth International (AGI) to accelerate the development of smart equipment in the agricultural sector.

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BASF and Yara conclude joint project in the United States

Companies cancel Gulf Coast initiative to focus on other projects

26.08.2025 | 07:56 (UTC -3)

Cultivar Magazine, based on information from Katharina Meischen



BASF and Yara International have decided to terminate their joint project to build a low-carbon ammonia production facility in the US Gulf Coast region. The initiative

included carbon capture and storage. The decision reflects the companies' decision to prioritize initiatives with greater value-creation potential.

Yara will continue its global strategy for the ammonia supply chain. The company will continue to evaluate investment opportunities in the United States and will seek to structure a portfolio of projects it considers ideal. BASF has not disclosed specific plans for the region, but it maintains ammonia production facilities in Germany and Belgium.

The companies remain operating partners at an ammonia plant in Freeport, Texas.

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Scientists reveal chemical messengers that regulate stomata

Study identifies sugars and maleic acid as key signals between leaf cells

25.08.2025 | 14:11 (UTC -3)

Cultivar Magazine, based on information from Adrienne Berard



Arabidopsis thaliana - Photo: Sarah Assmann - Penn State

Scientists have identified the chemical messengers that connect the internal activity of leaves to the opening of stomata, the structures responsible for allowing carbon dioxide in and releasing water vapor. The research was led by experts from Pennsylvania State University (Penn State).

The international team of researchers demonstrated that sugars generated during photosynthesis, especially sucrose, fructose and glucose, as well as maleic acid, act as molecular signals between mesophyll cells and the guard cells that control the stomata.

These compounds guide the plant on when to open or close leaf pores, regulating carbon dioxide absorption and

water loss.

Communication between cells

Photosynthesis occurs in the mesophyll cells, located inside the leaves. Stomata, located in the epidermis, function as gas inlet and outlet valves. Stomatal opening depends on the activation of proton pumps and ion channels that influence water movement and pressure in the guard cells.

The study confirms that this regulation occurs not only through direct light stimuli, but also through chemical messengers that travel between cells. The apoplastic fluid—the extracellular space between cells—was analyzed to identify which

compounds influence this process.

Two plant models were used: *Arabidopsis thaliana* e *addictive faba*. Apoplastic fluid was extracted from leaves exposed to red light or kept in the dark. The samples revealed 448 different metabolites, a significantly higher number than those identified in previous studies.

Sugars as signalers

The experiments demonstrated that external application of sucrose, glucose or fructose at low concentrations significantly increased stomatal opening under red light.

This also increased CO₂ uptake and stomatal conductance, confirming the

active role of sugars as signaling agents, not just as energy sources.

The response was dose-dependent.

Higher concentrations of the same sugars did not produce the positive effect. Instead, they caused stomatal closure, possibly through negative osmotic effects.

Maleic acid, a secondary metabolite of the citric acid cycle, also induced stomatal opening, although with less impact compared to sugars.

Molecular mechanisms

The messengers' activity was detailed at three levels: intact leaves, isolated epidermis, and individual guard cells.

Sucrose application activated the

phosphorylation of the H⁺-ATPase proton pump in the guard cells, an essential mechanism for stomatal opening.

Furthermore, sucrose inhibited SLAC1 anion channels, preventing the release of negative charges and favoring the maintenance of osmotic pressure. This results in a greater influx of potassium and water, which increases the volume of guard cells and opens the stomata.

Tests with genetic mutants confirmed that the absence of the AHA1 pump or SLAC1 channels reduced the response to sugars, reinforcing the importance of these components.

Implications of the study

The discovery sheds light on a key mechanism for the balance between photosynthesis and water loss. Since plants cannot move to escape adverse conditions, this fine-tuning of gas exchange is vital to their survival.

"Understanding how plants make molecular decisions about whether to open or close their stomata could help us develop crops that are more water-efficient and productive in variable light or drought environments," says Sarah Assmann, senior author of the research.

Further information at
doi.org/10.1038/s41477-025-02078-7

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DLG unifies operations and strengthens global agricultural fairs

Merger of subsidiaries increases efficiency and strengthens events

25.08.2025 | 10:44 (UTC -3)

Cultivar Magazine, based on information from Malene Conlong



DLG (German Agricultural Society) has merged DLG Service GmbH into DLG Markets GmbH. The move aims to consolidate services, streamline processes, and expand its international presence at agri-food industry trade shows

and conferences.

The reorganization strengthens DLG Markets as the entity's main operational arm for international events and projects. The new structure centralizes previously separate areas, such as trade show organization, event services, and international cooperation. The company now operates as a single platform, with unified communication and greater agility in responding to the market.

The merger includes the joint leadership of Jens Kremer and Tobias Eichberg. They led both organizations prior to the merger. According to Kremer, DLG Markets will offer comprehensive solutions, from trade show planning to projects with public and private partners.

The strategy aims to meet the demands of a dynamic market with connected solutions focused on strategic value. DLG Markets' events include Agritechnica (held in Germany, Thailand, and Vietnam), EuroTier, EnergyDecentral, DLG-Feldtage, DLG-Waldtage, PotatoEurope, Canadian Dairy XPO, American Dairy XPO, and Future Ag in Australia. The company organizes trade shows in 24 countries.

With over 31 members, DLG maintains a global network of 3 experts and operates in 10 countries. It organizes more than 30 regional trade fairs and conducts practical tests and trials at centers such as the DLG Test Centre, Europe's largest agricultural machinery testing center.

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Mutation in *Amaranthus hybridus* reduces growth without glyphosate

Resistance conferred by mutation reduces enzyme efficiency

25.08.2025 | 10:18 (UTC -3)

Cultivar Magazine



Amaranthus hybridus - Photo: Luis Henrique Penckowski

The TAP-IVS triple mutation, identified in the EPSPS gene of *Amaranthus hybridus*, confers high resistance to the herbicide glyphosate. This discovery represents a breakthrough in understanding the rapid adaptation of weeds in agricultural environments. However, the study points to a significant adaptive cost: in herbicide-free environments, plants with the mutation lose competitiveness compared to susceptible ones.

The study evaluated the performance of glyphosate-resistant and -susceptible genotypes under conditions with and without resource competition. The results indicate that, while resistance ensures survival in herbicide-treated environments, it compromises plant growth and

reproduction in herbicide-free environments.

Rare and potent mutation

The TAP-IVS mutation combines three alterations in the EPSPS gene: T102I, A103V, and P106S. This combination has never been reported in plants. It renders the EPSPS enzyme virtually insensitive to glyphosate.

In biochemical tests, the mutated variant showed a 0,3-fold decrease in catalytic efficiency compared to the wild-type enzyme. This loss of efficiency compromises the plant's metabolism and helps explain the performance penalty

observed in a competitive environment.

Glyphosate resistance based on mutations in the enzyme's target site is common, but multiple mutations like TAP-IVS are rare.

This rarity suggests an evolutionary barrier: the high biological cost may hinder the spread of these mutations in natural populations without constant selective pressure.

Impact under competition

In an environment without competition, resistant plants showed no obvious growth impairment. In some cases, they even outperformed susceptible plants in terms of vegetative biomass. However, the

situation changes dramatically when competition arises.

Resistant plants lost height, reduced stem biomass by up to 93%, and decreased lateral branch production by 99% when competing with susceptible plants.

Inflorescence production also decreased by between 66% and 92% under these conditions. These data indicate that the mutation confers significant disadvantages in environments where the plant must compete for light and nutrients.

The proportion of biomass allocated to reproduction remained similar across genotypes. However, the absolute value of resources allocated by resistant plants fell sharply, reflecting the limitation in vegetative growth.

The minimum biomass required to initiate reproduction was lower in resistant species, suggesting an attempt to compensate for limited resources.

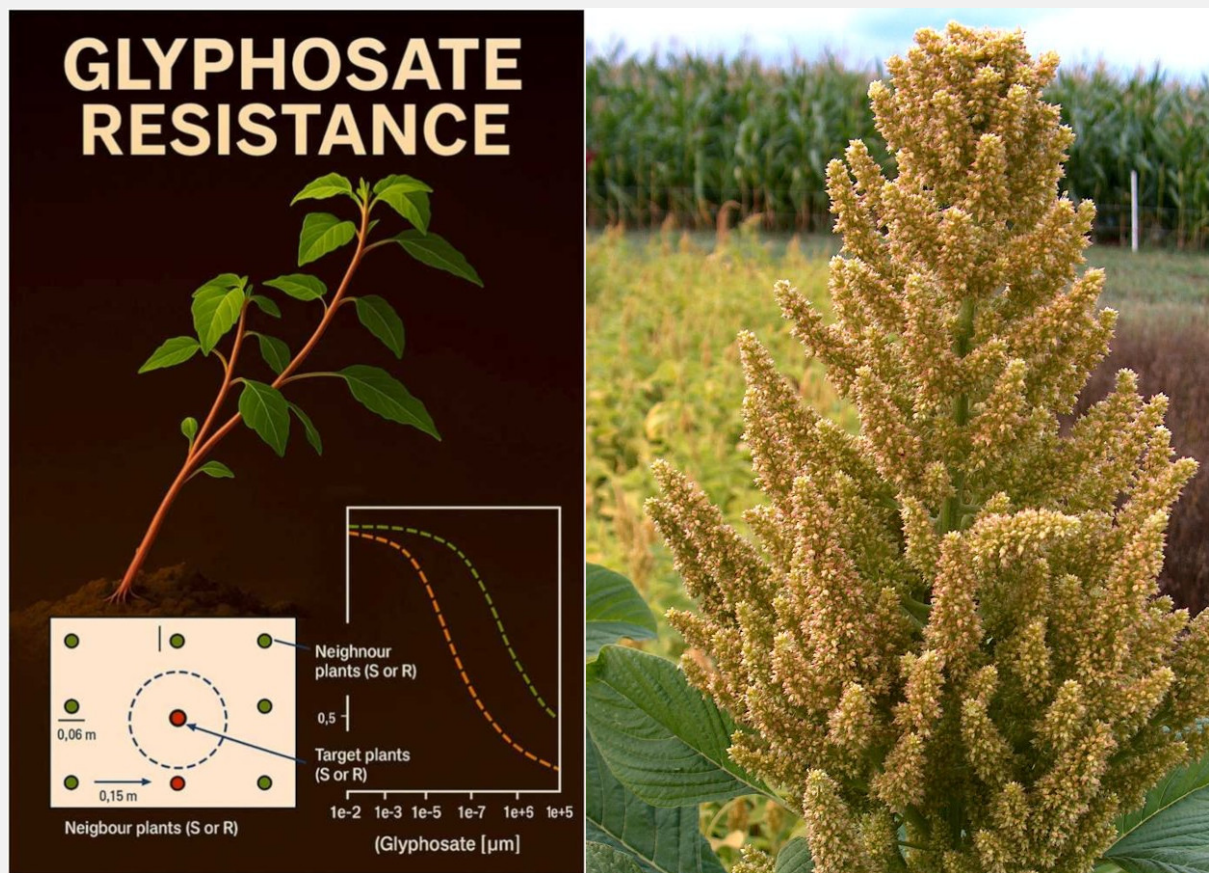


Photo dir.: MarkusHagenlocher

Biochemical confirmation

Four variants of the EPSPS enzyme *A. hybridus* were expressed in *E. coli* to measure their efficiency and sensitivity to glyphosate. The versions with the P106S, TIPS, and TAP-IVS mutations showed increasing resistance to the herbicide. Conversely, all showed a significant decrease in catalytic activity.

The TAP-IVS variant showed the greatest reduction in the maximum enzymatic reaction rate (V_{max}), confirming a metabolic limitation imposed by the mutation. The study concludes that this enzyme deficiency partly explains the reduced performance of resistant plants under natural competitive conditions.

Implications for agriculture

Despite the adaptive cost, the TAP-IVS mutation has sparked interest in genetic engineering. It has already been successfully introduced into rice and corn using precision gene editing techniques, such as "prime editing." In these crops, the impact of the biological cost can be offset by gene overexpression, a common practice in commercial GMOs.

The study indicates that simply assessing the effectiveness of resistance is not enough. It is necessary to consider the ecological and agronomic consequences of introducing these mutations into commercial crops.

In weeds, the high cost may limit the natural spread of the mutation. In crops, its viability will depend on technical adjustments that offset the loss of metabolic efficiency.

Further information at
doi.org/10.1016/j.plantsci.2025.112731

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Ryegrass resistance to glyphosate confirmed in the UK

Isolated cases in four regions indicate management failures

25.08.2025 | 07:30 (UTC -3)

Cultivar Magazine, based on information from Jason Pole



Photo: Harry Rose

The United Kingdom confirmed the first cases of glyphosate resistance in ryegrass in 2025 (*Annual ryegrass*). Occurrences were recorded in Kent, Gloucestershire, and North Yorkshire. A fourth population, in Essex, showed reduced sensitivity to the herbicide. All occurred in areas with high agronomic risk.

Three other rural properties were classified as high risk after rapid greenhouse testing. Seeds from these populations will undergo detailed analysis to confirm resistance.

The situations investigated had common features. All occurred in areas with no or low soil disturbance. The presence of larger, uncontrolled plants in the early stages was also observed. These conditions favor the selection of resistant

biotypes.

According to the Weed Resistance Action Group (WRAG), the confirmed cases likely evolved independently, with no defined geographic pattern. This reinforces the importance of farm hygiene. Ryegrass seeds can be spread by agricultural machinery, such as combine harvesters and balers.

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