

December 13, 2025

N° 60

Cultivar[®] *Semanal*

A microscopic image showing a green fluorescent fungus growing on a plant stem. The fungus has a complex, branching structure with many thin, interconnected filaments. The plant stem is a thick, elongated structure that runs diagonally across the frame. The background is dark, making the green fluorescence stand out.

**Fungus
strengthens
defenses**

Table of Contents

Brazilian agribusiness exports reach US\$13,4 billion in November.	06
Excessive heat during drying damages soybean seeds.	12
Beneficial fungus increases plant resilience.	17
Agricultural Market - December 12, 2025	24
Brazil projects a harvest of 354,4 million tons in 2025/26.	30
Luteolin reduces the survival and reproduction of thrips.	37
Genetically modified orange trees resist black spot and citrus canker.	41
Lemongrass oil kills bed bugs.	48

Table of Contents

Melatonin is making its way as an agricultural tool. 52

Senate allows seasonal workers to work without losing social benefits. 59

Parasitoid alters the development and reproduction of the potato tuber moth. 63

Allterra strengthens governance through strategic hiring. 66

Genetic action of aphids threatens alfalfa production. 74

Viral tools fail on rice 78

Case IH launches 16-row corn platform in Europe. 83

Warming accelerates generations of *Diceraeus melacanthus* 87

Table of Contents

Rovensa Next launches Myndra in Europe. 93

Gut bacteria could revolutionize the control of *Spodoptera frugiperda*. 96

Calibration of agricultural equipment 101

Exclusive test drive with the Crucianelli Plantor 2450 seeder. 126

Voltaremos em 2026

**A próxima edição da
Revista Cultivar Semanal
circulará no dia
17 de janeiro de 2026.**

We'll be back in 2026

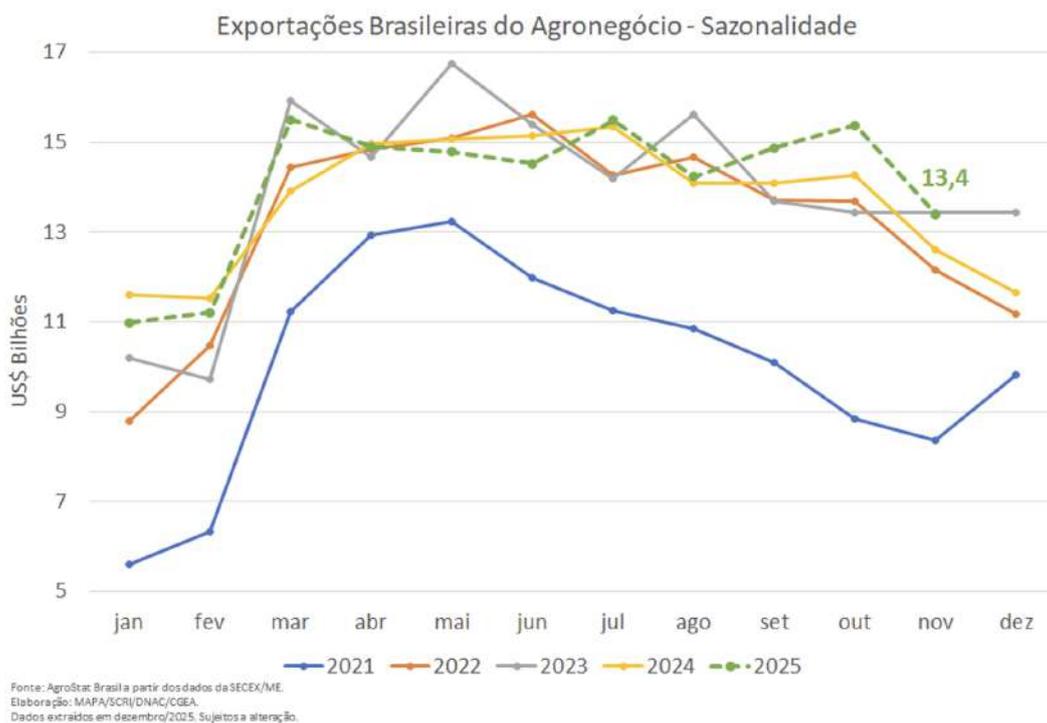
**The next edition of
Cultivar Weekly magazine
will be released on
January 17, 2026.**

Brazilian agribusiness exports reach US\$13,4 billion in November.

Increased export volume boosts results; meat, soy, and coffee account for the majority of exports.

12.12.2025 | 15:04 (UTC -3)

Cultivar Magazine

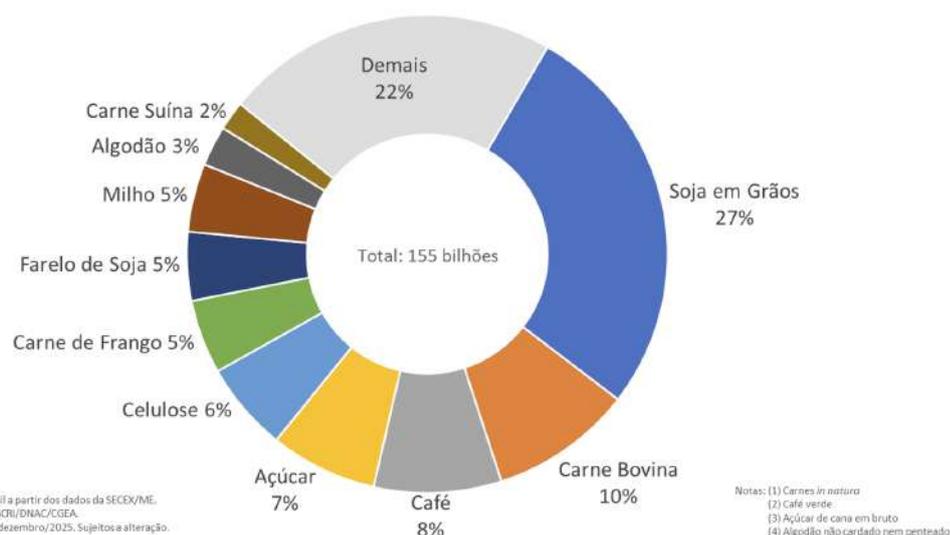


Brazil recorded US\$13,4 billion in exports of agribusiness products in November 2025. This value represented a 6,2%

increase compared to the US\$12,6 billion exported in November 2024. The result marked the second-best performance in the historical series for the month, practically equal to the US\$13,44 billion recorded in November 2023.

The increase was based on the rise in export volume. The export quantum index rose 6,5%. Average prices fell 0,3%, which limited greater growth in the total value shipped.

Exportações do Agronegócio Brasileiro - Principais Produtos
2025 (jan-nov)



The drop in average prices of Brazilian products was less pronounced than that observed in international markets. The FAO food price index showed a decline of 2,1% between November 2025 and November 2024. The World Bank indicated a 6,3% reduction in the global food index.

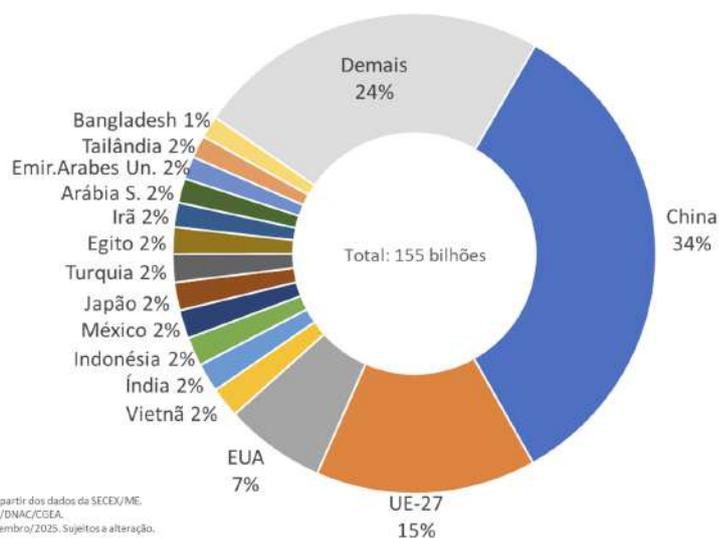
Imports of agricultural products totaled US\$1,51 billion in November 2025, a decrease of 2,1%. The country also imported inputs for production: fertilizers totaled US\$1,12 billion, a decrease of 10,1%. Purchases of pesticides reached US\$516,9 million, a decrease of 3,8%. Animal nutrition products reached US\$190,7 million.

Among exported products, six sectors accounted for 81,2% of the total value in

November 2025. Meat led the way with US\$3,0 billion. The soybean complex totaled US\$2,4 billion. The coffee sector reached US\$1,6 billion. Forestry products registered US\$1,4 billion. The sugar and ethanol complex exported US\$1,3 billion. Cereals, flours, and preparations totaled US\$1,2 billion. In November 2024, the combined share of these sectors had been 79,7%.

The top ten agricultural products accounted for 77,6% of exports for the month. This group showed a 13,3% increase compared to the same period last year. Other products saw a 12,5% decrease in exports, falling from US\$3,4 billion to US\$3,0 billion.

Exportações do Agronegócio Brasileiro - Principais Destinos
2025 (jan-nov)



RETURN TO INDEX

FIGHTER

POTÊNCIA, EFICIÊNCIA E TECNOLOGIA PARA MÁXIMA PERFORMANCE NO CAMPO

- ✓ **Motor Cummins:** Alta potência com baixo consumo de combustível, garantindo desempenho e economia no campo.
- ✓ **Capacidade em terrenos inclinados:** Opera com eficiência em áreas com até 34% de inclinação, oferecendo segurança e estabilidade.
- ✓ **Tanque em aço inox:** Facilita a limpeza e agiliza a troca de misturas, ideal para operações com diferentes produtos.
- ✓ **Sistema Airspray:** Pulverização precisa com válvulas eletropneumáticas e pneumáticas. A recirculação contínua mantém o produto homogêneo, melhora o tempo de resposta e simplifica a limpeza do circuito.



20 FAZENDO
ANOS HISTÓRIA
NO BRASIL COM VOCÊ



Excessive heat during drying damages soybean seeds.

Study indicates decline in germination and cell death.

12.12.2025 | 09:49 (UTC -3)

Cultivar Magazine



Photo: Syngenta

Drying soybean seeds with air heated above 50°C compromises physiological performance and causes cytogenetic damage. This conclusion comes from research conducted at the Federal University of Grande Dourados, in Mato Grosso do Sul, which evaluated temperatures of 40°C, 50°C, 60°C, and 70°C in the post-harvest process. The results indicate direct damage to germination, vigor, and cell integrity when the heat exceeds this level.

Seeds dried at 70°C showed a sharp drop in germination. The rate fell to 77% on the eighth day, compared to an average of 95% at temperatures between 40°C and 60°C. The germination rate also decreased significantly in the hottest treatment.

Vigor tests

Vigor tests reinforced the negative effect of heat. In the cold test, seeds dried at 70°C registered 83% normal seedlings, while those dried at 40°C reached 100%.

Electrical conductivity, an indicator of membrane damage, reached the highest value in the 70°C treatment, a sign of greater cell leaching.

Initial growth was impacted. Seedlings originating from seeds dried at 70°C developed shorter shoots and roots, as well as lower dry mass. Temperatures of 40°C and 50°C maintained better morphological performance.

Cytogenetic analysis

Cytogenetic analysis revealed increased chromosomal alterations and a reduced mitotic index in seeds subjected to 60°C and 70°C. The hotter treatment reduced cell division and induced nuclear alterations, such as excessively condensed chromatin and abnormal morphology. Tests with Evans Blue dye confirmed cell death in roots exposed to temperatures above 50°C.

The study indicates that 40°C and 50°C are the safest limits for drying soybean seeds. Higher temperatures intensify physiological and genotoxic damage, directly impacting seedling formation and the crop's yield potential.

The study was developed by Daynara Martins da Silva, Tathiana Elisa Masetto,

Leilaine Gomes da Rocha, Valdiney
Cambuy Siqueira, Diogo Santos Crippa,
and Allan Dellon Alegre Takagi.

Further information at
doi.org/10.3390/seeds4040068

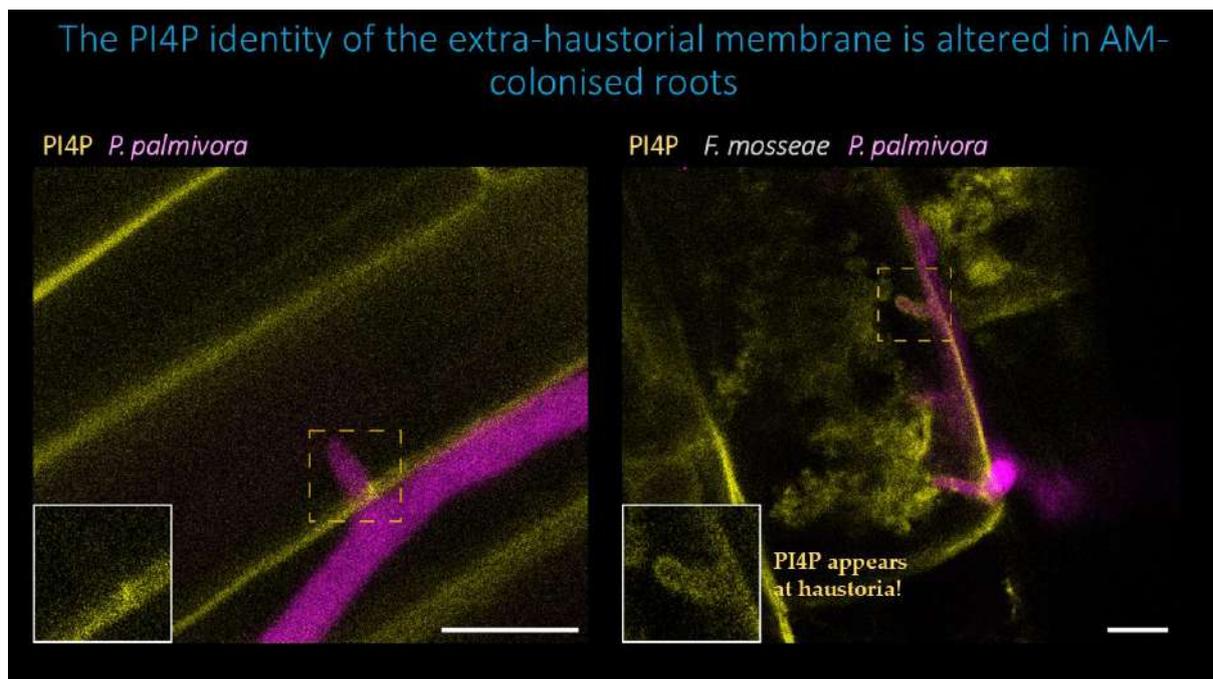
[RETURN TO INDEX](#)

Beneficial fungus increases plant resilience.

Research reveals that arbuscular mycorrhizal fungi modify the cell membrane in roots.

12.12.2025 | 08:15 (UTC -3)

Cultivar Magazine



PI4P identity of the extrahaustorial membrane is altered in roots colonized by AM fungi - doi.org/10.1016/j.celrep.2025.116702

Arbuscular mycorrhizal fungi (AM), present in more than 80% of terrestrial plants, can increase root resistance against pathogens

by modifying the cell membrane structure at the point of infection. The discovery was made by researchers at the Sainsbury Laboratory, University of Cambridge.

The research revealed that, instead of maintaining the typical membrane that plants build around invading pathogens, roots previously colonized by AM form a membrane with characteristics similar to those surrounding the symbiotic fungi themselves. This redirection of membrane identity results in a significant reduction in pathogen colonization. *Phytophthora palmivora*.

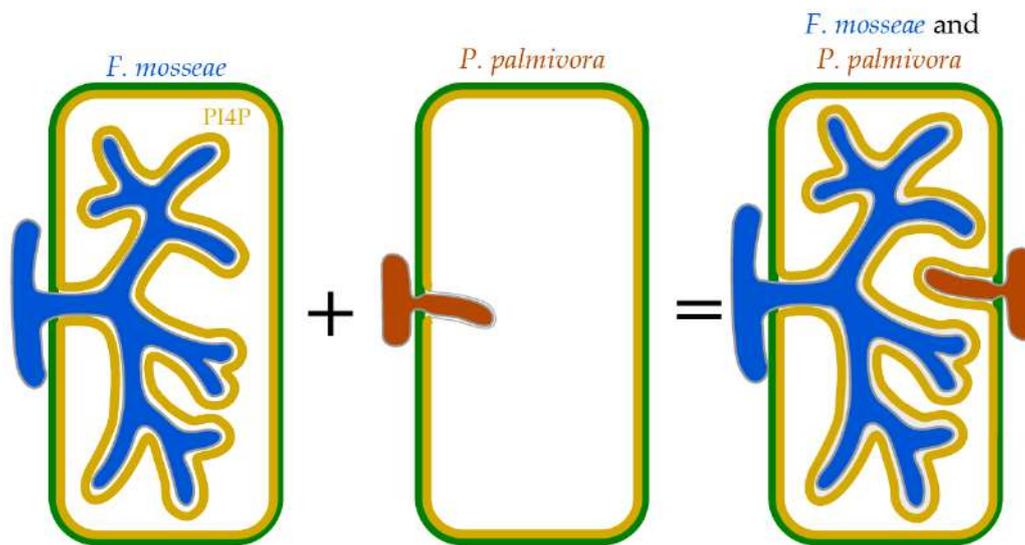
Roots redraw the cellular boundary.

Upon invading a plant cell, both mutualists and pathogens remain isolated by membranes produced by the plant itself.

These barriers are not merely physical; they function as platforms for the exchange of nutrients and molecular signals. In the case of AMs, such as...

Funneliformis mosseae The plant forms a periarbuscular membrane (PAM).

However, for pathogens such as *P. palmivora* The plant creates an extrahaustorial membrane (EHM).



Using phosphoinositide biosensors in *Nicotiana benthamiana* Scientists show that mutualistic and pathogenic interfaces exhibit distinct membrane lipid signatures. During co-colonization, host phosphatidylinositol-4-phosphate is recruited to pathogen structures, and resistance is increased, revealing a dynamic remodeling of host membrane identity that shapes the outcomes of the interaction.

However, when the roots of *Nicotiana benthamiana* Once colonized by AM, the EHM around the pathogen begins to incorporate lipids and proteins characteristic of PAM. Among them is phosphatidylinositol 4-phosphate (PI4P), which normally does not appear in the membrane interacting with the pathogen.

remodeled immune response

The work coordinated by Alex Guyon and Sebastian Schornack demonstrated that the presence of the mutualistic fungus directly interferes with the identity of the membrane formed against the pathogen. As a result, the plant reduces the efficiency of the microbial invasion.

In co-colonized roots, the pathogen loses the ability to exclude important membrane molecules, such as PI4P and membrane-anchored proteins by myristoylation. This indicates that the beneficial fungus reconfigures the cell interface before the pathogen can manipulate it. This "reprogramming" effect occurs even in

neighboring cells that do not directly contain AM structures.

Biological control strategies

The discovery has direct implications for agriculture. The ability of AM fungi to alter cellular architecture preventively suggests a viable avenue for the use of symbionts as natural biocontrol agents.

This approach could reduce dependence on fungicides while strengthening crop resilience to disease. The work also reinforces the need to study more complex interactions between multiple microorganisms, a common reality in the soil but rarely simulated in the laboratory.

Further information at
doi.org/10.1016/j.celrep.2025.116702

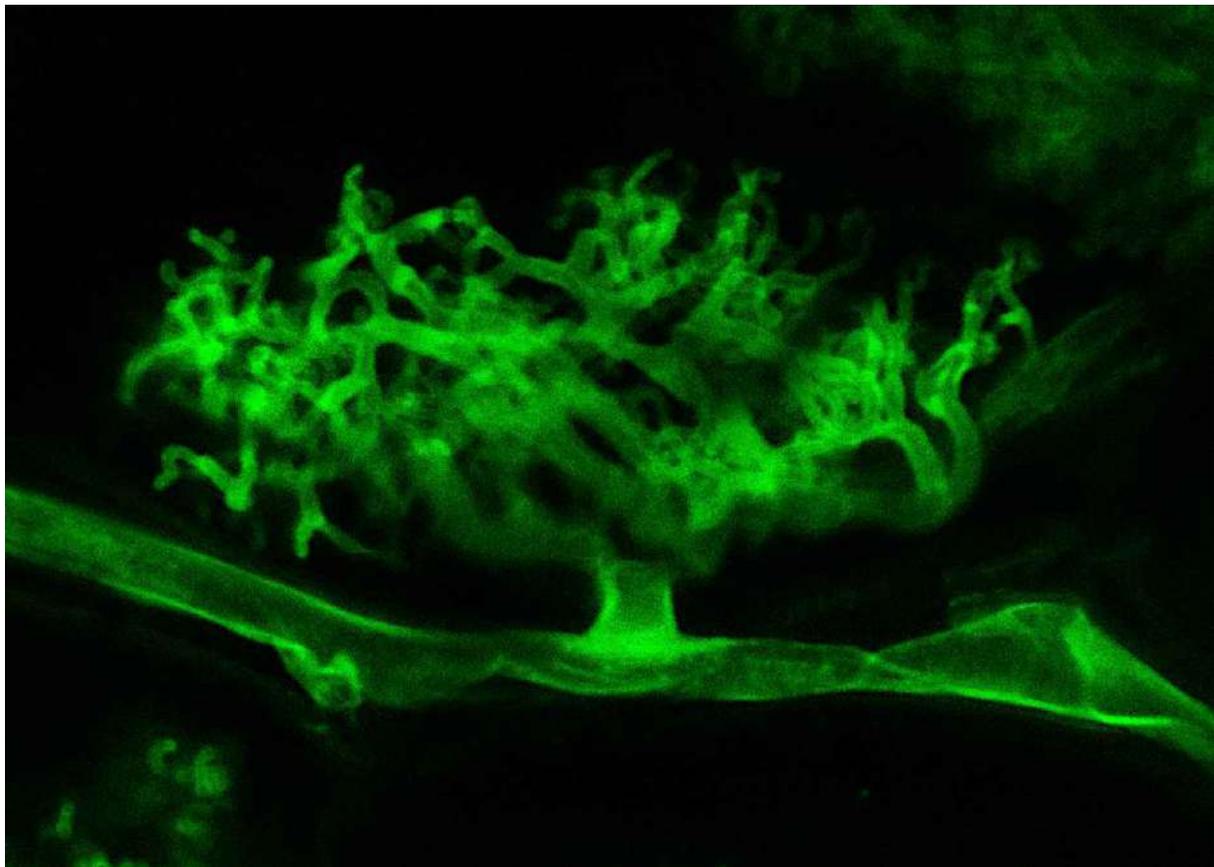


Photo: Hector Montero, CC BY-SA 2.0

[RETURN TO INDEX](#)

Agricultural Market - December 12, 2025

Brazilian soybeans support the market with record exports.

12.12.2025 | 08:04 (UTC -3)

Vlamir Brandalitze - @brandalitzeconsulting



Brazilian soybean exports continue to accelerate. China has resumed purchases from the United States, but continues to

take large volumes from Brazil, supporting the domestic market and prices in Chicago. Projections indicate new shipping records in December.

Soybean sales from the current crop have already reached 83,4%, slightly below the average of 86%. The total volume sold, at 143 million tons, is the highest ever recorded. The 2023/24 crop was 171,5 million tons. The new crop, with 96% of the area planted, is expected to produce between 175 and 180 million tons. Crops are showing good development.

In the futures market, contracts in Chicago are attempting to recover the \$11 per bushel level for January. The US dollar weakened after the Central Bank's Monetary Policy Committee (Copom)

maintained the Selic rate at 15% per year. The dollar fell to R\$ 5,40, which favors agricultural exports.

Corn situation

In the corn market, expectations of higher exports are putting pressure on buyers.

There are projections of shipments exceeding 41 million tons in December.

Even with a full harvest, delays in soybean planting are expected to impact the arrival of the second crop, which could tighten supply in the domestic market.

86 million tons of the second crop have already been traded, equivalent to 75,9% of production. 27,3 million tons remain on the market, in addition to 5 million tons

from the first crop. First-crop plantings are in good condition, especially in Paraná, Santa Catarina, and parts of Rio Grande do Sul.

Wheat situation

Wheat markets remain calm. Harvest is complete and trading is slow. Prices range between R\$ 1.010 and R\$ 1.200, with little movement.

Rice situation

Rice is showing a temporary recovery, but the market remains calm. Industries undergoing maintenance are slowing down. More than 30% of the harvest

remains in the hands of producers. Exports in the first week of December exceeded 88 tons.

Bean situation

In the bean market, harvesting is progressing in São Paulo and Paraná, with little supply pressure. Producers are facing difficulties selling their beans at prices above R\$ 240. Demand is expected to increase only in the second half of January.

By Vlamir Brandalitze -
@brandalitzeconsulting

[RETURN TO INDEX](#)



**SÓ QUEM SE BASEIA
EM BIOLOGIA, AGRONOMIA,
FÍSICA E QUÍMICA,
ANTES DA MECÂNICA,**

**PODE PRODUZIR O
EQUIPAMENTO DE MAIOR
PERFORMANCE NA APLICAÇÃO
DE BIOINSUMOS DENTRO DO
SULCO DE PLANTIO.**



ORION[®]
FOR PROFESSIONAL FARMERS



 @orionindustria
 @orionindustria
 vendas@orion.ind.br

Brazil projects a harvest of 354,4 million tons in 2025/26.

A third survey indicates a 0,6% increase in production and a 3% growth in cultivated area.

11.12.2025 | 10:29 (UTC -3)

Cultivar Magazine



Brazilian grain production is expected to reach 354,4 million tons in the 2025/26 harvest. The estimate indicates a 0,6% increase compared to the 2024/25 cycle.

The survey shows an increase of 2,2 million tons in the annual comparison. The data comes from the third survey by the National Supply Company (Conab).

The volume is down slightly more than 440 tons compared to the previous projection. The cut reflects adjustments following the progress of planting and changes in weather patterns. Conab highlights the end of the 2024/25 winter crop harvest, which showed higher productivity than the previous season. These results now form part of the estimate for 2025/26.

The cultivated area maintains the growth trajectory seen in the last 15 years. The country is expected to sow 84,2 million hectares, a 3% increase over the previous harvest. This increase corresponds to 2,5 million hectares. The sowing of first-crop

plantings is progressing according to weather conditions. At the beginning of December, the pace was slightly below that recorded in the same period of the 2024/25 cycle.

The total area includes second and third crop harvests and winter crops, whose planting will continue until June. Conab indicates the possibility of adjustments in the next readings. Variations may occur due to market and weather factors.

Entre as culturas, o **cotton** deverá ocupar 2,1 milhões de hectares, alta de 0,7% em relação a 2024/25, com produção estimada em 4 milhões de toneladas de pluma. O **rice** apresenta área de 1,6 milhão de hectares, queda de 8,1%, e produção prevista de 11,2 milhões de toneladas. A semeadura alcançava 80,2%

do total em 8 de dezembro.

O **bean** deve somar 3 milhões de toneladas nas três safras. A primeira safra registra queda de 12,4% na área, totalizando 796 mil hectares. A produção estimada atinge 941,6 mil toneladas, baixa de 11,4% frente ao ciclo anterior.

O **corn**, considerando as três safras, deverá produzir 138,9 milhões de toneladas, redução de 1,5%. A primeira safra cresce 7,2% em área, alcança 4 milhões de hectares e aponta produção prevista de 25,9 milhões de toneladas, aumento de 3,9%. A semeadura chegava a 71,3% da área em 8 de dezembro.

A **soybean** registra área estimada de 48,9 milhões de hectares, alta de 3,4%. A produção deve bater recorde, com 177,1

milhões de toneladas, 3,3% acima do ciclo passado. A semeadura avançava para a conclusão, com 90,3% da área plantada.

O **wheat** encerra a safra 2025 com produção de 8 milhões de toneladas, volume semelhante ao de 2024. A colheita segue apenas na Região Sul, com conclusão prevista para dezembro.

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

Brasil	Estimativa da produção de grãos			Safras 2024/25 e 2025/26					
	ÁREA (Em mil ha)			PRODUTIVIDADE (Em kg/ha)			PRODUÇÃO (Em mil t)		
	Safra 24/25	Safra 25/26	VAR. %	Safra 24/25	Safra 25/26	VAR. %	Safra 24/25	Safra 25/26	VAR. %
	(a)	(b)	(b/a)	(c)	(d)	(d/c)	(e)	(f)	(f/e)
ALGODÃO - CAROÇO (1)	2.085,6	2.100,2	0,7	2.773	2.674	(3,6)	5.782,8	5.615,7	(2,9)
ALGODÃO - PLUMA	2.085,6	2.100,2	0,7	1.954	1.885	(3,5)	4.076,1	3.959,6	(2,9)
AMENDOIM TOTAL	280,4	282,4	0,7	4.136	4.039	(2,3)	1.159,7	1.140,5	(1,7)
Amendoim 1ª Safra	273,1	275,1	0,7	4.202	4.102	(2,4)	1.147,6	1.128,5	(1,7)
Amendoim 2ª Safra	7,3	7,3	-	1.662	1.668	0,3	12,1	12,0	(0,8)
ARROZ	1.763,9	1.621,3	(8,1)	7.233	6.890	(4,7)	12.757,7	11.170,2	(12,4)
Arroz sequeiro	394,6	342,7	(13,2)	2.935	2.834	(3,4)	1.158,2	971,1	(16,2)
Arroz irrigado	1.369,3	1.278,6	(6,6)	8.471	7.977	(5,8)	11.599,5	10.199,1	(12,1)
FEIJÃO TOTAL	2.693,0	2.630,0	(2,3)	1.137	1.142	0,5	3.060,6	3.004,4	(1,8)
FEIJÃO 1ª SAFRA	908,5	796,0	(12,4)	1.170	1.183	1,1	1.062,7	941,6	(11,4)
Cores	347,3	321,4	(7,5)	1.707	1.767	3,5	592,8	568,0	(4,2)
Preto	169,0	119,0	(29,6)	1.953	1.754	(10,2)	330,2	208,6	(36,8)
Caupi	392,2	355,6	(9,3)	356	464	30,2	139,7	164,8	18,0
FEIJÃO 2ª SAFRA	1.400,1	1.407,1	0,5	953	967	1,5	1.333,6	1.360,2	2,0
Cores	294,6	297,9	1,1	1.499	1.501	0,1	441,6	447,1	1,2
Preto	286,6	292,4	2,0	1.616	1.658	2,6	463,2	485,0	4,7
Caupi	818,9	816,8	(0,3)	524	524	0,1	428,9	428,1	(0,2)
FEIJÃO 3ª SAFRA	384,4	426,9	11,1	1.728	1.646	(4,8)	664,4	702,6	5,7
Cores	326,5	361,0	10,6	1.883	1.802	(4,3)	614,9	650,6	5,8
Preto	14,1	14,1	-	1.268	1.145	(9,7)	17,9	16,2	(9,5)
Caupi	43,8	51,8	18,3	721	695	(3,7)	31,6	36,0	13,9
GERGELIM	608,0	608,0	-	657	657	-	399,4	399,4	-
GIRASSOL	61,9	63,8	3,1	1.622	1.598	(1,5)	100,4	101,9	1,5
MAMONA	69,6	76,1	9,3	1.437	1.938	34,8	100,0	147,4	47,4
MILHO TOTAL	21.842,3	22.727,9	4,1	6.457	6.111	(5,4)	141.037,4	138.879,0	(1,5)
Milho 1ª Safra	3.772,6	4.043,1	7,2	6.610	6.408	(3,1)	24.935,8	25.907,0	3,9
Milho 2ª Safra	17.430,3	18.092,7	3,8	6.496	6.105	(6,0)	113.228,4	110.461,0	(2,4)
Milho 3ª Safra	639,4	592,1	(7,4)	4.494	4.241	(5,6)	2.873,4	2.510,9	(12,6)
SOJA	47.346,1	48.935,6	3,4	3.622	3.620	(0,1)	171.480,5	177.123,6	3,3
SORGO	1.632,0	1.796,0	10,0	3.739	3.684	(1,5)	6.102,2	6.616,0	8,4
SUBTOTAL	78.382,8	80.841,3	3,1	4.363	4.258	(2,4)	341.980,7	344.198,1	0,6

Culturas de inverno	ÁREA (Em mil ha)			PRODUTIVIDADE (Em kg/ha)			PRODUÇÃO (Em mil t)		
	2025	2026	VAR. %	2025	2026	VAR. %	2025	2026	VAR. %
	(a)	(b)	(b/a)	(c)	(d)	(d/c)	(e)	(f)	(f/e)
AVEIA	528,4	528,4	-	2.406	2.406	-	1.271,3	1.271,3	-
CANOLA	211,6	211,6	-	1.534	1.534	-	324,5	324,5	-
CENTEIO	2,1	2,1	-	2.333	2.333	-	4,9	4,9	-
CEVADA	138,2	138,2	-	4.310	4.310	-	595,7	595,7	-
TRIGO	2.444,6	2.444,6	-	3.257	3.257	-	7.961,2	7.961,2	-
TRITICALE	11,2	11,2	-	3.268	3.268	-	36,6	36,6	-
SUBTOTAL	3.336,1	3.336,1	-	3.056	3.056	-	10.194,2	10.194,2	-
BRASIL (2)	81.718,9	84.177,4	3,0	4.310	4.210	(2,3)	352.174,9	354.392,3	0,6

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

Fonte: Conab.

Nota: estimativa em dezembro/2025.

[RETURN TO INDEX](#)

Luteolin reduces the survival and reproduction of thrips.

Flavonoid increases mortality, shortens lifespan, and reduces the reproductive rate of the pest.

11.12.2025 | 09:20 (UTC -3)

Cultivar Magazine



Photo: David Cappaert, Bugwood

Luteolin increased the mortality of nymphs and adults of *Frankliniella occidentalis*. The effect was proportional to the concentration of the substance, according to Chinese researchers. At high concentrations, the compound caused more than 80% corrected mortality within 48 hours. The LC50 values ??were 2,062 mg/mL for nymphs and 5,678 mg/mL for adults.

Choice assays showed thrips retreating from treated leaves. Nymphs consumed less leaf area and adults laid fewer eggs on discs exposed to the flavonoid. In no-choice tests, luteolin did not statistically alter feeding or oviposition, although a concentration of 0,1 mg/mL indicated a tendency towards reduction.

Sublethal exposure compromised developmental stages. The pre-adult survival rate decreased at both levels tested. The 0,1 mg/mL dose reduced the duration of the adult phase, shortened the longevity of males, and decreased the average lifespan of individuals. The total time until the start of egg laying increased. The oviposition phase decreased. Females produced fewer eggs.

Population growth parameters clearly declined. The intrinsic rate of increase, the finite rate of increase, and the net reproductive number shrank in both treatments, with a greater impact at the higher concentration. The average generation time did not change significantly.

The researchers who conducted the study state that luteolin combines toxic action, repellent effect, and the ability to reduce thrips fertility. These combined results support the molecule's potential as a botanical pesticide in pest management programs.

Further information at
doi.org/10.3390/insects16121255

[RETURN TO INDEX](#)

Genetically modified orange trees resist black spot and citrus canker.

Research shows that reducing the D-limonene compound in the fruit stimulates the production of monoterpene alcohol with an antimicrobial effect.

11.12.2025 | 08:38 (UTC -3)

Cultivar Magazine



Symptoms of citrus black spot on the peel of sweet oranges from the genetically modified (GM) lines 'Navelina' AS1, AS5 (A)-(B) and the non-GM 'Navelina' control (C); and symptoms of citrus canker in fruits from the genetically modified lines 'Pineapple' AS10, AS11 (D)-(E) and the non-GM 'Pineapple' control (F) - doi.org/10.1002/ps.70421

Research conducted in the interior of São Paulo demonstrated that fruits from transgenic orange trees 'Navelina' and 'Pineapple' exhibit partial resistance to black spot disease (caused by *Phyllosticta citricarpa*) and citrus canker (caused by *Xanthomonas citri*). The plants evaluated possess a gene that reduces the production of D-limonene, a compound abundant in the bark, and increases the concentration of monoterpene alcohols, mainly linalool.

In the 'Navelina' cultivar, the severity of black spot on the fruit was reduced by up to 45% in two consecutive harvests. This reduction coincided with a decrease of up to 98% in D-limonene levels and an

increase of up to 7 times in the concentration of linalool in the peel. The compound showed antifungal potential, even when disease symptoms exceeded 90% incidence in all plants.

In the 'Pineapple' cultivar, the incidence of citrus canker was reduced by more than 68% in the fruits of the AS10 and AS11 transgenic lines. The concentration of D-limonene in these fruits was reduced by up to 99%, while monoterpene alcohols doubled. The lower incidence suggests that the accumulation of linalool hindered the initial adhesion of the bacteria.

However, the number of lesions per fruit did not decrease consistently, indicating that other mechanisms still need to be activated to contain the spread of the

infection.

Genetic modification

Genetic modification was performed on the CitMTSE1 gene, which is responsible for the synthesis of D-limonene. Inserting the gene in an antisense orientation reprogrammed the metabolism of terpenes in the fruit, without altering productivity, shape, flavor, soluble solids content, or vitamin C.

The plants were grown in an experimental orchard in Ibaté, authorized by CTNBio. During fruit development, no bactericides or fungicides were applied, in order to favor natural infection. In the case of black spot, artificial inoculation was performed to

ensure the appearance of symptoms.

Despite the differences in results between cultivars, researchers highlight that the observed resistance has the potential to be incorporated into integrated disease management. Applications of copper and strobilurins, currently essential, can be reduced with the use of transgenic plants. Previous studies indicate that adjusting the number of sprayings can generate savings of up to US\$14,3 million per crop season in the citrus belt of São Paulo alone.

Linalool accumulation

The authors suggest that the accumulation of linalool stimulates the expression of genes related to plant defense, even

though D-limonene, by itself, does not have a direct antimicrobial effect. They also indicate that the terpene profile in the bark may be more decisive than the simple reduction of D-limonene in protection against pathogens.

Future research should evaluate the durability of resistance in other regions and cultivars, as well as test combinations with other genes that activate defense compounds, such as flavonoids. The metabolic modulation strategy may offer new sustainable solutions for citrus farming, especially in the face of challenges posed by climate change and international trade.

The work was conducted by researchers Geraldo José Silva-Junior, Thiago de

Aguiar Carraro, Rafael Angelo Gonçalves
Smirne, Rafele Regina Moreira, Nelson
Arno Wulff, Leandro Peña, Rodrigo
Facchini Magnani, Takehiko Shimada, and
Franklin Behlau.

Further information at
doi.org/10.1002/ps.70421

[RETURN TO INDEX](#)

Lemongrass oil kills bed bugs.

The nanoemulsion formulation is effective against *Euschistus heros* and *Dysdercus peruvianus*.

10.12.2025 | 14:05 (UTC -3)

Cultivar Magazine



Photo: Rob Westerduijn

Lemongrass (*Cymbopogon citratus*) exhibited strong insecticidal and ovicidal

action against bed bugs. *Euschistus heros*
e *Dysdercus peruvianus* The study
evaluated the essential oil and a
nanoemulsion with 5% oil. Direct treatment
with the oil caused 100% mortality of
insects of both species. The nanoemulsion
registered 83,33% mortality in *E. heroes*
and 86,70% in *D. peruvianus* No residual
contact. In topical treatment, it reached
53,33% and 33,33%, respectively.

The oil also completely prevented eggs
from hatching. The nanoemulsion reduced
emergence to 36,10% in *E. heroes* and
15% in *D. peruvianus*, indices close to
those obtained with triflumuron. Control
with oil-free nanoemulsion did not alter the
development.

Researchers recorded severe antennal deformities after contact with the nanoemulsion. *D. peruvianus* In 64,44% of the insects, there was a loss of antennal segments and a reduction in sensilla. *E. heroes* The rate reached 36,67%. This damage impacted behavior: in the olfactory test, deformed insects stopped responding to olfactory stimuli, while healthy individuals avoided the smell of the oil.

Analysis of volatile compounds showed profound changes in the chemical profile of the treated insects, with an increase in terpenes and aldehydes associated with signs of stress and defense.

The research was developed by Raul VC Apolinário, Jefferson D. Cruz, Walter SMF

Neto, Janaína MC Soares, Maria A.
Mpalantinos, Suzete A. Gomes, Maria D.
Feder, José LP Ferreira, Geraldo JN
Vasconcelos, Jefferson RA Silva, and Ana
Claudia F. Amaral.

Further information at
doi.org/10.3390/insects16121254

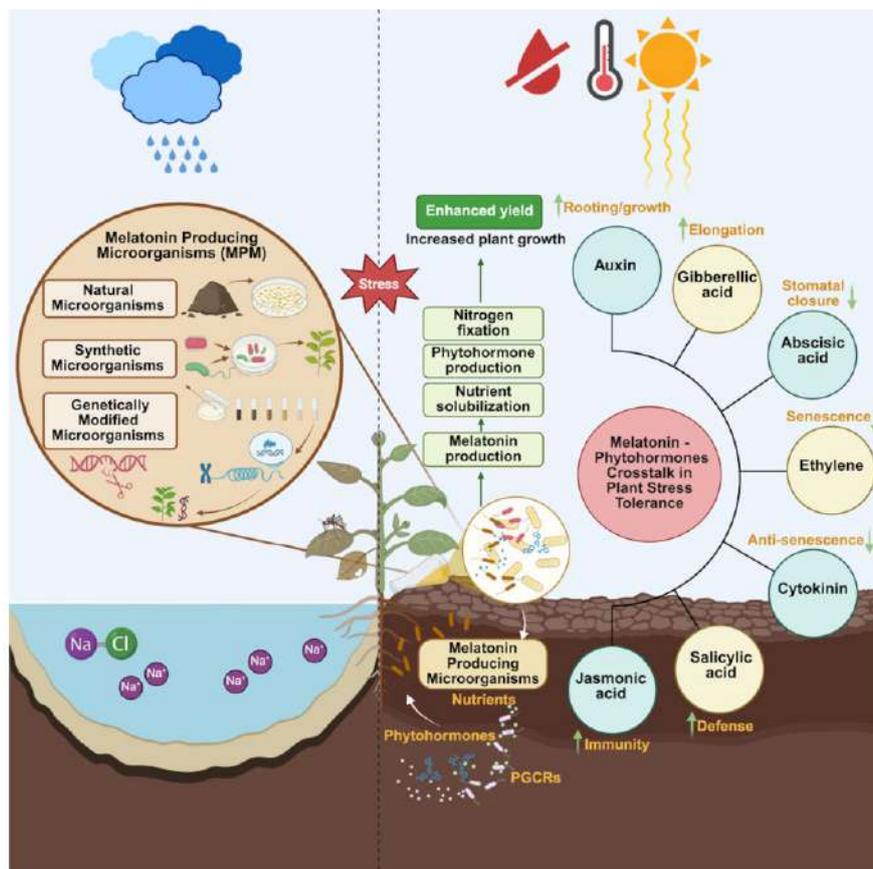
[RETURN TO INDEX](#)

Melatonin is making its way as an agricultural tool.

Researchers detail how the hormone regulates plant development and activates stress tolerance.

10.12.2025 | 08:33 (UTC -3)

Cultivar Magazine



Images: doi.org/10.1016/j.isci.2025.113704

Melatonin is gaining prominence in agriculture for stimulating plant growth and reducing damage caused by environmental stresses. Researchers report that, while the hormone induces sleep in humans, it activates physiological processes that accelerate plant development.

Abdul Latif Khan, a professor at the University of Houston, states that melatonin promotes growth and reduces the effects of abiotic stresses. Studies show that the hormone regulates processes dependent on the plant's biological clock. This regulation adjusts gene expression, metabolism, and protein stability, which affects photosynthesis, flowering, seed formation, and stress

responses.

Melatonin synthesis

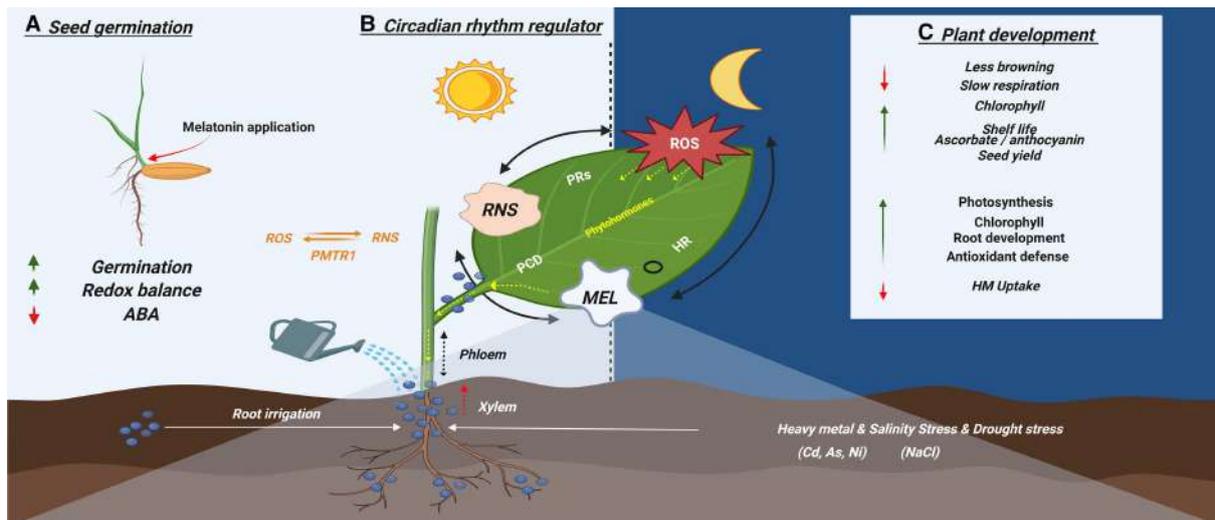
Plants synthesize melatonin through their own metabolic pathways. Researchers describe enzymes involved in these pathways and point out differences between species, tissues, and developmental stages. In addition to internal production, microorganisms present in the rhizosphere also synthesize the hormone. These microorganisms increase the availability of melatonin in the soil, enhance absorption by plants, and reinforce stress tolerance.

Research indicates that melatonin interacts with several plant hormones. The

hormone modulates pathways linked to auxins, abscisic acid, ethylene, cytokinins, gibberellins, salicylic acid, and jasmonates. These interactions influence germination, root growth, fruit development, and defense against pathogens.

agricultural uses

Scientists also highlight that melatonin-producing microorganisms can act as agricultural tools. Several bacteria and yeasts synthesize the hormone and increase plants' tolerance to drought, salinity, heavy metals, and nutritional deficiencies. In some cases, these microorganisms increase photosynthetic pigments and strengthen antioxidant systems.



Research indicates that the hormone modifies soil microbial communities. External application of melatonin increases enzymatic activity, improves nutrient cycling, and reduces pathogenic fungi. Simultaneously, it promotes bacteria involved in nitrogen fixation, phosphorus solubilization, and stress resistance.

Melatonin in the soil

Advances in biotechnology are enabling the creation of microorganisms to produce melatonin. The teams cited in the article reconstructed metabolic pathways in bacteria and yeast, adjusting enzymes and cofactors to increase the production of the compound in fermentations. These microorganisms can act as bio-inputs capable of releasing melatonin into the soil as the plant faces stress.

However, scientists point out limitations. Synthetic melatonin is expensive for large-scale use, and direct application faces instability in light and soil pH.

Microorganisms that produce melatonin emerge as an alternative, but their efficiency depends on colonization, competition with native communities, and regulations for genetically modified

organisms.

Further information can be found at
doi.org/10.1016/j.isci.2025.113704

[RETURN TO INDEX](#)

Senate allows seasonal workers to work without losing social benefits.

Proposal excludes seasonal income from calculation for maintaining Bolsa Família benefits.

10.12.2025 | 08:18 (UTC -3)

Cultivar Magazine, based on information from the Senate Agency



Photo: Jefferson Rudy / Senate Agency

The Senate yesterday approved a bill that removes seasonal contract remuneration from the calculation of family income used to maintain social benefits. The measure allows seasonal workers to accept seasonal jobs without risking the loss of access to programs such as Bolsa Família. The text (PL 715/2023) returns to the Chamber of Deputies for further evaluation.

Seasonal worker refers to a rural worker hired for a fixed term, during planting, harvesting, and other activities. The author of the proposal is Congressman Zé Vitor (PL-MG). The rapporteur in the Senate, Jaime Bagattoli (PL-RO), adjusted the text after negotiations with representatives of the federal government.

Bagattoli incorporated an amendment presented by Mecias de Jesus (Republicanos-RR). The amendment exempts the employer from providing information about the harvest contract for the purpose of maintaining social benefits until the government regulates the specific field of eSocial. The rapporteur stated that the rule avoids bureaucratic obstacles and guarantees immediate access to the right.

Bagattoli stated that the approval of the bill helps to address the labor shortage in the countryside. The senator cited a scarcity of workers in activities such as construction and supermarkets. According to him, the proposal alleviates an estimated deficit of more than 800 jobs and improves the dignity of those who work as seasonal workers and are part of the Bolsa Família

program.

[RETURN TO INDEX](#)

Parasitoid alters the development and reproduction of the potato tuber moth.

Exposure to the mite *Pyemotes zhonghuajia* modifies the life cycle and olfactory behavior of *Phthorimaea operculella*

10.12.2025 | 08:08 (UTC -3)

Cultivar Magazine



Photo: Merle Shepard, Gerald R Carner, PAC Ooi

The presence of the parasitoid *Pyemotes zhonghuajia* accelerated the development of the potato tuber moth (*Phthorimaea operculella*) and reduced their lifespan. This effect occurred mainly in the larval stage. Exposure also compromised reproductive parameters. Females produced fewer eggs.

Chromatography and spectrometry analyses identified 34 volatile compounds released by the parasitoid.

Electroantennographic recordings showed that the pest's antennae reacted to most of these compounds. Males demonstrated greater sensitivity than females.

Olfactory tests indicated an absence of behavioral response from females to all volatiles tested. Males advanced towards

decanal, 2-undecanone, nonanal, tetramethylpyrazine, and trimethylpyrazine.

Reactions induced by the risk of parasitism reveal trade-offs between survival and reproduction. A study points to the ecological implications of these changes in the pest's life history. The results reinforce the potential for *P. zhonghuajia* as a biological control agent in integrated pest management programs.

Further information at
doi.org/10.1002/ps.70432

[RETURN TO INDEX](#)

Allterra strengthens governance through strategic hiring.

The move marks progress in the corporate structure and strengthens the holding company's management foundations.

09.12.2025 | 16:27 (UTC -3)

Mariana Cremasco

Allterra announces the arrival of four new executives for key positions, strengthening the organization in strategic areas aligned with its expansion phase. These professionals will assume core operational roles (Supply Chain, Human Resources, Information Technology, and Manufacturing) and bring solid track records from national and multinational companies, reinforcing the holding

company's execution capacity and medium- to long-term planning.



Bruna Barros da Silva (Photo above), the new Executive Manager of Supply Chain, arrives to expand the integration between industrial and commercial processes, focusing on forecast accuracy, operational efficiency, and S&OP governance. A Production Engineer with an MBA in Logistics and Supply Chain, she built her

career in companies such as Inpasa Brasil and PifPaf Alimentos, conducting complete S&OP/S&OE cycles and leading cost optimization and productivity increase initiatives. Her analytical and data-driven experience will underpin one of the central pillars of Allterra's growth model.



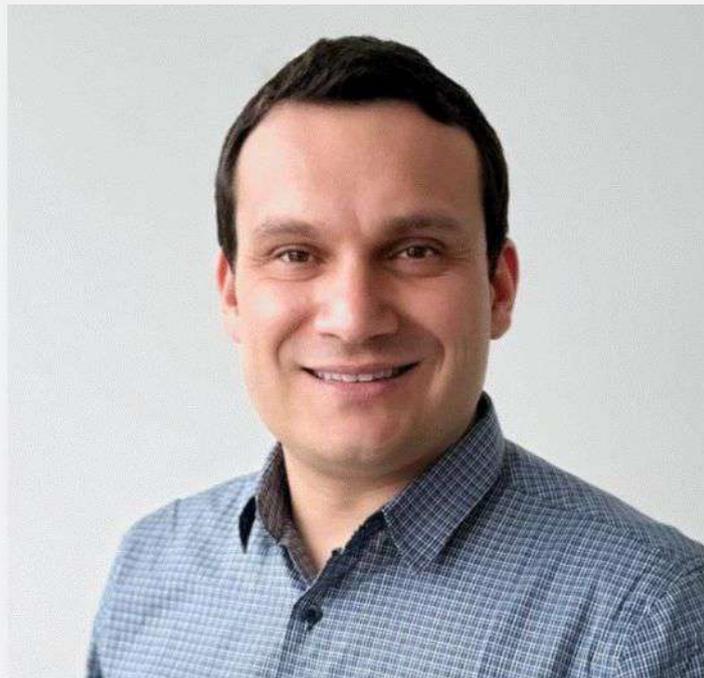
In the area of ??people, **Paulo Menezes** (Photo above) assumes the role of Executive Human Resources Manager,

bringing a robust track record in companies such as Grupo Oncoclínicas, Walmart, Saint-Gobain, Carrefour, Coca-Cola, Sonae, and Elektro. With experience in all HR subsystems, she has led projects in mergers and acquisitions, implementation of culture and performance policies, climate and diversity management, creation of People Analytics areas, and strategic compensation programs. Her experience in due diligence, change management, and governance models contributes to strengthening Allterra's organizational structure during a period of business consolidation.



To accelerate the company's technological pillar, **Fabio Salvador** (Photo above) assumes the role of Executive Manager of Information Technology. With a Master's degree from USP, an MBA, and a specialization in IT management, and over 18 years of experience, he has worked at companies such as Integralmedica, Itaú Unibanco, and technology consultancies, leading projects in digital transformation, IT

governance, and the adoption of agile methodologies. Recently, he led the implementation of generative artificial intelligence solutions in sales and supply portals, resulting in significant gains in automation, user experience, and business performance.



In the industrial core, **Joseph Hidalgo** (Photo above) arrives as Executive Manufacturing Manager, after more than

15 years working at companies such as Timac Agro, Yara and Cibra. A mechanical engineer with an MBA in Business Management, he brings together experience in factory operations, plant management, continuous improvement and highly complex industrial projects, essential skills for Allterra's expansion plans and increased production capacity.

The arrival of the new executives marks a strategic move by the holding company to sustain growth, advance governance, and enhance the integration of the companies that make up the group. With reinforcements in key areas, Allterra is positioning itself to respond more effectively to market challenges and boost its agenda of innovation, efficiency, and sustainable development.

[RETURN TO INDEX](#)

Genetic action of aphids threatens alfalfa production.

Research identifies gene responsible for unprecedented insecticide resistance in Australia.

09.12.2025 | 15:23 (UTC -3)

Cultivar Magazine



Photo: Eddie Tsyerlin

A lineage of blue-green aphid (*Acyrtosiphon kondoi*) a pest with unprecedented resistance to insecticides is worrying alfalfa producers in Australia. The pest exhibits resistance up to 35 times greater than normal to the chemicals used for control.

Studies conducted by the University of Melbourne indicate that this resistance comes from a clonal super-lineage spreading through New South Wales, Victoria, and South Australia. The rapid spread is due to the aphids' ability to reproduce asexually, generating genetically identical copies of the original female.

Gene identified

The gene identified as responsible is an E4-like esterase. It belongs to a family associated with the detoxification of chemical compounds. Resistant aphids express this gene up to 200 times more than susceptible ones. Laboratory tests, using transgenic fruit flies, confirmed the gene's direct role in resistance to the insecticides chlorpyrifos, pirimicarb, and alpha-cypermethrin.

The observed resistance does not involve mutations in the traditional targets of insecticides, such as sodium channels or acetylcholinesterase enzymes. Adaptation occurs through gene overexpression, not through changes in the protein sequence. The enzyme structure remains functional, but it is produced in greater quantities.

Control failures

Since 2019, alfalfa producers have reported failures in the chemical control of the pest. The lack of new active ingredients and cross-resistance to different chemical groups make the challenge more complex. The continued use of insecticides only strengthens the selection of resistant aphids.

Further information can be found at doi.org/10.1093/molbev/msaf246

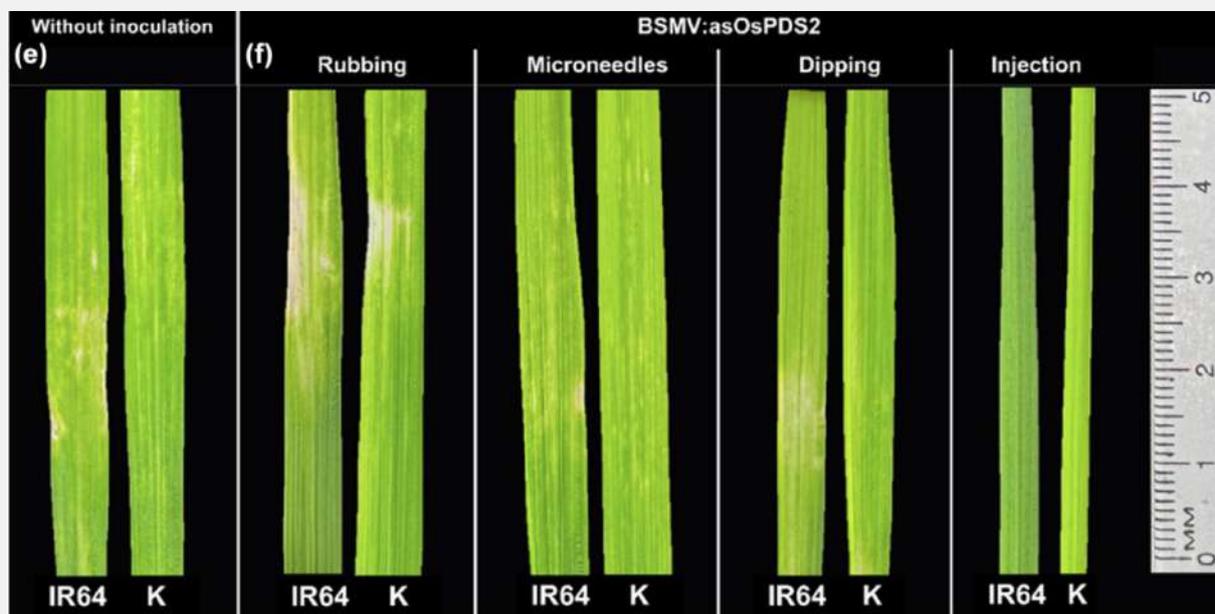
[RETURN TO INDEX](#)

Viral tools fail on rice

Gene silencing and overexpression methods successfully used in wheat do not work in *Oryza sativa*.

09.12.2025 | 14:46 (UTC -3)

Cultivar Magazine



Researchers tested two viral vectors widely used in reverse genetics, the barley striated mosaic virus (BSMV) and the foxtail mosaic virus (FoMV). They concluded that they do not work in rice. *Oryza sativa* The methods, which serve to

activate or deactivate genes transiently without altering the plant's DNA, are effective in wheat and other grasses. But they failed in six rice cultivars.

The team applied inoculation protocols using different techniques (friction, needle prick, immersion, and injection) and under various environmental conditions. Even with extensive optimization, the results did not show the expected effects. Silencing a gene involved in chlorophyll production did not cause the typical leaf bleaching.

Similarly, the gene for a fluorescent protein did not produce luminescence, as occurs in wheat and arrowgrass.

Inoculated plants

In total, 286 rice plants and 105 wheat plants were inoculated. In wheat, the methods worked: 77% of the plants treated with the FoMV vector expressed green fluorescence, and more than 91% of those treated with BSMV showed bleaching. In rice, however, no plant, among all the cultivars tested, showed any visible response to the genetic manipulation.

According to Guilherme Turra, a doctoral student at UFRGS and lead author of the study, the lack of effect is not due to technical flaws. “We rigorously tested variations of the protocols and different types of rice. The data show that these tools simply don't work on this species,” he stated.

For Dana MacGregor, senior researcher at Rothamsted, publishing the negative results is essential. "Sharing this data prevents other groups from repeating unsuccessful experiments and allows us to focus on solutions specific to rice."

Researchers suggest that rice's defense mechanisms against viruses may prevent the infection necessary for vectors to modify gene expression. Although they did not investigate the molecular processes in detail, the authors believe that the absence of a visible response indicates failures in infection or in the transport of the virus within the plant.

Although there are isolated reports in the literature of successful viral vectors in rice, such as the use of bromine mosaic virus

(BMV) and Rice Tungro Bacilliform Virus (RTBV), few studies have followed up on these approaches. The group highlights the need to develop new viral systems compatible with rice, especially for applications in functional genomics.

The team that conducted the study consists of Guilherme M. Turra, Aldo Merotto Jr., and Dana R. MacGregor.

Further information can be found at doi.org/10.1111/aab.70087

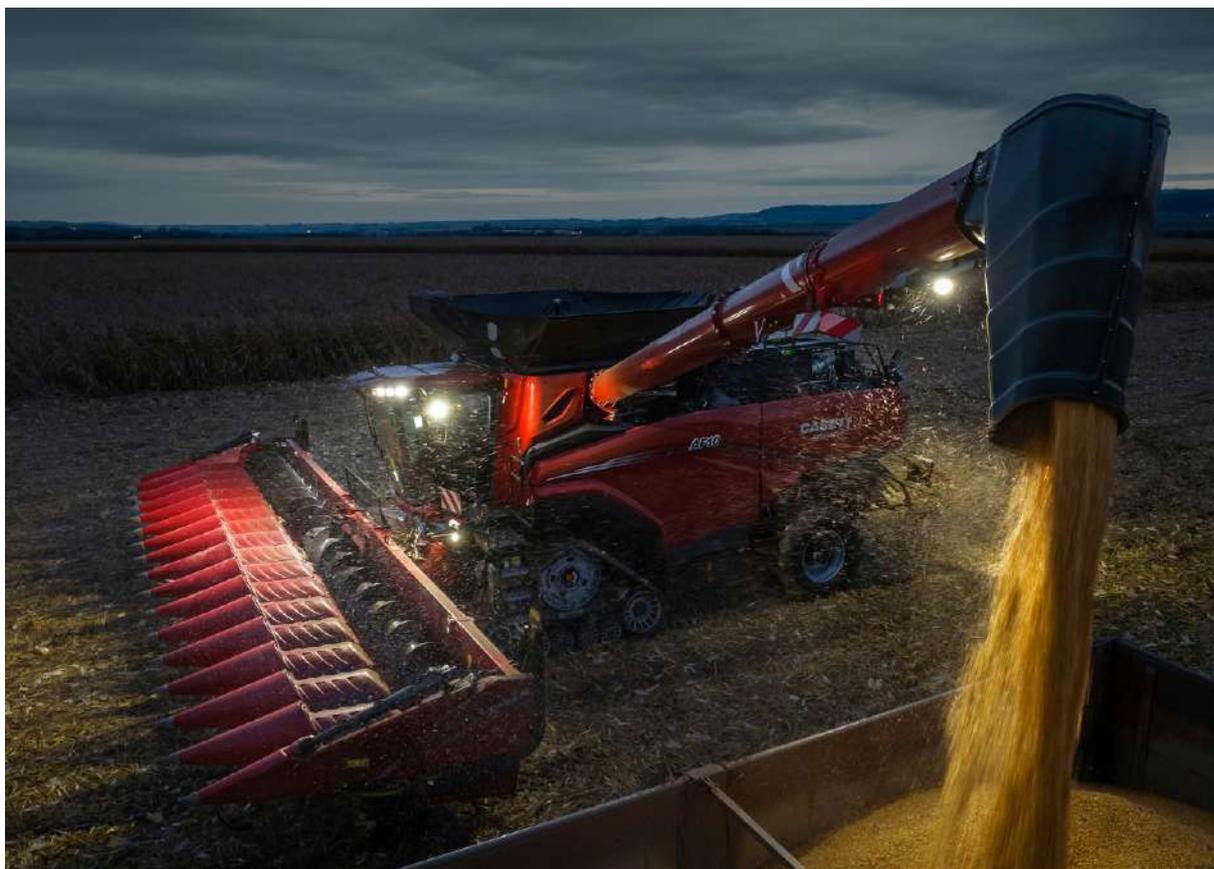
[RETURN TO INDEX](#)

Case IH launches 16-row corn platform in Europe.

The new C500 series enhances feeding, yield, and efficiency in Axial-Flow and AF combines.

09.12.2025 | 10:19 (UTC -3)

Cultivar Magazine, based on information from Silvia Kaltofen



Case IH has introduced the C500 series of corn headers. These models increase

feeding capacity, reduce component stress, and accelerate stalk breakdown. The line is compatible with all Axial-Flow and AF combines. It includes the brand's largest corn header in Europe.

The highlight is the C516-75 model. The first Case IH option with 16 rows and 75-centimeter spacing for the European market. The equipment takes advantage of the potential of AF combines. The design reduces the weight of the harvester units. Maintenance is simpler. Downtime is reduced.

The C512-75 model, with 12 rows, is also part of the series. Both feature double-action cutter plates with direct hydraulic adjustment from the cab. The operator can quickly change the configuration according

to the field conditions.

The C500 series receives a new large-diameter auger. The part operates with a 60-centimeter diameter and a 62,5-centimeter pitch. The feed flow gains regularity even at high volumes. A dual transmission system independently drives the collection assemblies and the integrated chopper. The solution distributes the load better and protects components and gearboxes.

Sensors installed on the main bar monitor vibration and actuation frequency. The system detects the activation of the safety clutches and sends an immediate alert to the cab.

According to Andreas Saile, Case IH's harvest marketing manager in Europe, the

C500 series meets the demand for higher yields in combine harvesters operating with 75-centimeter spacing. The combination of features increases performance, reduces downtime, and lowers the total cost of operation.

[RETURN TO INDEX](#)

Warming accelerates generations of *Diceraeus melacanthus*

Phenological maps indicate a greater number of annual cycles of the stink bug in Mato Grosso do Sul and western São Paulo.

09.12.2025 | 08:19 (UTC -3)

Cultivar Magazine



Photo: Ivan Cruz

O green-bellied stink bug (*Diceraeus melacanthus*) The study, conducted by researchers from the Paraná Institute for Rural Development and the State University of Londrina, calculated the thermal limits for the pest's development and estimated the number of possible cycles in Mato Grosso do Sul, Paraná, and São Paulo. The researchers associated these parameters with historical temperature series and constructed maps showing the insect's reproductive potential in these areas.

The study indicated that Mato Grosso do Sul registers the highest number of generations. The state reaches an average of 11 cycles per year. Municipalities like Corumbá reach 13 generations. The combination of low altitude and high

temperatures favors the insect's development.

São Paulo comes next. The state registers an average of nine generations per year.

The western and northwestern regions concentrate the highest values, with up to 11 cycles per year. Campos do Jordão presents only three generations due to the low temperatures and high altitude.

Paraná shows the lowest reproductive potential. The state sustains an average of seven generations per year. Cold and high-altitude areas, such as Palmas, Lapa, and Pinhais, register only four cycles per year. The highest values, up to ten generations, occur in northwestern Paraná, near the borders with Mato Grosso do Sul and São Paulo.

Latitude exerts the greatest influence on the number of generations. Altitude contributes less. The study confirmed that warm regions accelerate the insect's life cycle. Cold regions slow development and reduce the reproductive rate.

Minimum temperature

Researchers defined the minimum development temperature at around 14°C and the upper limit near 33°C. The insect completes its life cycle between 16 and 31°C, with greater speed in the higher ranges. This data supports the calculation of degree-days and the projection of annual generations.

The combined map of the three states highlights the greatest risk in the agricultural border areas between Mato Grosso do Sul, São Paulo, and Paraná. These areas support eight to more than ten generations per year. Cold regions, such as the Paraíba Valley and southern Paraná, act as climatic barriers.

The authors highlight that the presence of alternative hosts and systems such as soybean-corn rotation allow the stink bug to persist. The pest finds food year-round. The study reinforces the importance of seed treatment in corn and constant monitoring in areas with a higher number of generations.

The work was developed by Luciano Mendes de Oliveira, Rodolfo Bianco,

Maurício Ursi Ventura, Ayres de Oliveira
Menezes Júnior, and Humberto Godoy
Androcioni.

Further information at
doi.org/10.3390/insects16121242

[RETURN TO INDEX](#)

Rovensa Next launches Myndra in Europe.

Algae-based bioproduct increases firmness, sugar content, and bioactive compounds in fruits such as grapes, citrus fruits, and stone fruits.

09.12.2025 | 07:48 (UTC -3)

Cultivar Magazine, based on information from Rosario Montaner



Rovensa Next announced the European launch of Myndra, a new synergistic

biostimulant that improves quality attributes in woody crop fruits. The product has already been recognized as a non-microbial plant biostimulant under the European Fertilizer Regulation (FPR), allowing its commercialization in the 27 countries of the European Union.

Formulated from algae *Ascophyllum nodosum* Myndra combines organic molecules that promote physiological processes linked to fruit development and quality. The extract is obtained through a cold extraction process, without the use of chemicals, which preserves the biological activity of compounds such as polyphenols, mannitol, polysaccharides, alginates, vitamins, and pigments.

Field and internal tests on stone fruits, pome fruits, citrus fruits, and table grapes showed a 19% increase in firmness, a 10% increase in soluble sugar content, and a 19% increase in weight and market yield. Carotenoid levels rose by 25%, flavonoid levels by 56%, and antioxidant activity by 46%.

The synergistic action of the product promotes the formation of amino acids such as aspartate, arginine, glycine, and proline, which are essential for cell growth and reproductive metabolism. This creates a robust biochemical foundation for gains in quality and productivity.

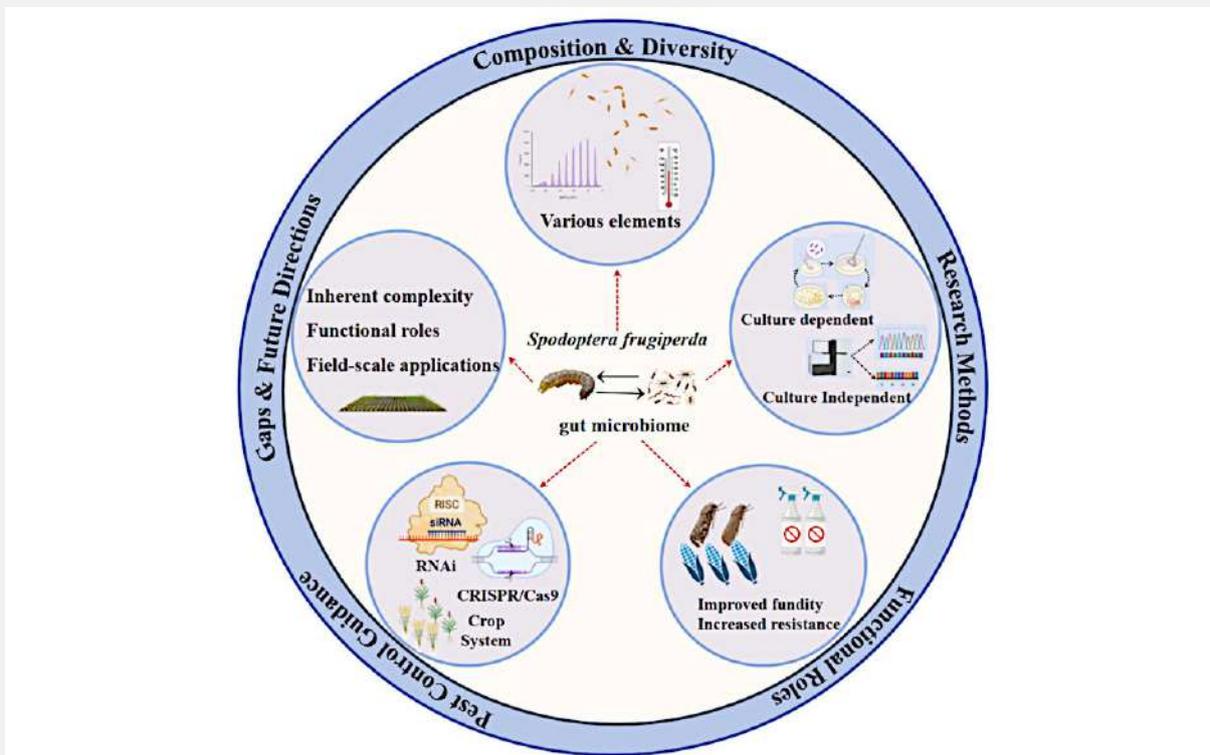
[RETURN TO INDEX](#)

Gut bacteria could revolutionize the control of *Spodoptera frugiperda*.

Research reveals crucial role of gut microbiota in adaptation, reproduction, and resistance to insecticides.

08.12.2025 | 07:23 (UTC -3)

Cultivar Magazine



The control of fall armyworm (*Spodoptera frugiperda*) This could take a new turn based on studies of its gut bacteria. A scientific review details how the insect's microbiota influences its adaptation, reproduction, and resistance to pesticides.

The gut bacteria of *S. frugiperda*, especially those of the genera *Enterococcus* and *Enterobacter*, help the insect digest toxic plant compounds, synthesize vitamins, and regulate metabolic functions. These microorganisms also increase the pest's tolerance to insecticides such as lufenuron e spinosad, in addition to contributing to their reproduction and migratory capacity.

The study highlights that the composition of the microbiota varies according to food,

sex, developmental stage, environment, and the use of pesticides. Larvae raised on an artificial diet, for example, exhibit greater microbial diversity than those fed on leaves in the field.

Microbiota manipulation

Chinese researchers suggest that manipulating the microbiota could become a new target in pest management.

Strategies such as the Incompatible Insect Technique (IIT), the use of genetically modified microorganisms, and the application of antimicrobial peptides are highlighted as promising and sustainable alternatives.

Table 1. Diversity of gut microbiota in *Spodoptera frugiperda*.

Variates	Dominant Gut Microbiota	References
Sugarcane, maize, onion	Acidobacteriia, Deltaproteobacteria, Clostridia, Alphaproteobacteria, Bacteroidia, Actinobacteria, Bacilli, etc.	[25]
Maize, hairy vetch	<i>Enterococcus</i> , <i>Bacillus</i> , <i>Klebsiella</i> , <i>Acinetobacter</i> , <i>Pseudomonas</i> , etc.	[56]
Corn, wild oat, oilseed rape, pepper, an artificial diet	Enterococcaceae, Muribaculaceae, Enterobacteriaceae, Lachnospiraceae, etc.	[59]
Developmental stage	<i>Enterococcus</i> , <i>Klebsiella</i> , <i>Acinetobacter</i> , <i>Pseudomonas</i> , <i>Lactobacillus</i> , <i>Streptococcus</i> , etc.	[29]
Female and male	<i>Enterococcus</i> , <i>Enterobacter</i> , <i>Providencia</i> , <i>Ralstonia</i> , <i>Acinetobacter</i> , etc.	[39]
Laboratory population	Actinobacterica, Bacteria, Bacteroidetes, Firmicutes, Proteobacteria, Thaumarchaeota, etc.	[40]
Field population	Actinobacterica, Bacteria, Bacteroidetes, Firmicutes, Proteobacteria, etc.	[40]
Dry and rainy season	<i>Enterobacter</i> , <i>Enterococcus</i> , <i>Klebsiella</i> , <i>Microbacterium</i> , <i>Ralstonia</i> , <i>Turcibacter</i> , etc.	[43]
<i>Bacillus thuringiensis</i> exposure	<i>Enterococcus</i> , <i>Weissella</i> , <i>Ileibacterium</i> , <i>Ralstonia</i> , <i>Dubosiella</i> , etc.	[60]
Exposure to broflanilide, spinosad and indoxacarb	<i>Acinetobacter</i> , <i>Pelomonas</i> , <i>Rhodococcus</i> , <i>Ralstonia</i> , <i>Bacteroides</i> , etc.	[61]

doi.org/10.3390/insects16121237

The IIT technique, based on introducing bacteria that cause infertility into wild populations of the pest, has already been successfully tested on mosquitoes and can be adapted for *S. frugiperda*. Meanwhile, genetic editing of gut bacteria aims to eliminate genes that favor the pest's survival or make it more vulnerable to pesticides.

Despite the potential, the authors warn of the technical, regulatory, and ecological challenges that still prevent the large-scale

use of these technologies. They also recommend studies under field conditions and the development of artificial diets that allow the rearing of insects without microbiota for controlled testing.

Further information at
doi.org/10.3390/insects16121237

[RETURN TO INDEX](#)

Calibration of agricultural equipment

Learn how to calibrate agricultural machinery, which equipment requires more attention, and how this reduces waste and increases crop productivity.

07.12.2025 | 14:28 (UTC -3)

Old



By Stara

For agricultural machinery operators, keeping sprayers, planters, seeders, and spreaders properly calibrated means applying the right amount of product to the right place. This reduces rework, improves the uniformity of operations, and contributes to a more profitable crop.

That's why calibrating agricultural equipment, in addition to its maintenance, is so important. Stara, a leader in technology and precision agriculture, has a mission to make daily life in the field easier, with technology and practical guidance that facilitate operation.

Throughout this content, you will understand what calibration is, which agricultural machines require special attention, and how to incorporate this

routine into your daily work, with the support of the technology embedded in Stara agricultural machines.

What is agricultural equipment calibration?

Calibration of agricultural equipment is the process of adjusting the machine so that, in practice, it delivers the same dose that the operator sets on the panel or in the application plan.

In agriculture, this means checking if the amount of seeds, fertilizers, or spray solution applied per hectare is in accordance with agronomic recommendations.

How does this step affect the field routine?

In the daily routine of agricultural work, calibration usually goes hand in hand with the adjustment of the agricultural machinery. The adjustment of the planter, distributor or sprayer, for example, defines settings such as gears, rotations, boom height and working depth.

Calibration confirms, through measurements, that these adjustments are delivering the expected result, for example, liters per hectare, kg per hectare, or seeds per meter. Some practical examples of calibration in the operator's daily routine:

- Check the flow rate of the spray nozzles and adjust the pressure and speed to

achieve the recommended volume per hectare;

- Measure, in a test area, how many kilograms of fertilizer the distributor applies per hectare and adjust the metering device accordingly;

- Check the number of seeds distributed per meter in the planter and adjust the planting rate or working speed accordingly;

- Check the quantity of seeds in kg per hectare for the seeders.

When this step is done correctly, the agricultural machinery works more predictably. The recommendations of the agricultural engineer translate into real-world application in the field, resulting in greater cost control and better utilization of

the crop's productive potential.

What agricultural equipment needs to be calibrated frequently?

Most agricultural machinery used on farms requires calibration. Each system that applies seeds, fertilizers, or spray needs to deliver the correct dose per area.

Therefore, it's worthwhile to organize the routine by equipment type.

Self-propelled and trailed sprayers

Sprayers operate using volume per hectare and require spray nozzles in good

condition, correct pressure, and compatible forward speed. Points to consider:

- measure the actual flow rate of each nozzle over a period of time;
- Compare with the recommended flow rate in the table or manual;
- Adjust pressure, operating speed, and nozzle change when the deviation exceeds the indicated limit.

When the sprayer is properly calibrated, the dose of pesticides per hectare stays within the recommended range, with a lower risk of drift and control failures.

Seeders and planters

During sowing, calibration ensures that the amount of seeds distributed per meter matches the crop plan. The basic routine includes:

- to test the seed rate in a test area;
- Check the spacing between seeds and the depth of seed placement;
- Adjust gears and dispensers until the desired stand is reached.

This reduces skips and doubles, improves emergence, and makes better use of the seeds' potential.

Distributors and fertilizer spreaders

Fertilizer distributors and spreaders operate with doses measured in kilograms

per hectare. Calibration ensures that the machine delivers the planned quantity with a uniform distribution range. Good practices:

- Weigh the material applied to the test area/time;
- Compare the result with the desired dose;
- Adjust the opening of the dispensers, disc rotation, and speed.

Uniform fertilization is crucial to avoid over- or under-fertilized areas.

Calibration frequency: when to do it and what to look for?

This process needs to be included in the crop calendar with the same importance as preventive maintenance. It's not enough to fix problems only when they become visible. Several milestones help define the frequency:

- before the start of each harvest or major operation;
- after long periods of machine downtime;
- after maintenance, replacement of nozzles, discs or hoses;
- whenever the operator notices a difference between the configured dose and the result in the field.

For machines that operate for many hours a day, it is prudent to check calibration at defined intervals of working hours,

following the manual.

When calibration becomes mandatory in practice

Calibration becomes essential in any situation where:

- Crops depend on precise dosages to avoid phytotoxicity or control failures;
- The rural property participates in certification programs, quality audits, or traceability programs;
- The application of inputs represents a significant portion of the production cost.

In these scenarios, recording and maintaining standardized procedures ceases to be a choice and becomes a requirement to maintain competitiveness.

Important: Whenever calibrating agricultural machinery, it is important to record the date and time, the person responsible for the activity, the parameters adjusted, and any parts replaced.

Practical step-by-step guide to calibrating agricultural machinery.

Calibration doesn't begin with the bucket or tray, but with how the operator organizes the routine. Following a clear sequence helps ensure that the dose set on the panel is the same one delivered to the field, with fewer trial and error corrections in the field.

The following procedure can be adapted for different agricultural machines, always with the support of the manual for each model. The idea is to standardize the procedure: prepare the equipment, measure what is being applied, compare it with the recommendation, and adjust until the desired value is reached.

1. Prepare the equipment

Before measuring anything, it's important to:

- Clean reservoirs, lines, nozzles, discs and sensors;
- Check for leaks, cracks, or looseness in hoses and connections;
- Check oil, fuel, and hydraulic fluid levels;

- Ensure that the tires are properly inflated and that there are no loose components.

An agricultural machine in poor physical condition will not hold its calibration.

2. Consult the technical manual.

The manual indicates the recommended working pressure range, flow rate for nozzles, metering devices, and transmission gears, as well as acceptable deviation limits and inspection frequency.

The operator should use these tables as a reference to compare what the machine is delivering with what it should be delivering.

3. Take measurements and perform tests.

Some procedures are common across different machines:

- Measure the flow rate of the spray nozzles in graduated buckets, with a timed interval;
- Conduct application tests in a known area and weigh the distributed input;
- Run the seeder on a test bench or in a test area to count seeds per meter.

On Stara machines equipped with Topper, calibration becomes simpler. Just activate the calibration command and inform the monitor of the volume collected in the test. The system automatically adjusts the

parameters to maintain the flow rate within the recommended range.

In the first calibration, the procedure follows the same logic. The only difference is the creation of the product in Topper. After that, the monitor automatically updates the settings, ensuring accuracy from the first applications.

With this data, the operator adjusts pressure, dispenser opening, gears, and speed until the result approaches the recommended value.

4. Ensure regular checks throughout the harvest season.

Even after a good initial calibration, it is important to repeat tests at specific times. One of these is whenever there is a change of product, mixture, or particle size, since these variations alter the behavior of the input in the agricultural machine.

It's also worth recalibrating after impacts, blockages, or emergency maintenance. These events can affect the adjustment of nozzles, dispensers, and hoses, compromising the dose applied in the field.

Another point of attention is abrupt changes in terrain or soil type, which interfere with the stability of the machine and can affect the uniformity of application along the worked area.

This care prevents the calibration from being "lost" throughout the harvest season. By following each of these steps, it's possible to maintain good operational quality and focus on results, without unforeseen problems.

And what about tire pressure?

Correct tire pressure influences traction, fuel consumption, soil compaction, and operator safety. The first step is to check the recommended pressure in the agricultural machine's manual and the tire specifications. These will include:

maximum pressure;

- Recommended ranges for different loads and speeds.

Working outside these ranges increases the risk of injury and compromises performance.

Good calibration practices

Always inflate the tires when the machine is in working condition, considering attached implements and load. Check the pressure with the tire cold, at the beginning of the day, and avoid large pressure differences between tires on the same axle.

Standards and technical references

related to calibration

Even if the operator doesn't work directly with regulatory documents, understanding the logic behind them helps to enhance the calibration routine. Standards such as ISO 9001 address quality management and reinforce the importance of:

- to control measuring instruments;
- Define calibration frequency;
- Record who performed the calibration, when, and with what results.

In practice, rural properties that follow these principles gain traceability and reduce application problems. Furthermore, regulatory and technical standards from different sectors emphasize safety and the

best use of equipment. Even when written for another segment, the logic adapts well to the field.

Stara Technology as a partner in application calibration and control.

The electronic features integrated into Stara agricultural machinery help the operator transform proper calibration into direct results in the field. The combination of correct adjustment and application technology reduces waste, improves the uniformity of operations, and strengthens control over costs per hectare.

Agricultural monitors and controllers display, in real time, application rate,

speed, area worked, and fault alarms. This allows the operator to quickly identify dose deviations and correct them in the field.

Variable rate and section control systems automatically adjust application according to the prescription map and geographic location, preventing overlap, coverage gaps, and unnecessary use of inputs.

Electronic records of operations allow for comparison of planned versus actual results, analysis of dose history, and support for decisions regarding new calibrations, adjustments, and management strategies.

Integration with technical assistance services, scheduled maintenance, and specific training helps the operator to

better utilize these resources.

Stara Distribution App: quick calibration of the agricultural distributor

The Stara Distribution app streamlines agricultural distributor calibration and reduces fertilizer waste. Developed by Stara's Product Engineering team and used by thousands of producers, it guides the operator in:

- To indicate the ideal positioning of the disc blades, based on machine data, product specifications, and the desired application range;
- Perform application profile testing with trays, evaluating uniformity and coefficient

of variation;

- To test the quality of the fertilizer, identifying variations in density between samples and more.

The role of calibration in the performance of agricultural machinery.

A consistent calibration routine transforms agricultural machinery into a more predictable and efficient ally. When the operator measures, adjusts, and records what the machine does in the field, it reduces waste, protects investment in inputs, and increases the chance of each plot expressing its productive potential.

With the support of the technology embedded in Stara agricultural machinery and reliable technical references, such as manuals and training, this step ceases to

be an occasional adjustment and becomes part of the management of the rural property.

RETURN TO INDEX

Exclusive test drive with the Crucianelli Plantor 2450 seeder.

With options ranging from 24 to 32 rows, the Plantor, from Crucianelli, arrives in Brazil with a design full of modern systems and advanced technology, focused on producers seeking precision in seeding.

01.12.2025 | 10:41 (UTC -3)



While still relatively unknown in Brazil, Crucianelli is a traditional company in the Argentinian market. There, it is a market leader, producing seeders and fertilizer distributors for many years. The company plans to be among the top five planting companies in the world by 2030, and Brazil plays a crucial role in achieving this goal. The factory in Argentina is located in the city of Armstrong, in the province of Santa Fe, the cradle of the Argentinian agricultural machinery industry. They specialize in planting machinery and bring their experience and innovations to Brazil, which we will share with our readers.

The machine we tested for this edition is a pre-production model manufactured in Brazil, produced at the São Carlos factory in the state of São Paulo. Crucianelli

established an agreement with the well-known Brazilian group Piccin to share space and expertise between these two traditional companies.



Clique aqui e veja no YouTube
Click here and watch on YouTube

Thus, the Crucianelli-Piccin Alliance (ACP) was established through the strategic union of the two companies, sharing strategic areas while continuing individual operations in other areas. Crucianelli then built its own building, housing its Engineering and Production departments, and shares all other common areas within the alliance.

The Planor 2450 seeder that we tested is from the Planor family, perhaps the most important currently manufactured by the brand, and was chosen for Brazil due to the recognized demands of our market.

The Planter line has two structures: one that folds to 3,9 m after articulation, and another with a transport width of 3,2 m, which greatly simplifies moving it from one location to another according to Brazilian regulations. The 3,9 m version has been manufactured in Argentina since 2016 and has seen significant sales, mainly in Eastern Europe and throughout South America. It has three chassis sizes: 12 m with 26 rows, 15 m with 32 rows, and 18 m with 38 rows, always with a standard spacing of 50 cm between rows. This machine can be sold without fertilizer

application in the row, according to the system adopted by the farmer.

The machines, which reduce their width to 3,2 m when folded for transport, are available in configurations of 12 m and 24 rows and 15 m and 30 rows, and can reach up to 32 rows, with multiples of 90 m, a spacing used in cotton in some regions. A row spacing of 50 cm is standard.



The Planor has a structure consisting of a central chassis with six rows and another 18 rows distributed on the side wings, nine on each.

To meet the after-sales needs of its entire product line, Crucianelli has established a network of dealerships for sales and customer service, with the majority being part of the Precision Planting dealer network, thus fully covering a large part of the country. To give greater attention to

component replacement, the company opted for a system that is quite innovative compared to most Brazilian manufacturers. They deliver the main machine parts on consignment to the dealership, or directly to the customer when their area is far from the nearest dealership.

User training is being provided by the brand directly through dealerships, but the activity of courses and training is being intensified as the products are marketed in the country.

In Argentina, this machine was awarded the CiTA Prize (Premio a la Innovación en la Tecnología Agropecuária) in the seeding category for its seed dosing and supply system in 2019. This award is one of the most important in the sector.



The pantographic system for cutting straw and opening the furrow for fertilizer placement is individual and does not depend on the seed placement system.

Machine structure

The machine has a structure consisting of a central chassis with six rows and another 18 rows distributed on the side wings, nine on each. The tractor hitch consists of a first pantographic section connected to the

tractor's drawbar, with a jack for adjusting the hitch height and a safety chain, which articulates to keep the machine level and independent. The second section is a triangle of longitudinal beams forming a robust structure attached to this central chassis.

The machine can be powered entirely by the tractor's hydraulic system via remote control valves (RCVs). However, if the tractor lacks the necessary capacity or number of outlets, a separate hydraulic unit, powered by the tractor's power take-off (PTO), can be used. This unit, consisting of a pump and an auxiliary tank, drives the turbine, manufactured in Argentina, with positive airflow. The separate hydraulic unit is useful for relieving the tractor, even if it has sufficient

flow. Most of the Plantor's components are manufactured in Brazil; however, the turbine, driven by a hydraulic motor, generates an airflow. At the outlet, a pipe coming from the turbine splits into three outlets, one for each tank. The remaining controls are on the RCVs, along with the hydraulic hose assembly for operating the machine.



The storage tanks, manufactured from polyethylene using a rotomolding process, are arranged in the central structure so that the main seed tank is at the front and the two fertilizer tanks are at the back.

The polyethylene tanks, manufactured using a rotomolding process, are arranged in the central structure so that the main seed tank is at the front and the two fertilizer tanks are at the back. Both the seed and fertilizer tanks have a capacity of 2.400 liters each, with a deflector at the bottom to relieve weight on the product outlet and a stainless steel screen at the top to prevent the entry of seed and fertilizer clumps that form with moisture. The lid can be fully opened with a suspension system to protect the hinges. The closure uses a quick-release latch. Therefore, each tank has a capacity for two bags, thus fitting four bags in the fertilizer tanks and two bags in the front

seed tank. A tarp has been placed to cover the tanks when the machine is in storage.

One of the features of the Plantor that we observed in the test is its versatility, because in this original configuration we described, the hoppers can all be used for seed or even the two rear hoppers, originally for fertilizers, can be used for seeds, and the front hopper for some other type of seed, allowing for intercropping. The change is relatively easy and is planned in the machine's operating design.

The entire central structure of the machine is supported by two pairs of large support wheels, with high-load-bearing-capacity tires and a large contact area, and the wings are supported at the ends by wheels that rotate and follow the movement. When

the machine folds for transport, the wheels at the ends of the wings are moved forward, making the towed machine fully supported by the wheels, transferring weight to the hitch. Access to the storage compartments is via a ladder at the rear of the machine, protected by a handrail.

Upon starting to climb onto the machine, one of the Planor's unique features becomes apparent. Access for maintenance is very easy, as the machine has no fairing, making everything easy to find and perform maintenance. This is one of the contributions of Argentinian engineering, which prioritizes simplicity for maintenance.



The entire central structure of the machine is supported by two pairs of large support wheels, with high-load-bearing-capacity tires and a large contact area, and the wings are supported at the ends by wheels that rotate and follow the movement.

Another interesting detail is that the hydraulic hoses run inside the booms, and the electrical and electronic harnesses are encased in cable trays for protection. The connection between the hoses in the fixed parts of the machine is made with sections of hydraulic tubing, which facilitates heat dissipation. The positive pressure air that

moves the products, seeds and fertilizer, runs inside the wing tube, which is sealed.

Due to a manufacturer's decision, whenever the machine is equipped with vDrive, there will be an alternator, which ensures the stability of the electrical current for operating the system. Another important design decision is that, when dealing with working widths greater than 15 m, there will be hydraulic cylinders generating load for the wings, in order to always maintain the working depth.

Furrowing and furrow closing

The pantographic straw cutting and furrow opening system for fertilizer placement is

independent and does not depend on the seed placement system. It is located at the front, attached directly to the bar that is the side wing itself, and has a variety of position adjustments. The furrow opener used can be a double disc or a shank type, like a boot. The straw cutting disc, which initiates the furrow opening, is independent of the fertilizer furrow opener and has a lateral movement.

Flow sensors were installed along the fertilizer line, displaying information about product interruption on a monitor located in the tractor cab.



Flow sensors were installed along the fertilizer line, displaying information on a monitor in the tractor cab indicating any interruption in product flow.

Fertilizer and seed dosage

One of the main parts of a seed-planting machine consists of the seed storage, transport, and metering system, as well as the furrow opening and seed placement. The activities of closing and compacting the soil over the seeds are also important for germination and emergence.

The Planor uses a pantographic mechanical system, independent of the system, that opens and places fertilizer. Dosing begins at the bottom of the seed hopper when a vertical air current lifts the seed mass, which is then conveyed through hoses to the metering device. Before the furrow opener, a pantographic track cleaning disc controls the furrow profile.

The seed metering system is one of the highlights of this machine we tested. It uses the vDrive system for electric drive and the vSet system for precise seed metering, both products from Precision Planting, a Crucianelli partner in this equipment line. This system allows for row cutting in areas where seeds have already been placed and curve compensation to

maintain the accuracy of the seed placement distance.



The seed metering system is one of the highlights of this machine we tested, featuring the vDrive system for electric drive and the vSet system for precise seed metering.



Planter also features Precision Planting's DeltaForce system, which automatically controls the furrow profile, ensuring consistent depth.

Also, to maintain seed placement quality, the DeltaForce system from Precision Planting was adopted. Its main function is to control downforce, which is the force that the planter trolley exerts on the soil, automatically controlling the standardization of the furrow profile. To do this, it uses a hydraulic cylinder with

positive and negative pressure; that is, aided by information provided by a load cell, it corrects the depth row by row as well.

The load cells are placed one in each row, operating at a frequency of 200 Hz, making five corrections per second, so that, in a quick calculation, it can be deduced that when the machine is developing an operating speed of 8 km/h, piston correction occurs centimeter by centimeter.

Using the Precision Planting system, the 20-20 model monitor controls the entire seeding and fertilization process, while the operational part of the activity is controlled on another monitor that uses the Isobus standard, therefore fully compatible with

tractors that adopt this protocol.

The basis of the entire design of this machine was to maintain a homogeneous and balanced furrow for fertilizer placement, which, as is known, favors germination and the initial impulse of plant emergence. Therefore, a depth adjustment system was also included, controlling the depth in centimeter increments and having an intermediate, mid-stroke position, allowing depth control every 1 cm and 1,5 cm.



The Planor 2450 seeder we tested is from the Planor family, perhaps the most important currently manufactured by the brand, and was chosen for Brazil due to the recognized demands of our market.

Machine closure for transport

One test we conducted with this machine was on the wing folding and retraction system for transport. The innovations compared to what's currently available on

the market are impressive. An exclusive Crucianelli system, patented by the brand, activates hydraulic pistons located between the wings and the central chassis, so that only the pantographic module for the cutting and fertilizer discs rises, while the seed module articulates separately, remaining on a lower plane to avoid excessively raising the center of gravity.

The machine then rests on its four central wheels, and the support wheels at the ends of the wings move forward to provide support. The sequence of the retraction operation for transport is very similar to the sequence of actions of a Transformer robot, well known to children.



Test location

Our test of the Crucianelli Plantor seeder took place in the municipality of Morro Agudo, in the state of São Paulo, on a production area belonging to Primos Agro, who welcomed us to provide this evaluation. We had the invaluable

collaboration of engineer Maximiliano Cassalha, who has extensive experience in various agricultural machinery companies and currently leads this process of bringing Crucianelli to Brazil, and also of Juan Pablo Nunes Marques, a machine operator who helped us demonstrate the equipment's characteristics in a sugarcane renewal area that is now receiving a soybean crop on prepared land with little straw. However, Crucianelli has another machine working in the Brazilian Midwest, with conditions for soybean succession and rotation with corn, in no-till planting.



The test drive was conducted in a sugarcane field recovery area belonging to Primos Agro, in Morro Agudo, in the state of São Paulo.

Optional

Although the Plantor has several optional accessories, in the model we tested they were standard. One item that is always optional is the reservoir and drive system for placing inoculant in the furrow, from Orion, which supplies all the components for Crucianelli to assemble on the machine. The product is supplied independently of the seeder, with an external pump.

This system is widely used by producers, mainly in the Midwest, especially in Mato Grosso and Goiás, and in the Southeast, such as in the states of São Paulo and

Minas Gerais.

Final considerations

Our test consisted of monitoring the machine's operation in an area of ??soil prepared with successive harrowings. The main factors we analyzed were related to the machine's ability to open the furrow and introduce fertilizer and seed, evaluating its components, the articulation of the rows, and the machine's opening and closing system for transport.

It is noteworthy that the machine's design paid special attention to the fertilizer and seed placement systems, assembling two separate and independent pantographic structures. Practicality and cutting power were sought, offering different furrow

openers for fertilizer. The system adopted by Crucianelli for controlling furrow opening and maintaining its uniformity was entrusted to Precision Planting, with the line pressure control system, in its most complete and modern version. The DeltaForce uses a hydraulic cylinder that acts in both directions, downwards and upwards, unlike the systems that only press the line, found in most seeders in Brazil.





The machine opens and closes quickly, thanks to a unique system from the brand that lifts only the cutting and fertilizer disc module, keeping the seed discs at a lower level to ensure a low center of gravity.

Regarding the seed and fertilizer metering system and plantability monitoring, the complete Precision Planting system was chosen again, with vSet for precise metering and vDrive for the electric drive of the metering mechanism. The 20-20 monitor is used to monitor the quality of the cabin operation.

Another highly praised feature was the machine's versatility, which has three hoppers that can be used in various ways for seeds and fertilizer, requiring little adaptation. In short, a rewarding experience where we were able to exclusively verify the features of one of this brand's models, which arrives in Brazil with years of experience and will help raise the level of precision seeding operations.

***Jose Fernando Schlosser,
Agrotechnology
Laboratory/Nema/UFSM***



[Clique aqui para baixar o PDF](#)
[Click here to download the PDF](#)

[RETURN TO INDEX](#)



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

Grupo Cultivar de Publicações Ltda.

revistacultivar.com

FOUNDERS

Milton de Sousa Guerra (*in memoriam*)

Newton Peter (director)

Schubert Peter

TEAM

Schubert Peter (editor in chief)

Charles Ricardo Echer (advertising manager)

Rocheli Wachholz

Nathianni Gomes

Sedeli Feijó

Franciele Ávila

Ariadne Marin Fuentes

CONTACT

editor@grupocultivar.com

comercial@grupocultivar.com