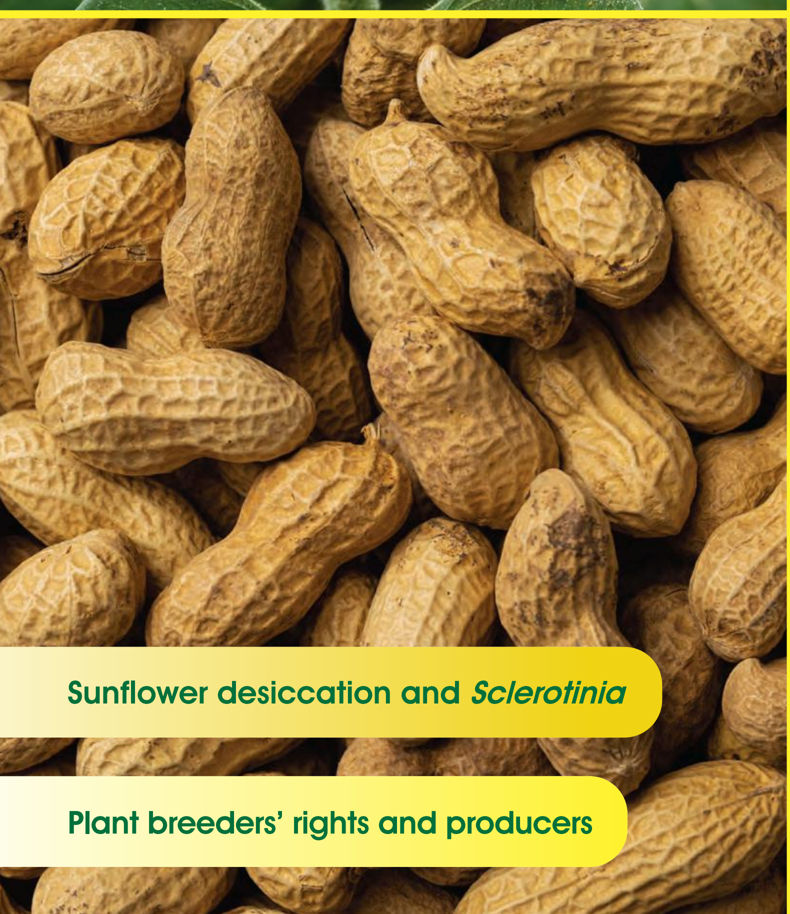
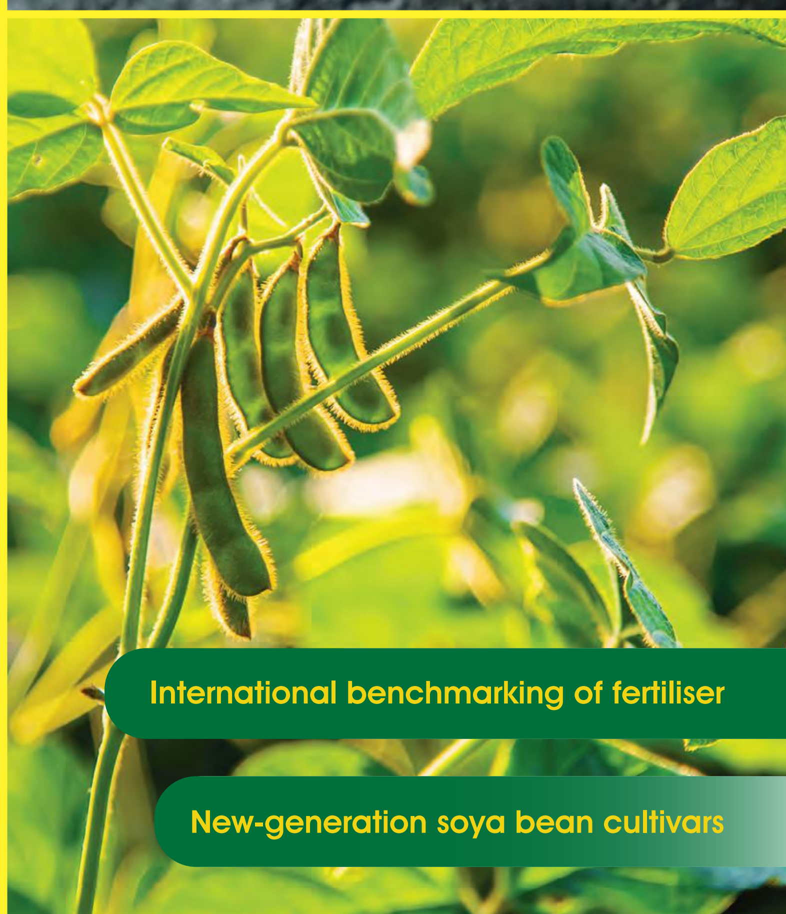
Vol 12 No 1 • March 2026
ISSN 2410-1206

OILSEEDS focus

Protein Research Foundation • Oil & Protein Seeds Development Trust • Oilseeds Advisory Committee





Sunflower desiccation and *Sclerotinia*

Plant breeders' rights and producers

International benchmarking of fertiliser

New-generation soya bean cultivars

A second wave of growth for South Africa's soya bean industry

By Prof Ferdi Meyer, managing director, BFAP, and PRF trustee and chair, Soya Bean Value Chain Initiative

The Cochrane Treadmill, a concept introduced in 1958 by agricultural economist Willard W Cochrane, describes a paradox that has shaped global agriculture for more than a century. Cochrane developed the theory after examining United States (US) farm price trends in the early 1900s. Between 1895 and 1915, US agricultural production expanded rapidly as producers brought more land into cultivation. Yet population, and therefore food demand, grew even faster, increasing farm prices.

This balance shifted dramatically in the decades that followed. A wave of technological breakthroughs accelerated production growth, and between 1948 and 1958, farm prices declined sharply as supply began to outpace demand.

Adoption of new tech

Cochrane observed something counterintuitive: even as prices fell, producers continued to adopt new technologies. Early adopters enjoyed temporary benefits such as lower costs and higher profits, but once others followed, the resulting surge in supply pushed prices down again. To stay ahead, producers had to adopt the next innovation, restarting the cycle. For this treadmill to keep turning, there had to be a 'vent for surplus', or a market capable of absorbing production beyond what the domestic economy could consume.

The US became a global agricultural exporter largely because of this treadmill dynamic. Consistent technological adoption, falling unit costs, and exceptionally efficient supply chains created a powerful competitive advantage. Barges carried grain from the interior to ports and returned with fertiliser.

Yet even robust export markets were not always enough. Global prices fell below US producers' break-even levels at times. When that happened, government support programmes stepped in, stabilising incomes and keeping producers in production until the next price upswing. New vents for surpluses also emerged through policy interventions, most notably the biofuel blending mandates introduced around 2005, which suddenly added more than 100 million tonnes of grain, oilseeds, and sugarcane to global demand.

South Africa's soya bean industry

A similar pattern has unfolded, only much faster, in South Africa's soya bean industry. In just over a decade, production has boomed: from below 500 000 tonnes in 2010 to one million tonnes in 2015, two million tonnes by 2022, and potentially close to three million tonnes in the current season if rainfall remains favourable. Production has grown far quicker than domestic demand, as producers expanded cultivated land and adopted better technologies.

As a result, the country has moved from a deficit position to surpluses. Soya beans are now trading at export-parity levels, and global prices have softened as international supply continues to outpace demand. Local prices this season have fallen back to levels last seen in 2019/20, putting farm margins under pressure and highlighting the need for new vents for surpluses.

For years, South Africa's expanding processing industry helped absorb growing soya bean volumes; however, with an additional 600 000 tonnes of crushing capacity recently added, the country now has more processing capacity than the domestic protein-meal market can consume. If plants operate at full capacity, the country will either need to export soya bean meal or grow local consumption, particularly through the poultry industry, which is the biggest consumer of protein meal.

Yet growth in chicken consumption has slowed due to weak economic conditions, and opportunities for replacing imports are narrowing. The biggest new opportunity lies in poultry exports, which could unlock additional feed demand and create a new vent for surpluses, effectively moving the Cochrane Treadmill further down the value chain.

Anticipating the challenge

Recognising these dynamics early, the Protein Research Foundation (PRF) launched the Soya Bean Value Chain Initiative in 2018. The initiative brings together stakeholders across agriculture, industry, and government to examine how different parts of the soya bean chain influence one another, from production and processing to feed manufacturing, logistics, infrastructure, and policy.

Its goal is to identify bottlenecks and opportunities, ensuring the country builds the competitiveness needed to thrive in a surplus-driven environment.

The path forward

Given current macroeconomic conditions, South Africa's domestic demand for soya beans is unlikely to grow fast enough to keep pace with rising production. The entire value chain will therefore need to prioritise and expand export readiness for soya beans, soya bean meal, and poultry.

Efficiency gains exist at every link in the chain, and coordinated action will be essential. One example is the Soya Bean Value Chain Initiative's current focus on the regulatory framework for new breeding technologies (NBTs), which could boost competitiveness. Be that as it may, NBTs represent just one of many areas with potential to support the next phase of growth.

Send an email to Prof Ferdi Meyer at ferdi@bfap.co.za for more information.


DUNLOP
PROTECTIVE FOOTWEAR
AGRICULTURE
COMFORT &
SAFETY
SOLUTIONS.
DUNLOP
TerraPRO
EN ISO 20344:2012 04 CI SRC
Cois Viljoen
082 805 0405
cois@dunlopboots.africa
www.dunlopboots.africa
LDV
DUNLOP. CARE BEYOND SAFETY.

Adapting to a changing world

The Food and Agriculture Organization (FAO) of the United Nations reports that disasters have caused roughly US$3 trillion in agricultural losses worldwide over the past 33 years – an average of US$99 billion per year. Droughts, floods, pests, and marine heatwaves are the main disruptors.

Disasters have destroyed an estimated 4,6 billion tonnes of cereals and 2,8 billion tonnes of fruit and vegetables. Asia accounts for 47% of these losses and the Americas 22%, while Africa, despite lower monetary losses, has suffered the greatest impact as agriculture represents a significant share of employment and income.

Digital solutions to mitigate risk

Digital technologies are transforming the way producers, governments, and communities monitor risks and anticipate impacts. Early warning systems play a crucial role in reducing risks, and proactive rather than reactive responses are part of the solution.

There are numerous examples of effective strategies and tools, such as the FAO's Climate Risk Toolbox (CRTB), Rift Valley Fever Early Warning Decision-Support Tool, Soil Mapping for Resilient Agrifood Systems (SoilFER), Fall Armyworm Monitoring and Early Warning System (FAMEWS), Global Information and Early Warning System (GIEWS), and parametric insurance platforms.

To fully realise the benefits of these strategies, digital infrastructure is essential. This will improve decision making and enable innovation, especially in the rural areas of the world's less-developed countries.

The geopolitical landscape

Ongoing turmoil in global politics is driving uncertainty, fuelled by protectionism and conflict. Food security is affected by price volatility and disruptions across global supply chains. For instance, exports from the Black Sea region, which is a major supplier of wheat, maize, and sunflower oil, have been affected by supply chain challenges and sanctions stemming from the Russia-Ukraine war.

The instability in the Middle East affects the cost of energy, which directly impacts fertiliser prices. The result is higher production costs and increased price volatility. Political instability also discourages long-term investment in agriculture within affected countries, further undermining growth.

In addition, global trade routes have shifted and, in some cases, been disrupted by trade barriers such as higher tariffs and protectionist policies. Evolving biofuel policies have added another layer of uncertainty.

This challenging environment requires continuous, judicious adaptation. Despite these headwinds, we hope 2026 will be a prosperous year for all.

Dr Erhard Briedenhann

Send us your contributions and suggestions to make *Oilseeds Focus* an enjoyable and valuable publication for the oilseeds industry. Contact Dr Briedenhann at erhardb@netactive.co.za for more information.

Editor: Dr Erhard Briedenhann
+27 82 551 1634
erhardb@netactive.co.za

Associate editor: Gerhard Keun
+27 11 803 2579
oliesade@opot.co.za

Published by: Plaas Media (Pty) Ltd
217 Clifton Ave, Lyttelton, Centurion, RSA
Private Bag X2010, Lyttelton, 0140, RSA
Tel: +27 12 664 4793 • *www.agriorbit.com*

Chief editor: Lynette Louw
+27 84 580 5120
lynette@plaasmedia.co.za

Deputy editor: Jayne du Plooy
jayne@plaasmedia.co.za

Sub-editor: Roné Kruger
rone@plaasmedia.co.za

News editor: Susan Marais
susanmarais@plaasmedia.co.za

Design & layout: Inge Gieros
inge@plaasmedia.co.za

Advertising:
Karin Changuion-Duffy
+27 82 376 6396 • karin@plaasmedia.co.za

Susan Steyn
+27 82 657 1262 • susan@plaasmedia.co.za

Anthony Struwig
+27 74 549 9911 • anthony@plaasmedia.co.za

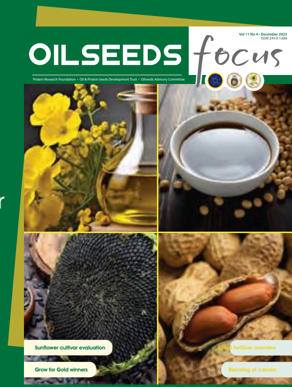
Accounts: Marné Anderson
+27 72 639 1805
marne@plaasmedia.co.za

Subscriptions: Beauty Mthombeni
+27 64 890 6941
beauty@plaasmedia.co.za

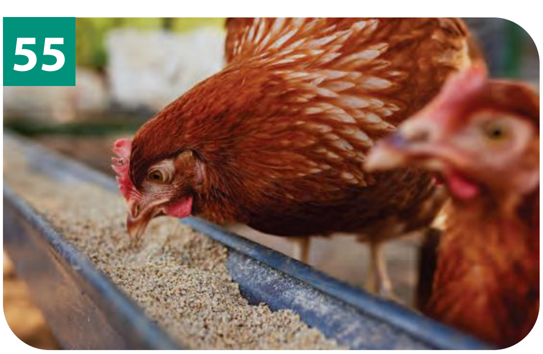
Published on behalf of:
Protein Research Foundation
PO Box 1564, Rivonia, 2128
Tel: 011 803 2579
Fax 011 803 2287 / 086 634 8067
Enquiries: gkeun@proteinresearch.net

To subscribe

Oilseeds Focus is a magazine aimed at addressing issues that are relevant to the canola, soya bean, sunflower and groundnut industries. To subscribe, please contact Beauty Mthombeni at 064 890 6941 or email beauty@plaasmedia.co.za. Subscriptions are free.



CONTENTS



Soya beans could transform dairy farming

At first look, the 400 acres of soya beans on the Preston family's dairy farm in southern Michigan appear no different from any other field. In reality, the crop reflects a research partnership with Michigan State University (MSU) that is cutting the family's livestock feed costs by tens of thousands of dollars each month and may have lasting effects on the dairy industry.

The soya bean variety was developed through federally funded research at the College of Agriculture and Natural Resources at MSU and is designed to improve milk quality when included in dairy cow diets. In the spring of 2024, the fourth-generation team at Preston Farms decided to plant the soya beans on nearly one-third of their 1 500 acres.

Once the soya beans were harvested and added to the cows' feed, the impact became clear. Within just three days, milk fat and protein levels rose, increasing the overall value of the milk produced.

What appears to be a sudden breakthrough is the result of many years of research. Adam Lock, a professor in the MSU Department of Animal Science and interim chair of the Department of Large Animal Clinical Sciences, leads a research team that has spent more than a decade examining how dietary fats affect dairy cows. One line of this work has centred on high oleic soya beans, which are rich in oleic acid, a naturally occurring fatty acid found in both animal and plant-based fats and oils.

Researchers hoped that adding these soya beans to cow diets would boost milk fat and protein production while also improving farm profitability. – *SciTechDaily*

Busting soya myths for men

In an era of viral fitness 'bro-science', men often steer clear of soya products, fearing they might develop feminine traits, according to Dr Shubham Vatsya, senior consultant in gastroenterology and hepatology at Fortis Vasant Kunj. However, the expert in digestive health is now setting the record straight: soya is not only safe – it's a vegetarian protein powerhouse.

According to him, soya remains a safe, affordable, and effective tool for muscle maintenance and overall health for athletes, vegetarians, and health-conscious men. The root of the soya scare stems from isoflavones, a type of plant oestrogen (phytoestrogen) found in soya beans. Sceptics have long claimed these compounds mimic human oestrogen enough to disrupt male hormones, he said.

Dr Vatsya dismissed these claims and said there was zero evidence linking soya to the development of male breast tissue, urging men to stop letting Internet myths dictate their nutritional choices. – *Hindustan Times*

Secret ingredient in healthier bread

As interest grows in healthier alternatives to traditional wheat-based foods, scientists are exploring new ingredients that can improve nutrition without sacrificing practicality. One promising option is partially defatted sunflower seed flour (SF), a material left behind after sunflower oil is produced. This underused by-product has shown strong potential for enriching bread with protein, fibre, and antioxidant compounds.

"Our aim was to optimise the reuse of sunflower SF, considering its high protein and chlorogenic acid content," says biologist Leonardo Mendes de Souza Mesquita, the lead author of a study published in *ACS Food Science & Technology*.

To evaluate how sunflower SF performs in baking, the research team prepared bread recipes that replaced wheat flour with sunflower SF at levels ranging from 10 to 60%. Each version was carefully analysed for its chemical makeup, dough behaviour, and the physical characteristics of the finished bread.

The results showed clear nutritional improvements. Breads made with sunflower SF contained significantly more protein and fibre than standard wheat bread. At the highest substitution level, the bread reached 27,16% protein, compared with 8,27% in conventional bread. Antioxidant levels rose alongside protein content. The values recorded in sunflower flour breads were much higher than those seen in bread made entirely from wheat flour. – *Science Daily*

Corteva drops 'toxic cocktail' herbicide

The chemical giant Corteva will stop producing Enlist Duo, a herbicide that environmentalists consider among the most dangerous still used in the United States (US), because it contains a mix of an active ingredient in Agent Orange and glyphosate, which have both been linked to cancer and widespread ecological damage.

Despite the risks of combining these substances, the US Environmental Protection Agency has twice approved the herbicide for use on food crops. The compound is annually spread on around 4,5 million acres of fields in which maize, soya beans, and genetically engineered cotton are grown.

The move will bring to an end a decade of litigation and public pressure campaigns aimed at banning Enlist Duo. Corteva reported selling more than US$1 billion in Enlist products in 2022. The Agent Orange chemical 2,4-D will still be used in Enlist One, and a lawsuit that asks a judge to invalidate its approval remains ongoing. In a statement, a Corteva spokesperson said the company stopped producing Enlist Duo because it accounted for just 1% of sales. – *The Guardian*

India holds off GM crop imports from US

Maize and soya, which are grown extensively for livestock and human consumption and considered to be among the world's most crucial row crops, are one of the key elements in the ongoing trade discussions between India and the US.

So far, President Donald Trump has imposed 50% tariffs on India, pushing several industries that export heavily to the US to the brink of collapse. One of the sticking points in trade negotiations is the US's access to India's agriculture sector. Washington wants New Delhi to open its market to genetically modified (GM) soya and maize. GM technology involves altering plant DNA to introduce new traits that help speed up production compared with traditional breeding.

The US is the world's second-largest producer of soya beans after Brazil, accounting for 28%, or 119,05 million metric tonnes, of global production.

Suman Sahai, the founder of Gene Campaign, said the US desperately needs a market for its soya beans and maize, because China, its one-time top buyer, has dramatically scaled back its purchases. India has so far held off the imports of GM-variety soya beans and maize on the grounds that it produces non-GM, or organic, crops, which have a global niche market and could be undermined by the perception of GM varieties diluting the strain. – *Al Jazeera*

Peanut butter recalled over toxins

Another peanut butter brand has been pulled from shelves in South Africa, following a notable recall in 2024. The National Consumer Commission (NCC) has confirmed that it received a product recall notification from peanut butter manufacturer ButtaNutt (Pty) Ltd. This was after tests revealed higher-than-legally-permitted levels of aflatoxin in some of its products. Aflatoxin is a toxin produced by certain fungi that can contaminate agricultural crops, including peanuts, and is regulated in South Africa due to the health risks it poses.

According to the NCC, the affected products failed to meet the quality standards set out under the Department of Health's *Regulation 1145*, which governs the tolerance of fungus-produced toxins in foodstuffs. According to the Cancer Institute, exposure to aflatoxin can cause short-term health effects such as nausea, vomiting and abdominal pain, while long-term exposure has been linked to more serious conditions, including liver cancer.

The recalled products were sold across several provinces, including Gauteng, KwaZulu-Natal, and the Eastern and Western Cape. Acting NCC Commissioner Hardin Ratshisusu urged consumers to take the recall seriously and act immediately. – *BusinessTech*

Plant-based diets drive oil market

The North America vegetable oils market will grow to 41,51 million tonnes by 2033 from 28,32 million tonnes in 2024. The driving factors are growing health awareness, growing demand for plant-based goods by consumers, and the growth of the food and beverage sector. Between 2025 and 2033, the market will witness a compound annual growth rate of 4,34%, which reflects a strong upward trend in the industry.

Shifting consumer demand for healthier, plant-based, and heart-healthy diets is fuelling vegetable oil consumption in North America. Oils such as canola, sunflower, and soya bean are generally accepted as being healthier than animal fats. Increased awareness of the advantages of unsaturated fatty acids and omega-3 levels is stimulating demand, especially in urban markets that value clean-label and natural foods.

Based on the Good Food Institute, plant-based food retail sales in North America grew by 27%, up to US$7 billion in 2023. Plant-based products such as meat and dairy derivatives are heavily dependent on vegetable oils for processing. The preference for plant-based products grew by 45% between 2019 and 2023 as consumers increasingly want healthy and sustainable food alternatives. – *GlobeNewswire*

USDA raises oilseed production forecast

In the February world oilseed balance for the 2025/26 marketing year (MY), experts from the United States Department of Agriculture (USDA) Foreign Agricultural Service again increased (compared to January estimates) their forecast for global oilseed production by 2,63 million tonnes to 695,78 million tonnes (684,9 million tonnes in MY 2024/25 and 657,4 million tonnes in MY 2023/24), particularly for soya bean (2,5 million tonnes). The forecast for world ending oilseed stocks was increased by 1,23 million tonnes to 146,3 million tonnes due to increased production.

The forecast for world soya bean production in the 2025/26 MY has been increased by 2,5 million tonnes to a record 428,18 million tonnes (427,15 million tonnes in MY 2024/25). In particular, Brazil's production is forecast to rise by two million tonnes to a record 180 (171,5) million tonnes, while Paraguay's is expected to increase by 0,5 million tonnes to 11,5 (10,2) million tonnes. For Argentina, the forecast has been left unchanged at 48,5 (51,1) million tonnes. – *UKAgroConsult*

Cultivating climate-smart oilseed systems

By Kent Buchanan, Stephanie Midgley, Johann Strauss, and Pieter Swanepoel

Mediterranean-type climates are warming faster than the global average. These regions, which include the Western Cape, southern Australia, and the Mediterranean basin, are projected to become more arid and climatically unstable. For oilseed crops such as canola, this presents a dual challenge: maintaining yield and quality under climate stress while reducing greenhouse gas (GHG) emissions to meet global climate targets.

Our literature review (2025) addresses a critical gap: identifying which agronomic interventions can contribute to climate adaptation and mitigation in crop systems typical of Mediterranean climates.

Research scope and methodology

The study synthesised 158 peer-reviewed articles from an initial pool of 722, mapping interventions, climate outcomes of these interventions, and the crop types that interventions were tested on. Searches in the *Web of Science* and *Scopus* databases targeted studies relevant to climate-smart agriculture in Mediterranean-type climates. Metadata extracted included geographic location, crop type, intervention studied, and climate outcome.

Research on climate-smart practices has grown since the late 1990s, with a sharp increase after 2015, likely driven by the *Paris Agreement* and IPCC reports. However, most studies remain concentrated in Spain and Italy, leaving major oilseed-producing regions such as Australia and South Africa with limited representation.

The review reveals that 62% of studies focus on adaptation, 22,5% on mitigation, and only 15% consider both. For oilseed systems, adaptation outcomes such as yield stability under water stress, improved soil health, and nutrient management are highly relevant. Heat stress and salinity are scarcely studied.

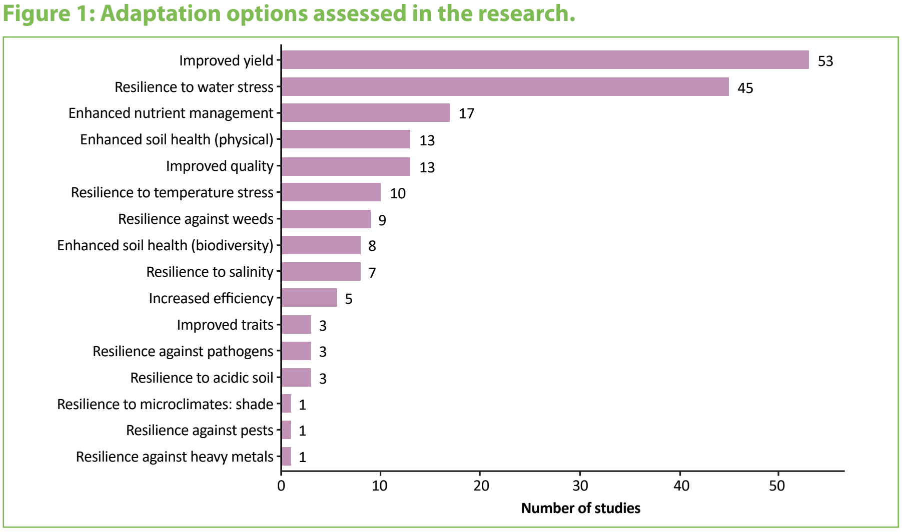
On the mitigation side, research emphasises carbon sequestration through soil management and reduced tillage, along with GHG emissions linked to fertiliser use. Methane receives little attention, and only two studies comprehensively assessed all major GHGs alongside soil carbon.

Among 27 interventions identified, those most relevant for canola include:

- **Tillage:** Reduced or no-till practices improve soil carbon and water retention.
- **Organic fertiliser:** Improves soil health and carbon storage, but trade-offs with N_2O emissions need assessing.
- **Cover crops:** Improve soil moisture and reduce erosion in canola rotations.
- **Chemical fertiliser:** Optimising nitrogen inputs is critical for mitigating N_2O emissions.
- **Cultivar selection:** Breeding for drought and heat tolerance is essential for Mediterranean climates.

Other interventions with potential relevance include biochar application, crop rotations, and irrigation scheduling.

Figure 1: Adaptation options assessed in the research.



Policy and industry implications

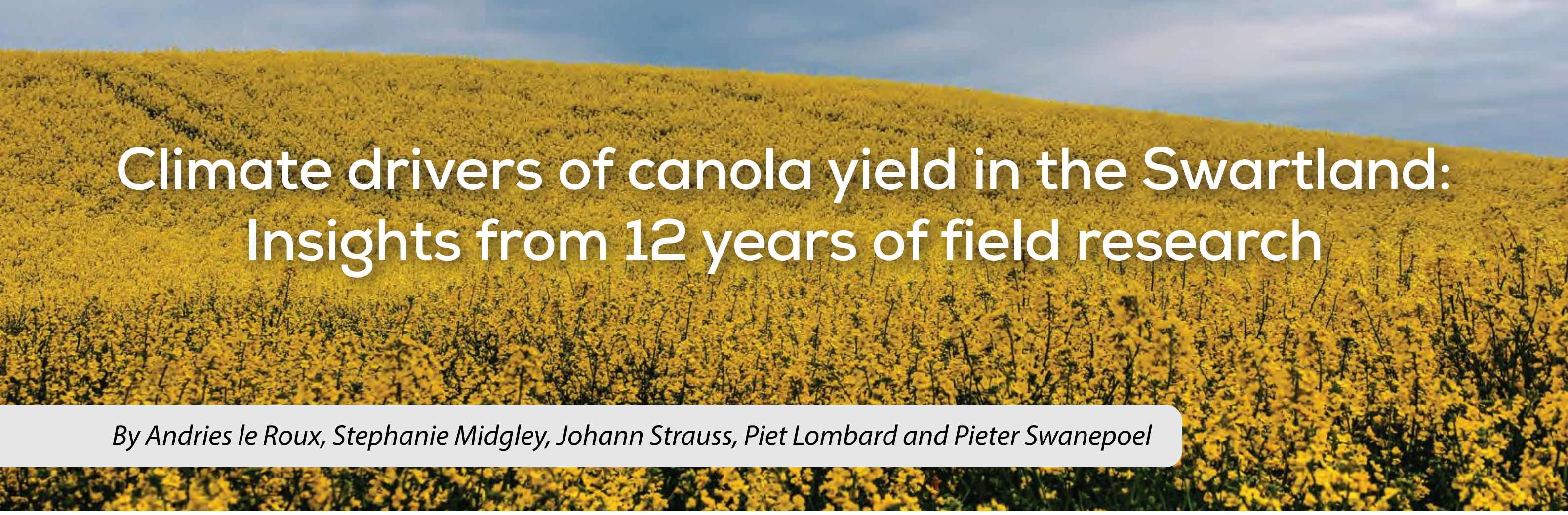
The evidence base is insufficient to guide integrated climate-smart strategies for canola in Mediterranean-type climates. Research remains fragmented, often isolating adaptation or mitigation outcomes without considering their interaction or economic viability. For policymakers and industry stakeholders, this means decisions risk being based on extrapolations from other cereal systems, which may not align with oilseed agronomy or market realities.

Future research must prioritise oilseed-specific trials that assess co-benefits and trade-offs across adaptation, mitigation, and yield. This includes life cycle GHG assessments for canola rotations, evaluation of soil carbon dynamics under different tillage and fertilisation regimes, and the development of cultivar portfolios tailored to heat and drought stress. Socio-economic dimensions should also be integrated to ensure that climate-smart practices are both environmentally and commercially sustainable.

Conclusion

For the oilseed industry, particularly canola, the systematic map underscores a critical evidence gap. While interventions such as conservation tillage, cover cropping, and optimised fertilisation show promise for climate adaptation and mitigation, their combined effects on yield and GHG emissions in oilseed systems remain poorly understood. Future research should bridge agronomy, climate science and policy, ensuring that strategies to combat climate change do not come at the expense of yield or economic viability.

For more information, send an email to pieterswanepoel@sun.ac.za



Climate drivers of canola yield in the Swartland: Insights from 12 years of field research

By Andries le Roux, Stephanie Midgley, Johann Strauss, Piet Lombard and Pieter Swanepoel

Canola (*Brassica napus* L.) has become an increasingly important crop in the Western Cape's dryland systems, serving as a profitable cash crop alternative to wheat and barley and contributing to long-term soil improvement and weed management. Yet its performance remains tightly constrained by climate variability.

Seasonal conditions vary from year to year, with changes in rainfall onset and timing, temperature patterns, and the occurrence of warm spells that are often difficult to anticipate. This inherent unpredictability makes it challenging to forecast how any given season will influence canola growth and yield, underscoring the value of long-term field data to identify which climate factors affect yield most.

A recently published article draws on 12 years of field trial data (2011 to 2023) from Langgewens Research Farm in the Swartland region. It provides empirical evidence of how rainfall amount and timing, temperature regimes and heat stress, as well as cultivar characteristics interact to shape canola yield outcomes.

Rainfall thresholds

Rainfall played a central role in canola yield in the Swartland, particularly during the vegetative and flowering periods. Seasonal rainfall of up to 300mm was strongly associated with increased yields, after which the response began to level off. As no season in the 12-year dataset exceeded this threshold by a substantial amount, the precise point at which rainfall becomes excessive could not be fully determined.

Figure 1 illustrates the average weekly rainfall pattern for the trial period and shows that, under typical conditions, canola rarely experiences extreme rainfall totals. The distribution of rainfall, however, told a clearer story than the total amount. During flowering, yields were maximised when rainfall ranged between 90 and 110mm. Amounts below or above this range reduced yield, likely due to drought stress, nutrient leaching, temporary waterlogging, or flower abortion.

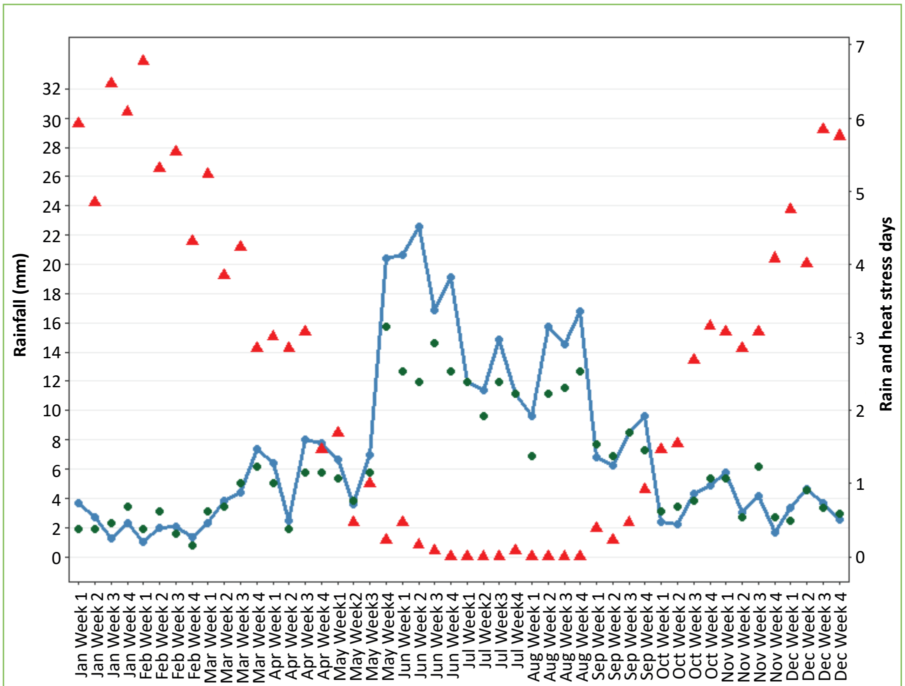
Rainfall clustering also had a marked influence. A greater number of rain days across the season generally benefited yield. However, when five or more consecutive rain days occurred, yields declined, possibly due to saturated soils or nutrient losses. Flowering was especially sensitive: More than 13 rain days during this period significantly reduced yield, consistent with literature linking prolonged wet conditions to poor pollination and increased disease pressure.

Importantly, *Figure 1* shows that such extreme rainfall patterns are not typical in the Swartland. Only crops flowering in late July face a slightly elevated risk of excessive rain days, although the overall likelihood remains low. Conversely, cultivars that flower early in the season rarely reach the optimal rainfall threshold and are more likely to experience moisture deficits than excess.

Temperature impact

Temperature acted as a double-edged sword. Warmer temperatures during the first 21 days after germination enhanced early growth and increased yield potential. These conditions often coincided with

Figure 1: Weekly average rainfall (blue line), rain days (green dots) and heat stress days (red triangles) across the trial illustrate the timing and intensity of key climate factors affecting canola production in the Swartland.



earlier sowing dates (5 May was the earliest in the trial), which extended the vegetative period and supported higher biomass accumulation, provided that sufficient soil moisture was available.

However, the crop responded very differently to higher temperatures during flowering and pod filling. As shown in *Figure 2*, maximum temperatures begin to rise sharply in late winter and early spring. Warm days are not synonymous with heat stress, but the likelihood of heat stress increases as the season progresses.

Heat stress was one of the most yield-limiting factors identified in the study. A single day above 28°C during flowering reduced yield by up to 0,5t/ha. *Figure 1* shows that canola still flowering in the last week of September is likely to experience at least one heat stress day, with the probability of heat and daily temperatures increasing through September, as seen in *Figure 2*. The combined effects of drought and heat during flowering can amplify losses, leading to flower abortion, reduced pollen viability, and reduced pod formation.

Although flowering is the most climate-sensitive stage, the study also demonstrated that average temperatures above 15°C during pod filling significantly reduced yield, underscoring the importance of avoiding late-season reproductive development.

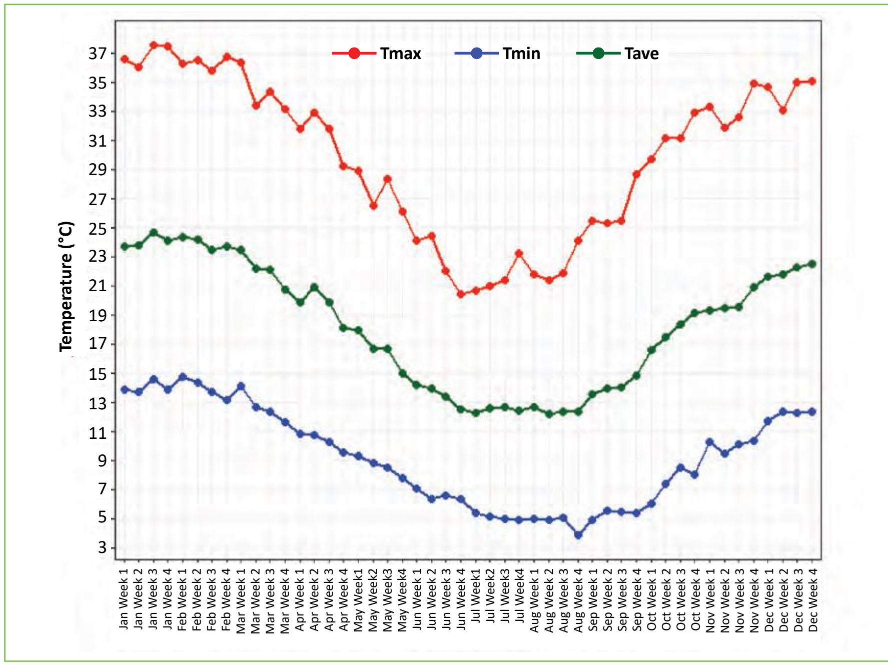
Cultivar choice and flowering

Choosing the correct cultivar remains one of the most critical management decisions for Swartland producers. Canola cultivars differ in season length, from short, medium-short, medium or long, which determines how quickly they progress from planting to flowering.

Warmer seasons accelerate this development and can cause cultivars to move to shorter growth classes. Late planting has a similar effect: After the winter solstice (around 21 June), day length gradually increases, prompting plants to transition more rapidly from vegetative growth to reproductive development. As a result, later planting effectively shortens the growing season for all cultivars, regardless of their inherent season length.

Across the 12-year dataset, several consistent patterns emerged. Medium-short cultivars produced the most reliable yields under the variable climate conditions of the Swartland. Medium-length cultivars performed well when planted early in May, but their advantage diminished with later planting. Short-season cultivars tended to excel under drier conditions or when sowing was delayed, as their compressed growth cycle allowed them to avoid late-season heat stress. Long-season cultivars were the most vulnerable, frequently underperforming as their flowering overlapped with the warm, high-risk periods shown in *Figures 1* and *2*.

Figure 2: Weekly average maximum (Tmax: red), minimum (Tmin: blue) and mean temperatures (Tave: green) illustrate the seasonal temperature cycle in the Swartland and highlight periods when heat or cold conditions are most likely to influence canola growth and development.



The timing of flowering emerged as a critical factor. The ideal flowering window is a cooler period with sufficient soil moisture, but without excessive consecutive rain days. Although early winter flowering may expose crops to nutrient leaching or reduced pollination efficiency, *Figure 1* shows that such conditions are not typically severe in the Swartland. In contrast, flowering too late in spring exposes canola to rapidly increasing temperatures and a higher probability of heat stress, as illustrated in *Figures 1* and *2*.

The average planting date was 23 May across all trials. Under these conditions, medium-short cultivars generally achieved the longest vegetative phase. Consequently, they had the highest probability of flowering within the favourable climate window, when temperatures were cooler, heat stress was less frequent, and soil moisture was more reliable.

For most producers planting more than one cultivar remains a practical strategy. Starting the season with longer-season types and finishing with shorter-season options helps spread climate risk and increases the likelihood that at least one cultivar will flower under favourable conditions.

Moisture management

Moisture conservation proved to be one of the most important management tools for stabilising canola yield under the variable climate conditions of the Swartland. In Mediterranean-type systems, where rainfall is limited and concentrated in winter, practices such as stubble retention, reduced tillage and effective weed control are crucial for sustaining soil moisture during dry spells.

These practices not only support vegetative development in drier seasons but also help reduce the impact of heat stress, particularly when warm conditions occur early in the crop's life cycle or when sowing is delayed. The long-term dataset suggests that, for the Swartland, conserving soil moisture often has a greater effect on yield stability than simply receiving more rainfall or experiencing more rain days during the season.

Looking ahead, climate projections for the Western Cape reinforce the importance of moisture management. Temperatures are expected to rise by 1 to 2°C over the next three decades, while total rainfall may decline by up to 20% in the Swartland, even though the number of rain days may remain relatively stable. These changes imply that crops will experience warmer conditions without a compensatory increase in rainfall frequency.

Canola development will accelerate as temperatures rise, potentially pushing cultivars into shorter season-length categories. This development may create opportunities for some medium- to long-duration cultivars, provided their flowering windows remain aligned with cooler periods. However, earlier and more frequent heat episodes, particularly during September, are likely to increase the risk of heat stress during flowering.

Higher atmospheric CO_2 concentrations may offer a modest advantage by improving intrinsic water-use efficiency in cool-season crops such as canola. Although this effect will not fully offset the impacts of warming or reduced rainfall, it may help maintain yields under drier conditions. Nevertheless, the combined climate projections indicate a production environment in which moisture conservation, cultivar choice, and careful management of flowering timing will become more crucial for sustaining canola productivity in the Swartland.

Conclusion

Twelve years of research clearly demonstrate that canola yield in the Swartland is influenced by the interaction of three key climate-driven factors:

- The amount and distribution of rainfall, especially during the vegetative stage and flowering.
- The timing of establishment, which determines whether the crop flowers in a favourable window.
- The avoidance of heat stress during flowering periods.

Moisture conservation emerged as an equally important buffer, helping stabilise yield in seasons marked by early heat events, delayed planting or reduced rainfall.

With informed cultivar selection, timely establishment when conditions allow, and management practices that protect soil moisture, producers can substantially reduce climatic risk. Despite increasing temperature variability and the likelihood of more frequent heat events, canola remains feasible and strategically valuable for Western Cape grain systems. The evidence shows that, with thoughtful adaptation and proactive planning, canola will continue to perform well and contribute to resilient and sustainable crop rotations under a changing climate.

We thank the Protein Research Foundation and OPDT/OAC (Oil and Protein Seeds Development Trust and Oilseeds Advisory Committee) for funding this research project. For more information and references, email Andries Le Roux at andriesleroux@sun.ac.za

NEW HOLLAND

New Holland CR Revelation combines: Ensuring the ultimate harvest

With the 2026 oilseed harvesting season approaching, the New Holland CR combine stands ready to deliver your valuable crop from field to bin. Backed by more than 50 years of technological advancement and designed for outstanding power, performance, and capacity, the CR range sets the benchmark for harvesting efficiency.

The CR6.80 (230kW), featuring 17" rotors and a $5,4m^2$ sieve area, can be equipped with headers up to 9,13m. The CR7.90 (309kW), with the same rotor dimensions and sieve area, handles headers up to 9,15m.

Good product feeding

The CR harvester's material feeder is equipped with the Dynamic Feed Roll™ (DFR), delivering a consistent flow of material to the Twin Rotor™. This optimised system reduces power demand by seven horsepower (5,2kW) while increasing capacity by up to 10%. Thanks to the straight, even flow through the TwinPitch Rotors™, the cleaning system is uniformly loaded for optimal crop and material separation.

The DFR also provides linear speed adjustment between working modules, allowing smooth processing of green or wet material. As a result, producers can begin harvesting earlier in the morning and continue later into the evening.

The TwinPitch Rotor™ effect

This system has two key advantages:

- The concave opening operates with sufficient clearance to create crop-on-crop friction action. This is gentler than traditional crop-on-concave threshing, while still ensuring efficient threshing, particularly with high-volume yields.
- Achieving the best straw quality and lowest fuel consumption depends on keeping the crop inside the harvester for the optimal amount of time. For this reason, CR harvesters feature a shorter 2,64m rotor design. When combined with the TwinPitch Rotor™ and Dynamic Flow Control™, this results in significant fuel savings.

Advanced cleaning and control

The Opti-Clean™ cleaning system ensures optimal separation of clean grain from other material. Operating within its own dedicated frame, the system remains level even when the harvester tilts by up to 17°, making it equally effective on level or uneven terrain.

The RotoThresh™ re-threshing system operates outside the main threshing area, maximising capacity across all crops. Material passing through the re-threshing process is redirected back onto the cleaning area via paddles rather than into the main rotor threshing area. This prevents overloading of the main threshing area and grain damage.

Opti-Fan™ technology compensates for the effects of gravity on crop material. When operating on level ground, the operator can select the desired fan speed, after which the system automatically adjusts the fan speed when moving up- or downhill.

The harvester's cab combines ergonomic design with simplicity. It's easy to set up and equipped with exactly what's needed to stay in control and get the job done.

All adjustments and actions required during the threshing process can be carried out quickly, with essential information clearly displayed on the Intelliview IV™ monitor. From the cab, the operator benefits from a wide, unobstructed view of material flow into the harvester.

Smart harvesting technology

New Holland's IntelliSense™ system equips the CR Revelation combines with industry-leading, proactive technology that evaluates 280 million possible actions and selects the optimal one every 20 seconds. This is made possible by an industry-first cleaning shoe load sensor, which, when paired with the next-generation Grain Cam™, allows the system to adjust instantly to the chosen strategy across all main settings.

The New Holland CR Harvesters are ready to deliver the highest quality, maximum productivity, and optimal fuel efficiency when bringing crops in from the field.

New Holland's harvesters operate efficiently, ensuring superior crop quality, maximum productivity, and smart operation in every field.

For more information, visit *www.newholland.com/za* or contact Derrick Coetzee, product marketing specialist: harvesting and hay equipment Southern Africa, at 082 524 7447.

Sunflower desiccation and *Sclerotinia*: What laboratory results may mean for disease management

By Kwanele Sabela and Lisa Rothmann, University of the Free State

Sclerotinia head rot (SHR), caused by the fungus *Sclerotinia sclerotiorum*, remains one of the most devastating threats to sunflower profitability in South Africa and can lead to complete yield loss in severe cases.

A key challenge for producers is that SHR risk is strongly linked to seasonal conditions during the flowering stage. Evidence suggests that optimally-timed sunflower plantings are often associated with lower disease risk (Mapfumo *et al*., 2024), likely because flowering does not coincide with peak periods of airborne pathogen spores, while later plantings tend to experience higher disease pressure. However, this does not imply that all late plantings will encounter conditions conducive to SHR.

Disease risk remains season-dependent and is elevated only in seasons when flowering coincides with periods favourable for infection. Although infection occurs during flowering, symptoms may not become visible until grain filling begins. At this stage, producers have limited to no preventive options available, particularly in the absence of registered fungicides for SHR in sunflower in South Africa. This lack of reactive management has driven a critical search for new, effective components to strengthen an integrated disease management (IDM) programme.

Controlled laboratory experiments

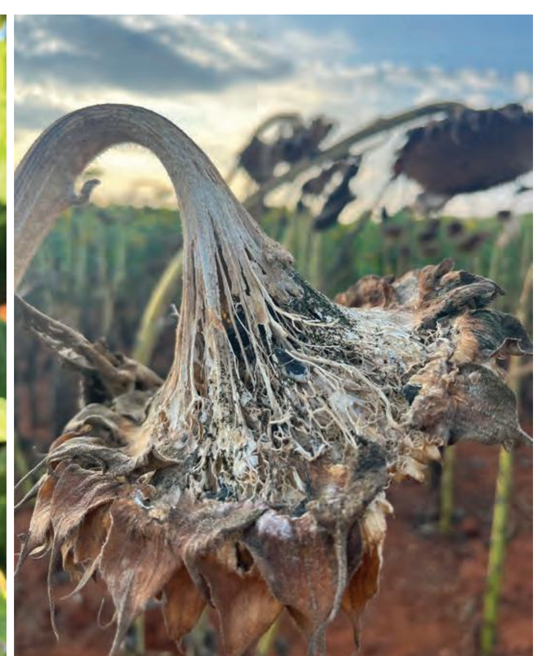
Desiccants are widely used in agronomy to accelerate the drying of crops late in the season. In sunflower production this practice ensures uniform dry-down, facilitating an easier and more timely harvest, especially when weather conditions might delay natural ripening.

This established practice led to the practical research question that formed the basis of a recent MSc research project at the University of the Free State. Given that the desiccant, diquat, is already registered for late season use, could it also possess direct antifungal properties that could be leveraged against the pathogen? This question arose from repeated discussions with producers who were frustrated by SHR outbreaks with no intervention available in sunflower. To explore whether diquat has any direct inhibitory effect on the pathogen, the first phase of this research focussed on controlled laboratory experiments.

An 'amended media' approach was used in the laboratory, in which a commercial diquat-based desiccant was incorporated into an artificial growth medium, potato dextrose agar (PDA). Concentrations were based on the manufacturer's recommended field application rate (designated as 1X), and concentrations ranging from 0,25X to 2X of the recommended rate were also included. A small amount of *S. sclerotiorum* was grown on the diquat-amended PDA, and the growth was then measured daily.

Research results

The results clearly showed that the herbicide exerted a significant, direct inhibitory effect on the fungus, with fungal growth decreasing as diquat concentration increased (*Figure 1*). To pinpoint the exact strength of this effect,



Advanced symptoms of Sclerotinia head rot in sunflower, with white fungal growth, shredded head tissue, and sclerotia embedded in strands in severe infections.

Figure 1: Reduced fungal growth of *Sclerotinia sclerotiorum* with increasing diquat concentration, shown after three and seven days under laboratory conditions.

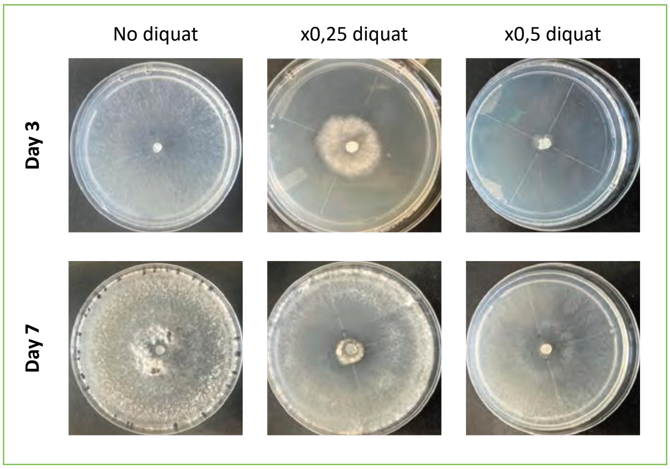
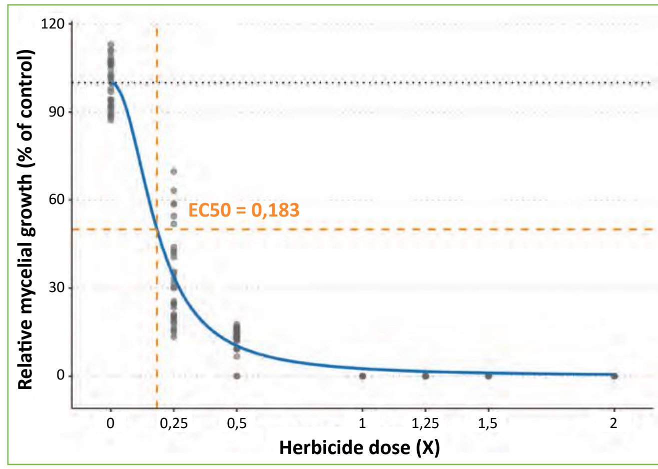


Figure 2: Laboratory response of *Sclerotinia sclerotiorum* to increasing diquat concentrations, showing the dose required to reduce fungal growth by 50%.



a statistical model was used to analyse the dose-response relationship, i.e. how fungal growth changed as diquat concentration increased.

Figure 2 summarises all the information from the dose-response tests, showing how fungal growth declined as the diquat concentration increased. By examining the shape and slope of this curve, it is possible to identify the point at which fungal growth is reduced by half, a commonly used benchmark known as the EC50. In this case, the midpoint was at 0,18X, indicating that approximately 18% of the standard field rate was sufficient to reduce mycelial growth by 50% under laboratory conditions. Lower EC50 values indicate stronger inhibitory activity, as less product is needed to achieve the same level of suppression.

Although this provides a strong scientific indication of antifungal activity, these results were generated under controlled laboratory conditions and should not be interpreted as direct field recommendations. In practice, factors such as application timing, spray coverage, and environmental conditions remain critical determinants of performance.

Field-based challenges

The laboratory findings confirm that diquat has a quantifiable, direct inhibitory effect on *S. sclerotiorum*. While promising, these results are not, on their own, a field recommendation. Translating *in vitro* potency into a reliable field strategy is a complex challenge. To address this, ongoing field-based research is evaluating several practical constraints in translating laboratory findings into field applications.

A key challenge is coverage and deposition, specifically whether a field application can successfully deliver sufficient product to the vulnerable internal tissues of the sunflower head, which are often protected by dense bracts. This challenge is closely linked to application timing, raising questions about the optimal window to limit disease progression within the sunflower head while preserving healthy, yield-bearing tissue and avoiding phytotoxicity.

Furthermore, field conditions introduce environmental factors absent in laboratory settings, and it is crucial to understand how sunlight, rainfall, and the plant's own metabolism will influence product persistence and residual activity.

Field-based research and trials

To answer these questions, ongoing research involves multi-season field trials. To date, two field seasons have been completed, with a final season planned to strengthen confidence in the findings and associated economic implications of this practice.

Field-based research on SHR is inherently challenging, as disease development is highly dependent on seasonal conditions, planting dates, and the establishment of sufficient disease. In some seasons, late plantings or limited disease pressure have constrained the ability to fully evaluate treatment effects. A third season is therefore required to verify trends observed to date and to refine application timing that achieves meaningful disease suppression without negatively affecting yield or seed quality.

Importantly, this approach is not intended as a proactive disease management strategy. Rather, it is being evaluated as a reactive intervention aimed at preserving at-risk yield in seasons where infection has already occurred. By suppressing pathogen development during the later stages of head maturation, premature desiccation may also reduce the formation of new sclerotia, thereby contributing to the longer-term management of inoculum.

Whether these potential benefits can be consistently achieved under field conditions, with appropriate application timing, and minimal to no negative effects on yield or seed quality, remains the focus of the final phase of this research. The full results from these field trials are anticipated to be finalised in the near future, at which point the findings will provide the evidence needed to assess whether premature desiccation can be integrated as a viable, reactive 'emergency' option for the South African sunflower producer's IDM toolbox.

For more information, send an email to Kwanele Sabela at sabelaks@gmail.com or Lisa Rothmann at coetzeeLA@ufs.ac.za

Combined Congress 2026:
Innovative research in oil- and protein seeds

By Pieter Swanepoel and Andries le Roux, Department of Agronomy, Stellenbosch University

Sunflower, soya bean, canola, and groundnuts form the backbone of South Africa's oilseeds industry, contributing to livestock feed, and smallholder food security. Recent advances in research on these crops were presented at this year's Combined Congress, held from 19 to 22 January at North-West University's Potchefstroom campus.

The congress brought together the soil science, crop production, and horticultural science societies of Southern Africa for their annual joint meeting, creating a national hub for agricultural innovation. By convening scientists, industry stakeholders, and policymakers, the event fostered collaboration aimed at strengthening climate resilience, improving soil health, and advancing sustainable crop production.

Soya bean

Evaluating the impact of foliar biostimulant application on soya bean cultivars across different localities by Jabulisile Gcabashe, Annelie de Beer, Jerry Dlamini, and Liesl Morey: Soya beans face multiple abiotic stresses during growth, particularly heat and erratic rainfall. This study evaluated whether a single spray of a brassinosteroid-based biostimulant (ComCat®) could improve soya bean performance in cool, moderate, and warm regions.

The biostimulant generally improved yields, but responses varied between cultivars and locations. Cool-area cultivars showed the greatest benefit. The biostimulant also elicited a greater response in cultivars with longer growth cycles in cooler regions, medium-length cultivars in moderate and warmer regions, and short-season cultivars in warm regions. These findings imply that biostimulants can enhance stress tolerance, but only when carefully matched to cultivar genetics and local conditions.

Productivity and consumption safety of crops irrigated with Witwatersrand mine water (soya bean component) by Lesego Madiseng, John Annandale, Phil Tanner, Corleen van Aswegen, and Sakhiwo Sukati: Soya beans were among the crops irrigated with treated and untreated mine water to test safety and productivity.

Soya beans were more sensitive than maize, oats or canola, especially under untreated mine water, showing reduced yields in some cases. While treated mine water is generally safe, soya beans require more cautious management and more frequent testing for accumulations of arsenic and uranium.

Optimising soya bean seeding rates in variable environments by KJ Truter, H Glas, M Delport, FH Meyer, and PA Swanepoel: Commercial producers often plant soya beans at uniform seeding rates, but natural variation within fields means this may not be optimal.

Variable-rate seeding increased profitability, particularly in fields with high spatial variability. Optimised flat seeding rates varied widely by site and season, yet still outperformed producers' usual seeding practices, demonstrating that precision agriculture can improve yield and economic returns when soya bean planting is tailored to local field conditions.

Canola

The effect of plant density on the incidence of *Sclerotinia* stem rot in canola by L Nowers, JA Strauss, and M van der Rijst: With *Sclerotinia* stem rot being a major disease, researchers tested whether adjusting plant density affects infection levels.

Across wide density ranges and multiple datasets, no significant relationship was found between plant density and disease incidence. This suggests that other factors such as microclimate, weather, and cultivar choice play a bigger role than density in the development of *Sclerotinia*.

Productivity and safety of crops irrigated with mine water (canola component) by Lesego Madiseng *et al*.: As with soya beans, canola was among the crops irrigated with mine water.

Canola was fairly tolerant of both treated and untreated mine water, showing no major yield losses across most treatments. This points to canola's potential role in water-limited areas using alternative water sources – provided that trace elements remain below critical thresholds.

From cool to warm: Climate change and regional shifts in canola phenology and leaf gas exchange by AA le Roux, SJE Midgley, PA Swanepoel, and JA Strauss: This study explored how canola responds physiologically to projected future climates with higher CO_2 levels and warmer temperatures.

While elevated CO_2 under future climates can improve growth and water-use efficiency, the tendency for earlier flowering highlights the need to breed and select cultivars suited to these changes. Regions warmer than the Swartland showed potential for increased canola growth, provided water and nutrients are not limiting. Early-maturing cultivars develop faster and can escape late-season heat and drought, making them better suited to warmer or later-planted conditions. Medium-season cultivars benefit more from elevated CO_2 in higher-potential environments, where longer growth allows greater biomass and yield to be achieved.

Canola and wheat response to tillage practices under dryland farming by MV Mabitsela, F Tshuma, J Labuschagne, and PA Swanepoel: Canola was tested under zero till, shallow-till, deep ripping, and rotational tillage systems.

Canola proved more sensitive to tillage practices than wheat, with rotational deep tillage improving yields and maintaining oil quality during seasons with high weed pressure. These gains were likely driven by temporary improvements in soil conditions, including reduced compaction and improved nutrient movement, which helped alleviate constraints associated with long-term zero- and no-tillage systems. However, researchers caution against frequent ripping, highlighting concerns around long-term soil health and farming sustainability.

Groundnuts

Symbiotic performance of four groundnut varieties under field conditions by MM Mapalakanye, RP Gununu, TY Ngmenzuma, and FD Dakora: Using natural isotope methods, researchers measured nitrogen (N) fixation and water-use efficiency across four varieties.

Varieties differed greatly, fixing between 22 and 168kg N/ha, with yields strongly influenced by rainfall. ARC K6 and PC 474 stood out for high N fixation and good water-use efficiency, making them promising for drought affected smallholder systems.

Morphological and biochemical response of Bambara groundnut to Kelpak priming by Tretty Ngobeni, Phetole Mangena, and Lucy Molatudi: While Bambara groundnut is not the same as peanut groundnut, it is an important African legume. Seaweed based seed priming was used to improve early growth.

A moderate Kelpak concentration applied for short durations boosted growth, chlorophyll, and flavonoids. This low cost technique can strengthen early establishment and resilience in an underutilised legume that complements peanut production in many regions.

Sunflower

Effects of year, planting date, and site on the yield and oil content of sunflower hybrids by Safiah Ma'ali, Liesl Morey, and William Makgoga: Sunflower production is heavily influenced by climate variability. This multi-environment trial tested how planting time and genotype interact with climate.

Sunflower yield was driven mainly by year-to-year climate variation, while oil content was largely determined by hybrid choice. Warmer and drier seasons substantially reduced seed yield and oil concentration, especially when planting was delayed to January. Planting early with insufficient soil moisture was also detrimental. Overall, selecting region-appropriate hybrids and targeting planting from mid-November to early December, when moisture allows, can help reduce heat and drought risk and maintain sunflower productivity under changing climatic conditions.

In conclusion

Across sunflower, soya bean, canola, groundnuts, and cowpea, several themes emerge:

- **Climate stress is the biggest driver of yield variation:** Sunflower and soya bean were especially sensitive to heat and erratic rainfall, while canola's response depended strongly on CO_2 levels.
- **Biological and microbial inputs are emerging as powerful tools:** From soya bean biostimulants to sunflower-beneficial bacteria and groundnut symbiotic fixation, biological approaches consistently improved stress tolerance.
- **Precision agriculture improves profitability:** Variable rate seeding in soya bean and site-specific tillage in canola demonstrate that fine-tuned management can outperform 'one-rate-fits-all' approaches.
- **Water-scarcity solutions must be crop-specific:** Canola tolerated mine-affected water better than soya bean, showing that alternative water sources require crop-by-crop evaluation.

For more information on the Combined Congress 2026, contact Pieter Swanepoel on 021 808 4668 or pieterswanepoel@sun.ac.za

JOHN DEERE

The new John Deere S7 Combine: Power and intelligence working together

The John Deere S7 Combine blends powerful performance, smart automation, and operator comfort to deliver a more productive and efficient harvest every time.

Every harvest season brings new challenges, and producers need machines that rise to the occasion with strength, efficiency, and intelligence. The new John Deere S7 Combine has been designed with exactly this in mind. It combines dependable hardware with advanced technology to deliver a harvesting experience that is more productive, comfortable and intuitive than ever before. The S7 represents the next step in harvesting innovation, offering key improvements that help producers get more out of every hour in the field.

At its core, the S7 focusses on delivering better fuel efficiency, higher productivity, and greater operator comfort. These three elements shape the machine from the inside out. John Deere has taken the rugged power producers rely on and paired it with smart technology that lightens the workload and improves results. The outcome is a combine built to perform consistently, even in changing field conditions.

The all-in-one package

One of the most significant upgrades is the new John Deere 9ℓ engine. It delivers a potent combination of power and fuel economy, giving operators the confidence to push through demanding conditions without unnecessary fuel consumption. More power means more capability, but the S7 also ensures this power is used wisely.

Productivity is further boosted through a larger 10 600ℓ grain tank and faster unloading speeds. Fewer stops for unloading mean more time spent harvesting, which can make a noticeable difference during tight weather windows. When every minute counts, the ability to remain in the field for longer becomes a real advantage.

Technology plays a major role in elevating the S7 beyond traditional combine performance. The machine is available with three technology packages, which include a range of automation and guidance tools. These tools help operators improve precision and manage long days with less stress. Experienced operators benefit from streamlined workflows, while those with less experience can achieve superior results more consistently.

Comfort has not been overlooked. The S7 cab is larger, quieter and more refined, offering the same environment found in the John Deere X9. Operators will appreciate the upgraded seat, redesigned swing ladder, brighter LED lighting, and updated primary corner display. The G5 Plus CommandCenter™ Display adds even more convenience with 35% more screen space, clearer images and faster processing. Everything is within easy reach, allowing operators to stay focussed and productive.

Smart harvesting technology

Intelligence is built directly into the S7. Ground speed automation helps maintain consistent crop feeding by automatically adjusting the ground speed based on real-time data from sensors around the combine. Harvest settings automation lets the machine optimise itself according to the operator's goals, whether the focus is on grain quality, loss reduction, or overall efficiency.

The most advanced feature is predictive ground speed automation. Using stereo cameras mounted at the front of the combine and satellite-based yield predictions from the John Deere Operations Centre, the system can anticipate variations in crop conditions before the combine reaches them. This allows the machine to increase peak feed rates by up to 20% in almost any crop environment. The result is smoother harvesting and improved performance across the field.

Grain handling has also been enhanced to help producers maximise every load. The S7 includes an adjustable spout and a cross-auger shut-off for easier, more controlled unloading. Improved loss sensing provides more accurate feedback, helping operators fine-tune performance with fewer false alerts. Straight knives with dimples ensure more even residue sizing and distribution by reducing air resistance.

With the S7 Combine, John Deere has created a machine that blends strength and intelligence to deliver a better harvesting experience. It supports operators with smart automation, powerful hardware and thoughtful design, reducing stress while improving productivity. The S7 is built for producers who expect more from every harvest, and it is ready to meet the future of farming with confidence.

For more information, contact John Deere at 011 437 2600 or visit *www.deere.africa/en/index.html*

The global drone revolution in agriculture

By Ben Belton and Evgeniya Anisimova

Agricultural drones have taken off globally at remarkable speed over the past five years. Remarkably, the agricultural drone revolution has spread from the global south to global north, reversing historical patterns of agricultural technology diffusion.

Drone diffusion is enabling technological leapfrogging, helping to equalise global inequalities in access to agricultural technology. Millions of farmers in the global south suddenly have at their disposal technological equipment with extremely sophisticated capabilities, comparable to the most state-of-the-art large machines used on farms in the global north.

Use of drones in agriculture

Drones can perform two main types of agricultural tasks. First, mechanical tasks such as sowing seeds, spreading fertilisers and feeds, spraying herbicides, pesticides, and fungicides, or airlifting loads. Second, informational tasks such as counting livestock, mapping and monitoring fields, and generating data to assess crop health and yields.

Most drones are built to do either mechanical or informational tasks, but not both together. They can't yet automatically adjust the amount of seed, fertiliser, or spray in real time based on crop or field conditions – but this technology is likely to come soon.

Today, drones are already used to apply inputs to a wide range of crops: grains such as rice, maize, and soya; industrial crops such as cotton; fruits like bananas and pineapples; and vegetables. The most widespread use of drones is for applying pesticides and other crop protectants, followed by spreading fertiliser, and then sowing seed for rice and cover crops.

Number of drones in use

We conducted online searches in multiple languages to look for information on the number of agricultural drones operational in major agricultural economies. China leads the world with an estimated 250 000 agricultural drones. Japan and South Korea have some of the highest numbers, relative to their areas of agricultural land (roughly 20 000 and 8 000, respectively). Brazil (12 000), Thailand (around 15 000), Turkey (6 000), the United States (roughly 5 500), and Vietnam (4 000) are among the fastest-growing markets. Use is also growing in countries including India, Argentina, and Ukraine.

Benefits for smallholder farmers

There is growing anecdotal, and some scientific, evidence that drones performing mechanical tasks such as spraying crops, sowing rice seeds, and broadcasting fertilisers can:

- **Improve efficiency** by reducing the amount of input needed per hectare.
- **Increase yields** by distributing seed, fertiliser, and pesticides more evenly, supporting better growth, and reducing crop damage from heavy ground-based machines.
- **Cut energy use** compared with large fossil-fuel-powered tractors.
- **Lower production costs**, contributing to higher farm profitability.
- **Save time and labour**, easing drudgery, helping older farmers remain active, making agriculture more attractive to youth, and freeing farmers to pursue other employment.
- **Improve worker safety** by reducing direct exposure to pesticides and herbicides compared with hand spraying.

This emerging evidence suggests that drones have great potential to contribute to sustainable intensification (producing more food with fewer inputs), but more systematic research is needed to test and measure these impacts on farms at a large scale.

Risks and impact

Is there a risk of drones potentially displacing the jobs of human farm workers? Yes, this risk exists for farm workers currently hired to apply inputs. However, drones are diffusing most rapidly in middle- and high-income countries where farm labour is scarce. In places with abundant labour there is much less demand, so we wouldn't expect the displacement effect to be very large.

Other risks include:

- **Increased spray drift:** Stray pesticides or herbicides are more likely to be carried on the wind to neighbouring farms or bystanders compared to conventional ground-based spraying.
- **Data security and privacy:** Who owns the information collected by drones, where is it stored, who has access to it, and how is it used?
- **Technological sovereignty:** Does the very concentrated nature of global drone manufacturing create future vulnerabilities to supply chain disruptions, and could drones be affected by cyberattacks?

Future research

Most prior research has been technical, focussing on tasks designed to support precision agriculture. However, drones are not yet widely used by producers for these purposes. At the same time, less attention has been given to using drones for mechanical tasks, although these represent most current agricultural drone applications globally.

Hence, we still know relatively little about where, how, and to what extent drones are being used in agriculture, as well as their current impacts and potential implications.

New research is needed to better understand the scale and nature of global drone adoption, identify policies that can maximise the benefits and mitigate the risks, and ensure that drones contribute meaningfully to more sustainable agricultural practices.

Read the full article on *www.ifpri.org/blog/the-global-drone-revolution-in-agriculture/*

Canola cultivar choice 2026: What and where?

By P Lombard, L Smorenburg, J Strauss, and Z Sedeman

The 2025 season clearly demonstrated the substantial impact planting date and climate conditions can have on canola production, particularly in the Swartland. The highest-yielding fields were planted immediately after favourable rainfall events in mid-April.

Overall, the Western Cape experienced a season characterised by low rainfall and a dry, warm spring. In the eastern Southern Cape, canola was harvested in several areas that received less than 100mm of rainfall from 1 May onwards. How was this possible? The early planting date proved to be the decisive factor. Available soil moisture was very favourable for the establishment and early growth of the plants. Climate extremes of this nature are nearly impossible to predict with certainty.

Despite this, the use of well-adapted cultivars remains a central requirement for long-term production success. Cultivar selection is always based on a combination of traits; no single factor should determine the decision in isolation. While certain traits may carry more weight under specific conditions, other considerations must still be taken into account.

Factors to consider

Yield potential is a key driver of cultivar choice, but within a sustainable crop-rotation system, it cannot be the only criterion. In general, triazine-tolerant (TT) cultivars yield less than conventional and Clearfield (Cl) cultivars. Combination-type cultivars with both Cl and TT tolerance (CT, TC or TTI, depending on the company) should be compared directly with TT cultivars.

Weed management strategy and the growing risk of herbicide resistance increasingly enhance the importance of using TT-type cultivars (TC, CT types) in specific systems and fields. It is important to note that where sulfonylurea herbicides were used in the previous season, residue carryover may occur after a dry summer. In such cases, planting a Cl cultivar is advisable.

Physiological development rate and the principle of 'horses for courses' apply strongly. Cultivars with longer growth cycles perform best in years and environments that remain cool and moist for longer. Faster-developing cultivars are preferred in short-season environments such as the Swartland.

Blackleg disease can cause significant yield losses if poorly managed. Cultivars should therefore be rotated after two seasons. Resistance genes, which are cultivar traits, should also be alternated to reduce selection pressure on the pathogen population.

Sclerotinia disease is widespread in the Western Cape, particularly in the Overberg and Southern Cape. Disease incidence varies significantly; however, cultivars that flower early may be exposed to higher disease pressure.

No cultivar decision is executable without seed availability. The risks associated with farm-saved seed remain too high. Average yield reductions of 15 and 16% (in 2023 and 2024, respectively) were recorded with farm-saved seed, with losses as high as 24% in some cases.

Comparison of cultivars

Across the Swartland, the conventional cultivar CC90014 exhibited the strongest and most consistent performance over

Table 1: Swartland yield as a percentage of the trial average (2023 to 2025).

	2023	2024	2025	Rank	2023-25	Rank	2024-25	Rank
Diamond	107	102	106	2	105	2	104	2
Quartz	103	105	103	3	104	3	104	3
CC90014	116	109	115	1	113	1	112	1
Conventional	109	105	108		107		107	
44Y94	108	108	110	1	109	2	109	1
45Y95	113	109	97	6	106	4	103	4
PY421C Cl	115	110	107	3	111	1	108	2
Solstice Cl	109	106	107	2	107	3	107	3
Ceres Cl	107	99	93	7	100	5	96	7
Continuum Cl		107	100	5			103	4
Equinox Cl		99	102	4			100	6
Cl-group	110	105	102		106		104	
Blazer TT	91	92	92	6	92	4	92	5
HyTTec Trophy	96	89	98	2	94	2	93	3
HyTTec Trifecta	97	91	95	5	94	3	93	4
PY429TT		88	102	1			95	2
PY432TT			90	8				
Defender CT	93	87	91	7	90	5	89	6
PY520 TC	97	95	96	3	96	1	96	1
Griffon TTI			96	4				
TT-group	94	92	95		94		93	

Table 2: Swartland yield for 2025 (kg/ha^{-1}).

	Langgewens 1		Langgewens 2		Philadelphia		Malmesbury		Hopefield		Eendekuil		Swartland	
	9 May		21 May		14 May		14 May		15 May		13 May			
Diamond	3 215	bcde	2 747	abc	2 615	bcdefg	2 979	abc	2 414	def	2 392	a	2 726	bcd
Quartz	3 297	bcd	2 614	bcde	2 375	efgh	3 074	a	2 360	def	2 106	bc	2 638	cde
CC90014	3 748	a	2 852	ab	2 928	abc	3 033	ab	3 125	a	2 055	bcd	2 957	a
Conv group	3 420		2 737		2 639		3 029		2 633		2 184		2 773	
44Y94	3 408	abc	2 941	a	3 002	ab	2 761	abcde	2 665	bcd	2 186	ab	2 827	ab
45Y95	2 623	f	2 297	fg	3 066	a	2 685	abcde	2 180	efg	1 998	bcde	2 485	fghij
PY421C Cl	3 730	a	2 612	bcde	2 588	cdefg	2 947	abcd	2 483	cdef	2 092	bc	2 742	bcd
Solstice Cl	3 445	abc	2 678	bcd	2 857	abcd	2 618	cdef	2 971	ab	1 938	bcde	2 751	bc
Ceres Cl	2 996	def	2 330	fg	2 317	fgh	2 200	g	2 502	cde	1 959	bcde	2 384	ijkl
Continuum Cl	2 893	ef	2 383	efg	2 743	abcde	2 578	defg	2 665	bcd	2 106	bc	2 555	efgh
Equinox Cl	3 554	ab	2 218	g	2 525	defgh	2 923	abcd	2 351	def	2 072	bcd	2 607	def
Cl group	3 236		2 494		2 728		2 673		2 545		2 050		2 622	
Blazer TT	2 937	def	2 417	efg	2 343	fgh	2 480	efg	2 277	defg	1 746	ef	2 367	jkl
HyTTec Trophy	3 097	cde	2 302	fg	2 240	gh	2 934	abvd	2 858	abc	1 818	def	2 509	efghi
HyTTec Trifecta	2 903	def	2 242	g	2 673	bcdef	2 892	abcd	2 082	fg	1 779	ef	2 428	hijkl
PY429TT	3 248	bcde	2 545	cdef	2 690	abcdef	2 971	abcd	2 522	cde	1 884	cde	2 603	defg
PY432T	3 118	cde	2 442	defg	2 177	h	2 623	cdef	1 912	g	1 615	f	2 315	l
Defender CT	2 888	ef	2 354	fg	2 421	efgh	2 255	fg	2 324	def	1 741	ef	2 331	kl
PY520 TC	2 916	def	2 371	efg	2 746	abcde	2 400	efg	2 453	cdef	1 897	cde	2 464	ghijk
Griffon TTI	3 098	cde	2 378	efg	2 343	fgh	2 649	bcdef	2 381	def	1 892	cde	2 457	hijk
TT group	3 026		2 381		2 454		2 651		2 351		1 796		2 434	
Average	3 173		2 484		2 592		2 722		2 474		1 960		2 564	
lsd	399,91		249		390,62		398,12		408		265,48		141,32	
cv	7,38		5,87		8,96		8,81		9,81		8,16		8,3	

** Cultivars with the same letter did not differ significantly from each other.*

the past two seasons, producing yields 12% above the trial mean (*Table 1*). The conventional cultivars Diamond and Quartz also performed stably, each averaging +4% relative to the trial mean in both 2024 and 2025.

The Cl cultivar 44Y94 recorded the highest yield within this group, achieving +9%, followed closely by PY421 Cl (+8%) and Solstice Cl (+8%), indicating strong adaptation and favourable phenotype stability under Swartland conditions. Among the TT-based cultivars, PY520 TC was the best performer, yielding 4% below the trial mean, followed by PY429 TT. HyTTec Trophy and HyTTec Trifecta ranked third and fourth, respectively, within the TT group.

In the Southern Cape, CC90014 again ranked as the top performer across two seasons, yielding +6% relative to the trial mean (*Table 1*). Diamond achieved +5% and Quartz exceeded the trial mean by more than 4%. PY421 Cl was the leading Cl performer, delivering a +19% yield advantage relative to the trial mean. The cultivars 44Y94 and 45Y95 also performed strongly, with yields +13 and +10% above the mean, respectively. For TT-type cultivars, PY429 TT was the highest-ranking entry, averaging 3% below the trial mean. HyTTec Trophy and PY520 TC followed in second and third place, with yields of -6 and -7% relative to the trial mean.

Season overview

The 2025 season at Langgewens (Swartland) was characterised by a dry period towards the end of the growing season. Total rainfall was 55mm below the long-term average, with August and September receiving 34,8mm less than the historical average. The only notable rainfall in September occurred on the 15th, when 12mm was recorded. Total rainfall during the 2025 growing season was 242mm.

Average temperatures were slightly lower than the long-term average. However, August and September – critical months for flowering and seed fill – were 0,2°C warmer than normal. The maximum temperatures exceeded 28°C on only two occasions (temperatures that negatively affect seed development).

Many producers were able to plant immediately following rainfall on 8 April, which positively influenced yield. As a result, the Swartland achieved an above-average canola harvest.

At Tygerhoek in the Southern Cape, total rainfall during the 2025 season was 101mm below the long-term average

of 313mm, compared with 86mm above the mean in 2024. April received 60,4mm which is favourable for early establishment, while May's rainfall was 11mm below the long-term average. The main challenge occurred in August and September, when only 15,9mm were recorded, compared to the long-term average of 83,8mm. Rainfall in the eastern production areas (Albertinia) was even lower, placing canola yields under considerable stress and resulting in harvests below the long-term average.

Temperatures at Tygerhoek were initially close to the long-term mean. However, during August and September, maximum temperatures were 1,7°C higher than the historical average. During this period, ten days exceeded 28°C, a temperature range detrimental to canola.

Yield results

Yield data for the Swartland is summarised in *Table 2*. CI and TT cultivars are presented separately from conventional cultivars. Combination cultivars (CT and TC) are included within the TT group.

Average yields in the Swartland ranged from 1 796kg/ha^{-1} (Eendekuil) to 3 026kg/ha^{-1} (Langgewens, first planting date). Most trials germinated shortly after planting. The conventional cultivar CC90014 produced the highest mean yield (2 957kg/ha^{-1}), followed by Diamond (2 726kg/ha^{-1}) and Quartz (2 638kg/ha^{-1}). CC90014 was statistically higher than Diamond and Quartz.

The cultivar 44Y94 CI (2 827kg/ha^{-1}) recorded the highest yield, followed by Solstice CI and PY421 CI. These three did not differ significantly from each other. The 2025 season ended very dry, negatively affecting cultivars such as 45Y95, which are usually favoured in longer, wetter seasons. In Philadelphia, where moisture and temperatures remained favourable for longer, 45Y95 was the highest-yielding cultivar.

Within the TT group (including CT, TC, and TTI cultivars), PY429TT (2 603kg/ha^{-1}), HyTTec Trophy (2 509kg/ha^{-1}), and PY520CT (2 464kg/ha^{-1}) were the top performers, without significant differences among them. The average yield of TT cultivars was 7,3 and 13,2% lower than that of CI and conventional cultivars, respectively.

Table 3: Southern Cape yield for 2025 (kg/ha^{-1}).

	Tygerhoek 1		Klipdale		Roodebloem		Southern Cape	
	19 April		15 April		8 May			
Diamond	3 027	b	3 111	cdef	2 806	a	2 981	bc
Quartz	2 860	bcd	3 236	bcde	2 393	bcd	2 830	c
CC90014	2 637	cde	3 463	b	2 484	abc	2 861	bc
Conv group	2 841		3 270		2 561		2 891	
44Y94	2 571	de	3 788	a	2 776	a	3 045	b
45Y95	2 396	efg	3 929	a	2 641	ab	2 989	bc
PY421 CI	3 582	a	3 935	a	2 732	ab	3 416	a
Solstice CI	2 604	cde	3 167	cdef	2 086	d	2 619	de
Ceres CI	2 184	fg	3 016	cdefg	2 481	abc	2 560	e
Continuum CI	2 967	bc	3 257	bcd	2 490	abc	2 905	bc
Equinox CI	2 606	cde	3 003	defg	2 200	cd	2 602	e
CI group	2 753		3 478		2 528		2 920	
Blazer TT	2 190	fg	2 947	efg	2 153	cd	2 460	e
HyTTec Trophy	2 550	def	2 764	g	2 097	d	2 470	e
HyTTec Trifecta	2 342	efg	3 066	cdef	2 083	d	2 497	e
PY429TT	2 605	cde	3 101	cdef	2 694	ab	2 800	cd
PY432T	2 498	defg	2 457	h	2 471	abc	2 475	e
Defender CT	2 137	g	3 125	cdef	2 121	cd	2 504	e
PY520 TC	2 470	efg	3 307	bc	1 568	e	2 448	e
Griffon TTI	2 397	efg	2 940	fg	2 222	cd	2 519	e
TT group	2 399		2 963		2 176		2 522	
Average	2 590		3 201		2 361		2 721	
lsd	373,9		290,9		370,8		194,6	
cv	8,6		5,5		9,3		7,6	

**Cultivars with the same letter did not differ significantly from each other.*

Trial averages in the Southern Cape were highest at Klipdale, with 2 963kg/ha^{-1}, followed by Tygerhoek at 2 399kg/ha^{-1}. The overall 2025 trial mean was 2 521,8kg/ha^{-1}, lower than in previous years: it was 3 274kg/ha^{-1} in 2024 and 3 204kg/ha^{-1} in 2023 (*Table 3*). The conventional cultivar Diamond achieved the highest yield (2 981kg/ha^{-1}), followed by CC90014 (2 861kg/ha^{-1}) and Quartz, with no statistically significant differences among them.

Within the CI group, PY421 CI (3 416kg/ha^{-1}) led, followed by 44Y94 CI (3 045kg/ha^{-1}), 45Y95 (2 989kg/ha^{-1}), Continuum CI, and Equinox CI (2 905kg/ha^{-1}). Their yield was significantly lower than that of PY421 CI.

In the TT group, PY429TT (2 800kg/ha^{-1}) significantly outperformed all other TT, TC, CT, and TTI cultivars. The remaining TT cultivars showed no significant differences. Average TT yields were 13,6 and 13% lower than that of conventional and CI cultivars, respectively.

Conclusion

Growing season length is a critical factor in the Western Cape, given the generally short seasons. Longer seasons benefit long-duration cultivars, as observed in previous years, while the dry 2025 season favoured faster-developing cultivars. Yield stability across seasons and locations remains essential in making cultivar decisions. Both planting date and seasonal conditions influence flowering dates, but cultivars generally maintain their relative position for time to flowering when compared with others.

For more information, send an email to piet.lombard@westerncape.gov.za

Management of soya bean greening and its implications for kernel quality

By Stephano Haarhoff and Pieter Swanepoel, Department of Agronomy, Stellenbosch University

Soya bean is a cornerstone oilseed for feed, food, and industry globally. In South Africa, soya bean forms part of the crop rotation system with maize, which is grown as the primary crop in the western and eastern production regions. As production areas expand and growing season conditions become more variable, maintaining yield and seed quality has become more challenging for producers.

One notable quality defect is soya bean greening, in which mature seeds remain visibly green because the chlorophyll breakdown during maturation is ineffective. Green seeds can cause cloudy, off-coloured oil that is more costly to refine, reduce the end-use value of full-fat products, and impair seed lot performance during storage and planting.

Greening is not a problem with a single cause. It emerges from the interaction of three main elements:

- **Genetics:** Cultivars differ in how robustly they switch on the enzymes that dismantle chlorophyll under stress conditions.
- **Environment:** Terminal drought, hot and windy finishes at the end of the season, sudden cold snaps, and uneven rainfall during late seed filling can disrupt the normal sequence of chlorophyll breakdown.
- **Agronomy:** Plant density, planting date, irrigation, disease and weed control, desiccant timing, and harvest date can either expose the crop to stress at sensitive stages or buffer it.

A recent article we've written, published in *Agronomy Journal*, focusses on usable field-level strategies while providing sufficient biological background to understand why the agronomic practices work.

Genetic factors

Chlorophyll is normally broken down late during seed development through a set of enzymes that convert it into colourless molecules. Cultivars vary in how strongly and consistently these enzymes are expressed, especially under stress. In practice, that means some cultivars 'de-green' reliably even when seasons finish hot and dry, while others retain their green pigment. Hot, dry conditions late in the season are a common occurrence in South Africa, especially in the western production region.

Two practical takeaways for genetics are to treat 'tolerant' as stress tolerant rather than stress proof, as even low-risk lines can show greening after severe heat, drought, or premature desiccation; and to select cultivars by region and maturity group so that the most vulnerable period during maturation (R5 to R8) avoids the harshest local heat and rainfall conditions.

Genetics can reduce baseline risk, but agronomy determines exposure. The rest of this article emphasises the practices that limit stress at different times during the growing season.

Environmental factors

Late-season weather conditions are the main driver of greening. The pattern is consistent across regions: When seed filling transitions to maturation (approximately R5 to R8), stress that accelerates dry-down or disrupts the plant's metabolism can halt chlorophyll breakdown mid-stream. Typical scenarios include:

- **Heat plus drought near R6 to R8:** Rapid water loss and high temperatures inactivate enzymes before they complete chlorophyll breakdown.
- **Sudden cold or unseasonal low temperatures around R7:** Chilling can slow or suspend the degradation steps, leaving green pigment residues.
- **Waterlogging surges:** Temporary flooding can create oxidative stress that destabilises chlorophyll protein molecules.
- **Prolonged low light near R6:** Reduces photosynthate supply and delays physiological maturation, increasing the chance of incomplete de-greening in the kernels.

These dynamics are reflected in the stage-based environmental summary (*Table 1*).

Agronomic factors

Agronomy is the most actionable option for producers to reduce greening where problems persist. The objective is to avoid or blunt stress during R4 to R8 and to harvest at the right time. The following points translate physiology into management:

Planting date and maturity matching

Aim for R5 to R7 to occur in a period that historically has fewer heat spikes, less wind-driven desiccation, and more dependable soil moisture levels. Avoid planting so late that seed filling collides with typical terminal droughts or heat bursts, or even frost in colder areas.

Seeding rate and canopy structure

Moderate to higher plant densities buffer soil evaporation and reduce heat load at the pod zone in high rainfall regions,

Table 1: Environmental stress conditions and their physiological implications for increased green seed risk in soya bean across reproductive growth stages.

Growth stage	Environmental factor	Physiological implication
V3 to V8	Drought or heat stress	Poor photosynthesis, reduced chloroplast development and chlorophyll building, altered hormonal balances. Impaired root development alters the transport of hormones.
	Waterlogging	Hypoxia in root zone reduces nutrient uptake, increases hormonal production, and promotes stay-green traits.
	Poor nutrient availability	Impairs photosynthesis and chlorophyll production and retention during senescence.
	Cold stress	Delays vegetative growth and chloroplast formation, affecting chlorophyll breakdown later.
R5	Drought or heat stress	Reduces assimilate translocation and triggers early senescence. Impairs chlorophyll breakdown initiation.
R5 to R6	Low temperatures	Reduce enzyme activity for chlorophyll breakdown.
R6	Prolonged cloud cover or low light	Decreased photosynthate accumulation delays maturing and impairs de-greening.
R6 to R7	Waterlogging	Promotes ethylene production and oxidative stress, which may destabilise chlorophyll-protein molecules and disrupt breakdown.
	Heat stress and drought	Disrupt hormone building and balances, reducing expression of chlorophyll breakdown genes.
R7	Sudden low temperatures	Delay general molecule and chlorophyll breakdown, especially when seeds dry too quickly, and enzymes are inactivated before completing breakdown.
R5 to R8	Nutrient deficiencies (N and Mg)	Impair chlorophyll molecule building and remobilisation disrupts turnover balance, potentially leading to retention during senescence.
R7 to R8	Termination due to high heat and wind	Rapid drying halts enzymatic activity prematurely; chlorophyll remains in kernels.
	High oxidative stress species	Damages breakdown enzymes, trapping chlorophyll within seeds.

lowering late season stress. Very low densities often exacerbate greening in hot, dry finishes due to exposed soil and higher canopy temperatures, so adjust density by soil type and rainfall outlook.

Water management

In irrigated systems, prioritise steady soil moisture through the R6 and R7 growth stages. Small, timely irrigations are more protective than one large watering event. In rainfed systems, manage for water conservation: retain residue, minimise unnecessary tillage, build soil organic matter levels, and use rotation or cover crops to improve infiltration and water-holding capacity over the long term.

Where compaction or perched water leads to timely waterlogged conditions, use once-off strategic tillage before planting or improved drainage to avoid stress swings.

Disease, weeds, and pests

Stress from heavy rust infestations, defoliators, or weed competition can desynchronise development and delay or disrupt chlorophyll breakdown. Keep early-season competition low and protect leaf area through mid-reproductive stages.

Nutrients

Balanced macro- and micronutrition is necessary to support steady photosynthesis and transport during R5 to R7. Pay attention to magnesium (Mg) and potassium (K) for chlorophyll stability and translocation. Effective *Rhizobium* inoculation supports nitrogen (N) supply without late spikes in vegetative growth.

Harvest timing

Premature harvest catches seeds before de-greening is complete, while an over-delayed harvest after a harsh finish can trap green pigments and raise shattering or weathering risks.

Table 2 summarises the agronomic choices that are important considerations across the season.

Seed quality and post-harvest

Residual chlorophyll darkens crude oil, increasing refining costs and reducing shelf life for the end-user. While overall oil percentage may not always change drastically, oil stability and clarity do. In meal, green seeds are often slightly lower in protein and can show changes in amino acid balance, which matters for feed formulation.

Lots with notable green seed percentages tend to show lower germination rates, weaker seedling vigour, and more rapid viability loss during storage. Green seeds often have softer seed coats or wrinkled cotyledons that imbibe water unevenly, extending the lag phase during germination and increasing susceptibility to pathogens.

The way seeds are dried and stored can either allow enzyme-driven de-greening to continue or 'freeze' pigments in place. Moderate, slower drying (around ambient to mid-20°C) allows residual enzyme activity to continue degrading chlorophyll and reduces the formation of additional molecules that are hard to remove, whereas high-temperature drying (≥40°C) can inactivate enzymes, lock in green colour, and increase free fatty acids.

Seeds harvested too early (e.g., R6 to early R7) will contain more chlorophyll. If early harvest is unavoidable due to weather or logistics, favour cooler, slower drying to permit continued pigment breakdown.

Cooler, drier storage (e.g., ≤13% seed moisture, low relative humidity, and low temperature) slows oxidative damage and preserves germination in the next planting season. Over time, some residual chlorophyll can still decline in storage,

Table 2: Stage-based agronomic framework outlining themes, practices, and descriptions to minimise late-season chlorophyll retention and soya bean greening in production systems.

Growth stage	Agronomic theme	Agronomic practice	Description
Pre-planting	Cultivar type	Cultivar selection	Use cultivars with documented tolerance to chlorophyll retention under heat or drought stress.
			Use cultivars varying in growth period and susceptibility based on regional conditions.
	Soil fertility and pH	Organic and inorganic fertilisers	Ensure optimal soil nutrient levels (phosphorus, K, Mg, and iron) to support uniform crop growth and stress resilience.
		Agricultural lime and gypsum	Alleviate acidic conditions and low calcium or Mg levels.
		Seed treatments and foliar feeds	Provide plant-available micro-elements.
		Seed inoculant	Promote *Rhizobium* colonisation for adequate N supply.
	Effective rooting depth	Soil tillage	Alleviate compacted soil layers to allow optimal root growth and resource utilisation.
		Reduced tillage	Lowers organic matter content losses and soil erosion in soils not prone to compaction, thereby promoting optimal root growth.
	Soil biological status	Diverse crop rotation system (e.g., cover crops)	Promote microbial diversity and activity for advanced nutrient cycling, disease management, and root development.
		Microbial inoculants	
	Planting date	Optimise planting window for region and cultivar type	Align planting timing to avoid seed filling/ maturation during historically high stress periods of poor rainfall and high temperatures.
			Avoid late planting to limit frost damage.
	Soil water management	Once-off tillage	Avoid waterlogging in compacted soils.
		High crop residue load	Promote soil water holding capacity in rainfall-limited regions.
		Irrigation	Avoid stress conditions during reproductive growth stages.
VE to V2	Uniform stand establishment	Effective planting equipment	Optimise seed rate, planting depth, and fertiliser placement to promote even development and maturity.
V2 to V6	Weed and pest control	Herbicides and pesticides High crop residue load Diverse crop rotation system	Early-season weed and pest pressure stress plants and delay development, prompting uneven maturity.
R1 to R3	Water management	Irrigation	Avoid water-deficit conditions and waterlogging.
	Disease management	Effective fungicide applications Diverse crop rotation systems	Avoid fungal infestations causing stress conditions and uneven/premature reproductive development.
	Nutrient deficiencies	Foliar nutrition	Apply key nutrients related to photosynthetic stability and nutrient translocation if deficient (Mg and K).
R4 to R6	Water management	Irrigation	Avoid water-deficit conditions and waterlogging.
		Crop residue cover Increased soil organic matter content	Promote soil water holding capacity to lower effect of prolonged droughts late in the season.
R7 to R8	Timely harvest	Harvest at optimal seed moisture level and window	Premature harvesting may disrupt normal maturation process.
			Avoid delayed harvest especially following stress conditions late in the growing season.

but this should not be relied upon as a primary mitigation strategy.

Conclusion

Soya bean greening is a late-season quality disorder with a significant economic impact on producers and the wider agricultural industry. It occurs when the normal chlorophyll breakdown pathway is interrupted by stress, often during R5 to R8. Cultivars differ in susceptibility, but environmental conditions and management practices determine exposure.

The most effective approach is integrated and stage-aware:

- **Genetics:** Choose region-fit cultivars with a track record of low greening under stress, while recognising that no cultivar is immune.
- **Agronomy:** Plan planting windows so that R5 to R7 avoid the harshest conditions; use plant densities that moderate canopy microclimate; conserve soil moisture; manage diseases, pests, and weeds to protect leaf area; and time desiccants and harvest correctly.
- **Post-harvest:** Prefer cooler, slower drying and cool, dry storage to permit ongoing pigment breakdown and preserve vigour.

Although green seeds have only appeared in certain seasons in South Africa and are not expected to be a problem every year, the issue can recur when conditions are unfavourable. With increasing climate variability, maintaining resilience requires a systems approach: pairing stress-tolerant cultivars with agronomic practices that reduce late-season stress, and post-harvest handling that protects seed quality.

Consistent field monitoring from R4 onwards, combined with well-timed harvest and careful drying, remains the most effective way to limit green seed levels and the financial losses they can cause.

The authors gratefully acknowledge the support provided by the Oilseeds Advisory Committee (OAC) and the Oilseeds Production Development Trust (OPDT), which made this research possible. For more information, send an email to pieterswanepoel@sun.ac.za


BREAKING NEW GROUND IN SOYBEAN TECHNOLOGY
The revolution in soybean technology is here!
INTACTA RR2 PRO®
INTACTA RR2 PRO® technology offers the following key benefits:
The INTACTA RR2 PRO® technology offers three key benefits in a single product. This new trait combination represents a significant milestone for South African farmers and showcases the next wave of innovation in soybean at Bayer. The introduction of INTACTA RR2 PRO® brings a new choice in insect control and convenience to farmers increasing productivity, efficiency and value leading to yields of higher quality and quantity.
PROTECT
Protect against serious feeding damage caused by African bollworm.
IMPROVE
Improved glyphosate tolerance provided by Roundup Ready 2 (RR2)® technology.
MAXIMISE
Increased yield potential through repositioned herbicide tolerant trait on the soybean DNA.
Bayer (Pty) Ltd. Reg. No. 1968/011192/07.
Collaboration Hub, First Floor, Waterfall Circle,
9 Country Estate Drive, Waterfall City, Midrand, 2090.
INTACTA RR2 PRO® is a licensed product of Bayer AG.
A39314/OF

Plant breeders' rights and producers: Impact of the new *Act*

By Miekie Human, Welile Dlamini, and Kobus van Huyssteen, Sansor

Intellectual property (IP), defined as creations of the mind, is part of our everyday lives. Our mobile phones are protected by various forms of IP, just as trademarks such as John Deere are legally protected IPs. Books, and articles published in agricultural magazines and newspapers, are also considered IP and are protected by copyright because they originate from an individual's creativity. This means, for example, that a journalist may not translate a colleague's article and call it their own. In the same way, Harry Potter will always be attributed to JK Rowling, even if it is in Russian.

Breeding is a resource-intensive process spanning, on average, ten to 15 years for grain crops, with costs to produce a variety running into the millions.

Research conducted by AgbioInvestor on behalf of CropLife International found that, based on data from Bayer Crop Science, Corteva Agriscience, Syngenta, and BASF Agricultural Solutions, the cost of commercialising a new plant biotechnology-derived genetic trait was US$115 million, with a mean development period of 16,5 years.

Global alignment in IP protection

Countries around the world recognise the need to encourage the development of new plant varieties for the benefit of society. Protecting the IP of plant breeders incentivises innovation and unlocks the benefits of new plant varieties for producers and, ultimately, consumers.

The International Union for the Protection of New Varieties of Plants (UPOV), an intergovernmental organisation established in 1961, sets forth global guidelines to assist countries in drafting legislation. A total of 80 countries, including South Africa, are signatories to this convention. Two legal frameworks have been published under the UPOV convention, the first in 1978 and the second in 1991.

Breeders' rights in South Africa

The *Plant Breeders' Rights Act, 2018 (Act 12 of 2018) (PBR)* came into effect on 1 June 2025 following the publication of the associated regulations. This *Act* replaces the *PBR Act, 1976 (Act 15 of 1976)*, which was aligned with UPOV 1978. Key provisions of the *PBR* Regulations, as published in 2025, are presented in *Table 1*.

Table 1: Overview of the key provisions of the *PBR* Regulations of 2025.

Administrative procedures	• Updated and streamlined. • Time limits are placed on the provision of plant material for tests. • Timelines for submission of original documents are clearly specified. • All genera of plants can now be protected, if they comply with the criteria of being novel, distinct, uniform, and stable. • The *Act* makes provision for the establishment of a PBR advisory committee.
Provisional protection	• Automatically granted.
Duration of protection	• 30 years for fruit trees, vines, sugar cane, and potatoes. • 25 years for all other crops.
Exceptions to PBR	• Producers who may use protected varieties are categorised. • Conditions for farm-saved seed have been introduced. • Prescribed maximum quantities of farm-saved seed are set out. • Exempted crops are limited to conventional (non-GMO) crops.
PBR infringements	• Now a criminal offence, and offenders are liable for a fine and/or imprisonment.

Farm-saved seed

Producers who may use protected varieties are categorised. The regulations associated with the *PBR Act* of 2018 define the following categories:

Household producer (vulnerable): A producer who primarily produces for household consumption and has limited resources and skills to operate a market-oriented production system. This includes child-headed households and households producing on communal land or commonages that are registered as indigents, or that meet the criteria for registration as indigents with their municipality.

Household producer (subsistence): A producer who primarily produces for household consumption, is not and would not be classified as indigent by their municipality, and may market limited surplus production (annual turnover of less than R50 000).

Smallholder producer: A producer or entity that operates at the primary, secondary, or tertiary level, producing for household consumption and the market.

Farming is consciously undertaken to meet household needs and generating income. These are usually new entrants aspiring to produce for the market at a profit, with an annual turnover ranging from R50 001 to R1 million.

Medium-scale commercial: An individual or entity that produces and sells agricultural commodities for the purpose of making a profit. These are established, profit-driven enterprises producing for the market (annual turnover of R1 000 001 to R10 million) that are eligible for VAT registration. They require water use licence authorisation in terms of the relevant national legislation.

Large-scale commercial: An individual or entity that produces and sells agricultural commodities for the purpose of making a profit. These are established enterprises producing for the market (annual turnover between R1 000 001 and R10 million). They are eligible for VAT registration and require water use licence authorisation in terms of the relevant national legislation.

Mega/corporate producer: An individual or entity that produces and sells agricultural commodities for the purpose of making a profit. These are established, profit-driven enterprises producing for the market (annual turnover exceeding R50 million). They are eligible for VAT registration and require water use licence authorisation in terms of the relevant national legislation.

Exceptions to PBR are specific to producer categories

- **Vulnerable and subsistence household producers:** May save on their own holding or exchange seed of protected varieties (*Table 2*) with other household producers for propagating purposes.
- **Smallholder producers:** May save seed of protected varieties (*Table 2*) on their own holding for propagating purposes.

A plant breeder's right shall not be infringed in the following cases:

Producers within limits of prescribed maximum quantities for farm-saved seed.

- *Royalties*: Exempt for listed crops (*Table 2*) within limits specified.
- *Notification*: Not required for small quantities (less than specified in *Table 2*).
- *Labelling*: Must preserve identity of variety.
- *Restriction*: Use limited to own holding.

Producers exceeding limits of prescribed maximum quantities for farm-saved seed of which the material was obtained legitimately.

- *Royalties*: Producers must pay the breeder or holder of PBR a reasonable remuneration upon agreement in a written licence agreement.
- *Notification*: Written notice to the breeder or holder of PBR required, indicating the volumes of saved seed.
- *Labelling*: Maintain clear identification of variety and producer.
- *Restriction*: Use limited to own holding.

The *PBR* Regulations of 2025 state the prescribed maximum amounts of seed of protected varieties that may be held back, and for maize and soya bean it is clearly stipulated that genetically

Table 2: Prescribed maximum quantities of farm-saved seed.

Categories of plants	Maximum seed produced/year/ protected variety
Category A: Agricultural and vegetable crops	
***Allium cepa* L (onion)**	100g
***Arachis hypogea* L (groundnut)**	50kg
***Avena sativa* L (oats)**	50Kg
***Brassica oleracea* L *convar. capitata* (L) Alef. (cabbage)**	1kg
***Citrullus lanatus* (Thunb.) Matsum. and Nakai (watermelon)**	150g
***Colocasia esculenta* (L) Schott (taro, amadumbe)**	50 000 tubers
***Cucumis melo* L (sweet melon)**	100g
***Cucurbita maxima Duchesne* (pumpkin)**	100g
***Cucurbita moschata Duchesne* (squash, butternut)**	100g
***Cucurbita pepo* L (squash, zucchini, vegetable marrow)**	100g
***Eleusine corocana* (L) Gaertn. (finger millet)**	10kg
***Glycine max* (L) Merr. (conventional soya bean)**	40kg
***Helianthus annuus* L (sunflower)**	3kg
***Ipomoea batatas* (L) Lam (sweet potato)**	25 000 tubers
***Lagenaria siceraria* (Molina) Standl. (calabash)**	100g
***Manihot esculenta Crantz* (cassava)**	25 000 tubers
***Pennisetum glaucum* (L) R.BR. (pearl millet)**	15kg
***Phaseolus vulgaris* L (garden bean)**	15kg
***Solanum lycopersicum* L (tomato)**	100g
***Solanum tuberosum* L (potato)**	25 000 tubers
***Sorghum bicolor* (L) Moench subsp. *bicolor* (sorghum)**	20kg
***Triticum aestivum* L subsp. *aestivum* (wheat)**	25kg
***Triticum turgidum* L subsp, *durum* (Desf.) van Slageren (durum wheat)**	25kg
***Vigna radiata* (L) Wilczek (mung bean)**	25kg
***Vigna subterranea* (L) Verdc. (jungo beans)**	25kg
***Vigna unguiculata* L Walp. (cowpea)**	25kg
***Zea Mays* L (conventional white and yellow maize)**	12kg
***Zea mays* L var. saccharata (Sturtev.) L.H. Bailey (sweet corn)**	1kg
Category B: Fruit crops	
All species as reflected in the *PBR* Register maintained in terms of section 4 of the *Act*	Five per kind

modified crops are excluded. In terms of genetically modified organism (GMO) crops, licensing agreements between the producer planting the seed and the company selling the seed determine if and how seed may be saved for replanting, and are based on the conditions for approval as communicated by the GMO Registrar.

What *PBR* holders should know

Review your documents such as agreements and delivery notes and update all to ensure alignment with the current *PBR* Regulations. All documents and PBR information are available from the SA PBR office. Assess the differences between licensing agreements and sales, and weigh the benefits of both.

What producers should know

Exceptions to PBR have been restricted, and a producer with an annual turnover of more than R1 000 000 needs permission from the PBR holder to save seed and must comply with obligations as stated in the regulations.

Buying, selling, trading and advertising farm-saved seed of protected varieties is now a criminal offence, and not only a civil matter as per the previous *PBR Act* (1976). Other PBR infringements can also be pursued in criminal courts, and infringers may be liable for a fine or imprisonment.

What the industry should know

PBR protection extends to harvested material from unauthorised use. Industry role-players handling illegal harvests may be held liable for aiding and abetting PBR infringements. Companies selling services (e.g., conditioning for purposes of propagation) or products (e.g., seed treatments) to prepare farm-saved seed for planting also carry a responsibility for ensuring that the obligations put on the producer, as per the regulations, have been met.

Breeding and technology levy

In South Africa, the *Marketing of Agricultural Products Act, 1996 (Act 47 of 1996) (MAP)* provides for the application of a statutory levy. Since 2016, the breeding and technology levy has been in place for specific self-pollinating grain crops, i.e. wheat, soya bean, barley, oats, and lupin cultivars. The purpose of the breeding and technology levy is to support ongoing innovation in plant breeding and technology development of the previously mentioned crops for the South African market.

The purpose of the *PBR Act* is to provide a system for the protection of new plant varieties. Therefore, the *PBR* and *MAP Acts* are considered in parallel, and not one replacing the other, when remuneration is concerned.

The PBR holder has the right to determine the value of their product and whether reasonable remuneration is being received.

Send an email to Miekie Human at policy@sansor.co.za for more information.

Promising new-generation soya bean cultivars

By AS de Beer, L Bronkhorst, J Gcabashe, and N Cochrane

In the 2024/25 trials, 28% of the cultivars were new-generation varieties with the new Intacta RR2 PRO® soya bean trait. This technology enables the soya bean plant to resist African bollworm (*Helicoverpa armigera*) and provides improved tolerance to glyphosate treatments. A total of 32 commercially certified cultivars were included in the national soya bean cultivar trials. Thirty-six trials were planted across 33 localities, representing the cool, moderate and warm production areas.

Figure 1: Yield performance of cool (A), moderate (B), and warm (C) short growers (MG 4 to 5,4) in 2024/25.

In all the climatic zones, cultivar DM 53i54RSF IPRO was one of the top five performers for the short growers (MG 4 to 5,4) during the 2024/25 growing season and can thus be regarded as widely adapted and an allrounder. The remaining four performers included RA5022BR, Lake 5021 IPRO, and Lake 5122 IPRO, which produced significantly higher yields in the moderate and warm climatic areas compared with the rest of the short growers.

Regarding the medium growers, RA5924BR was one of the top performing cultivars for all three climatic regions and can also be regarded as an allrounder (MG 5,5 to 6,4). Lake 5920 IPRO performed above average in the cool and warm areas, while RA6124BR performed significantly better in the moderate and warm areas compared with the other medium growers. The cultivars US63-16IPRO and DM 59i60RSF IPRO were among the top performers in the cool and warm areas, respectively.

DM 61i63RSF IPRO performed well in the cool and moderate areas, whereas RA7024BR performed above average in the cool and warm climatic areas. The cultivar Y651 IPRO was one of the best performers in the cool areas, and RA6824BR performed best in the warm areas.

Conclusion

Promising new-generation cultivars were identified in all the maturity groupings (MG 4 to 5,4 short growers, MG 5,5 to 6,4 medium growers, and > MG 6,5 long growers).

- **Short growers:** DM 53i54RSF IPRO was among the top performers in all climatic areas, while RA5022BR, Lake 5021 IPRO and Lake 5122 IPRO also performed well in the moderate and warm areas.
- **Medium growers:** RA5924BR, US63-16IPRO, and Lake 5920 IPRO are all new-generation cultivars and performed significantly better than the rest of the cultivars in the cool areas. In the moderate areas, the cultivars RA6124BR and RA5924BR

Figure 2: Yield performance of cool (A), moderate (B), and warm (C) medium growers (MG 5,5 to 6,4) in 2024/25.

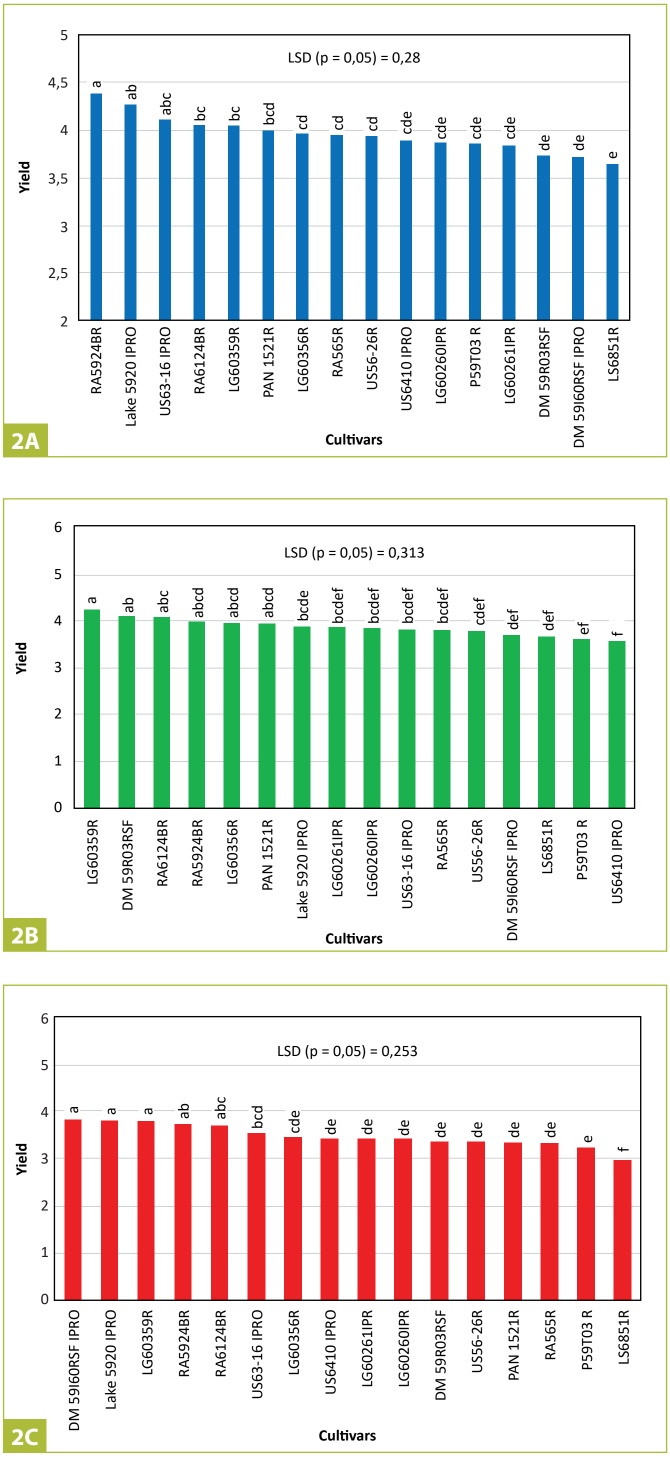
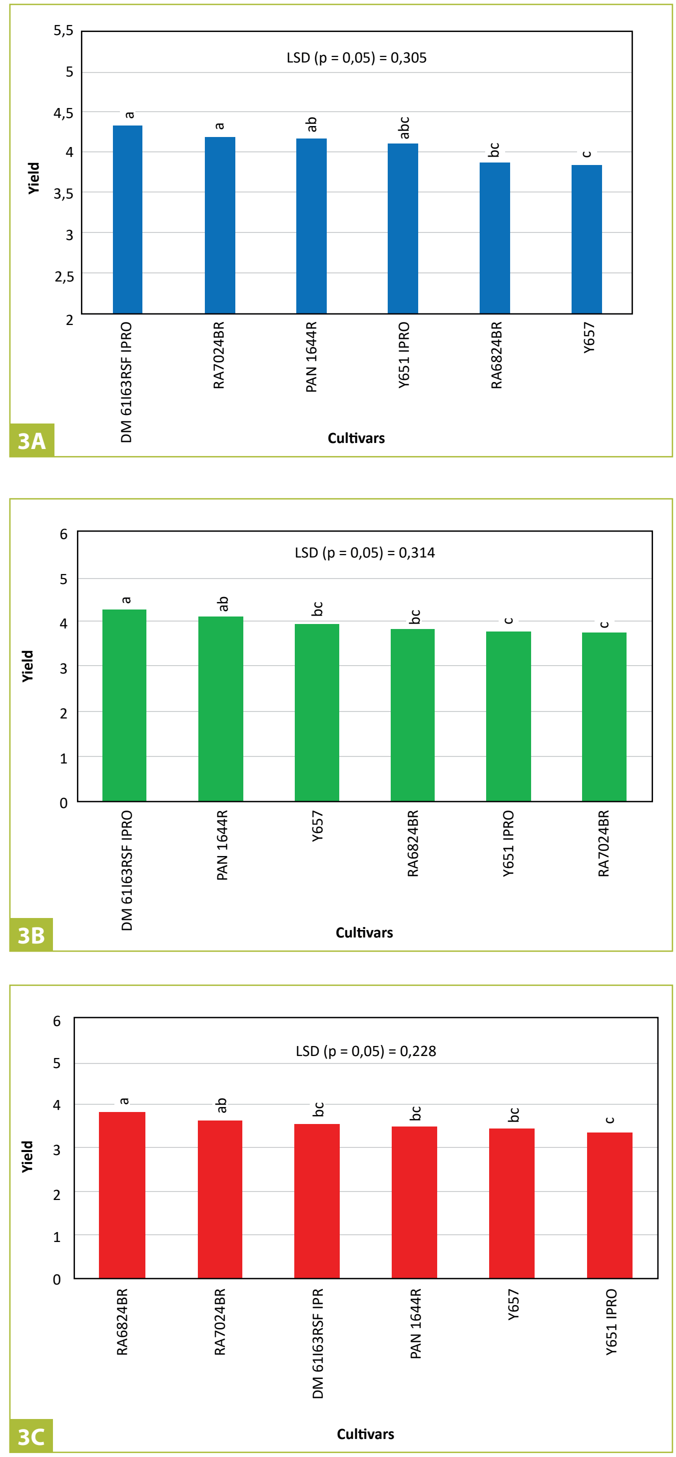


Figure 3: Yield performance of cool (A), moderate (B), and warm (C) long growers (MG 6,5 to 7,4) in 2024/25.



were among the six performing cultivars, and RA5924BR, RA6124BR, DM 59I60RSF IPRO, and Lake 5920 IPRO were among the five cultivars that performed best in the warm areas.

- **Long growers:** DM 61i63RSF IPRO, RA7024BR, and Y651 IPRO are new cultivars that made up three of the four top performers in the cool areas. DM 61i63RSF IPRO was one of the two top performers in the moderate areas. Both cultivars that performed the best in the warm areas (RA6824BR and RA70224BR) were new-generation cultivars.

It can be concluded that the new-generation cultivars are well adapted and are, in most instances, able to perform better than the rest of the cultivars in all climatic regions.

Send an email to debeerannelie@arc.agric.za for more information.

Tracking trends and quality:
The importance of fertiliser benchmarking

By Marguerite Pienaar, economist, Grain SA

South Africa relies heavily on imported fertiliser, with almost 80% of its supply sourced from global markets. The sector is therefore particularly sensitive to exchange rate volatility and international price movements. For this reason, Grain SA continuously monitors global and domestic fertiliser trends to better understand their impact on local prices and to provide transparent, measurable competition and accurate comparisons for the industry.

According to an analysis by the Bureau for Food and Agricultural Policy (BFAP), field crops remain the dominant users of fertiliser in South Africa, accounting for roughly 73% of all NPK fertiliser (nitrogen, phosphorus, and potassium) consumed over the past decade. Within this group, soya beans and canola have recorded the fastest growth in fertiliser use, largely due to steady expansion of their production areas.

Given that fertiliser represents between 35 and 50% of total production costs, Grain SA plays a critical role in monitoring the sector. In addition to tracking price trends, the team also monitors the quality of fertiliser sold in the country, which is an essential function to ensure producers receive fair value and reliable inputs. As production costs continue to rise and global markets remain volatile, these benchmarking and monitoring activities will become increasingly important in maintaining the sustainability of local grain producers.

Fertiliser prices and quality

The first step in creating a transparent production environment for producers is benchmarking local fertiliser prices against international price trends. Grain SA conducts this process monthly and publishes the results in an input cost report, which tracks several key production inputs, including chemicals, fertiliser, and diesel.

Since South Africa relies on imports for more than two-thirds of its fertiliser consumption, it is essential to verify whether international price movements are reflected in local prices once the exchange rate is considered. *Figures 1* and *2* illustrate local and global price trends, respectively, and it is clear from these figures that the underlying raw materials follow similar patterns.

Figure 1: Local fertiliser prices (R/t).

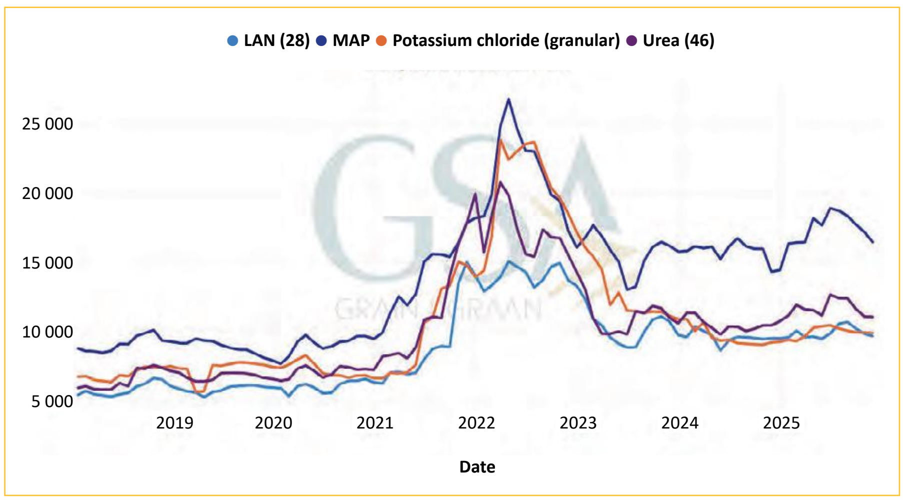


Figure 2: International fertiliser prices (US$/t).

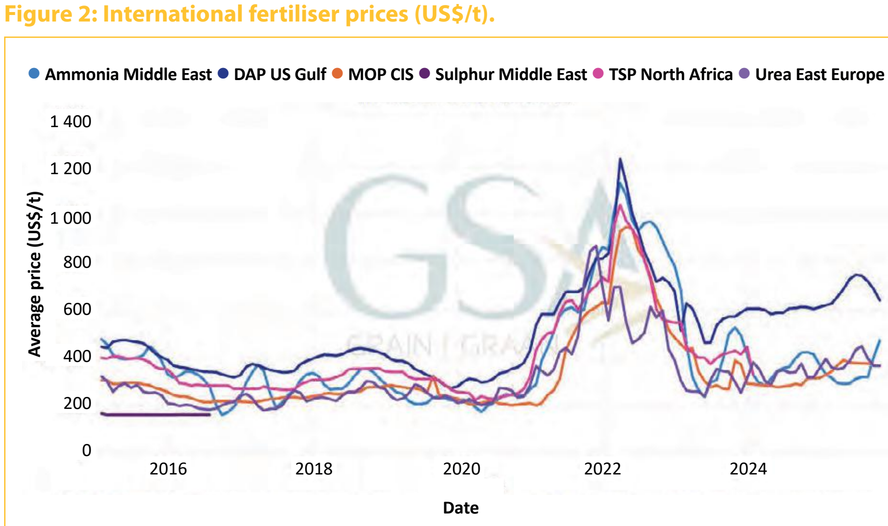


Table 1: Summary of the fertiliser products sampled.

	Rainfall area		Total
	Winter	Summer	
Fertilisers sampled and analysed	46	47	93
Fertilisers with deficiencies	2	11	13
Companies	6	11	14

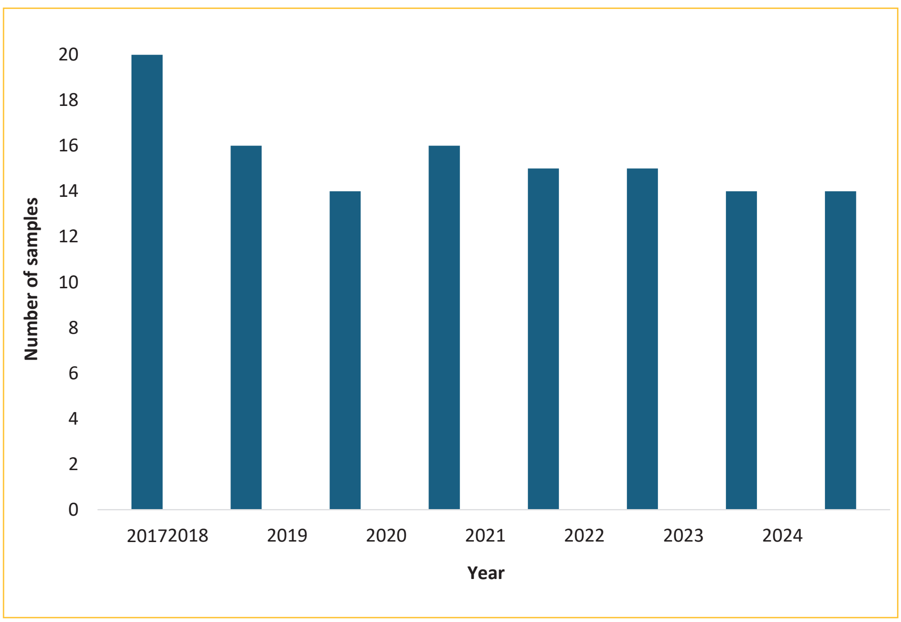
Another way to create a transparent fertiliser environment is by monitoring the quality of fertilisers. In 2017 a memorandum of understanding for the funding and management of this fertiliser and lime quality monitoring project was entered into by the then Department of Agriculture, Forestry and Fisheries, the Fertiliser Association of Southern Africa (Fertasa), Grain SA, and Sasol Agricultural Trust.

This project aims to establish whether liming material and fertiliser quality are maintained in accordance with the regulations of the *Fertiliser Act, 1947 (Act 36 of 1947)* through random sampling of at least 140 fertilisers and ten lime sources.

The aim is to determine whether products comply with the regulations and to identify possible deficiencies or under-specification products at an early stage. In 2024, 93 fertiliser products, 13 lime products, and two gypsum products from various regions – particularly the winter and summer rainfall areas – were analysed (*Table 1*).

In total, 14% of the fertiliser products did not meet the minimum requirements. In the summer rainfall region, 23% deviated, compared with 4% in the winter rainfall region. The number of deficiencies from 2017 to 2024 is shown in *Figure 3*.

Figure 3: Number of fertilisers with deficiencies.



Success of the project

The overview of the period from 2017 to 2024 highlights several key trends:

- Overall compliance with requirements improved since 2017, with deviations stabilising between 14 and 16% from 2018 onwards.
- Nitrogen content showed strong results between 2018 and 2023, with less than 2% failing to meet requirements; this increased to 6% in 2024.
- Zinc continues to be a significant concern, with between 11 and 21% of samples failing to meet the requirements since 2017.
- Micronutrients such as boron and magnesium still show relatively high variability, likely due to challenges related to micro-batching during production.
- The average absolute deviation between actual and registered nutrient content has improved over the years for nitrogen, sulphur, calcium and zinc, indicating better production control.

Send an email to marguerite@grainsa.co.za or visit *www.grainsa.co.za* for more information.

International benchmarking of fertiliser uses for oilseed crop production

By Helga Ottermann, Stephano Haarhoff, Karen Truter, Ferdi Meyer, Divan van der Westhuizen, and Pieter Swanepoel

Oilseed crops such as soya bean, sunflower, and canola are central to South African crop production, supporting edible oil supplies, livestock feed, and export growth. The sector has expanded over the past decade due to improved cultivars and alternative soil and crop management practices, particularly in the summer-rainfall regions of the Free State, North West, and Mpumalanga. This expansion has occurred alongside, among others, rising input costs and variable soil fertility.

Fertiliser is a major variable cost in oilseed production, but are influenced by global price volatility, local soil conditions, and crop nutrient requirements. South African systems are largely rainfed, with soils ranging from fertile clay loams to sandy, nutrient-poor types. Phosphorus (P) is often limiting, potassium (K) availability is highly variable, and nitrogen (N) management is crop specific.

Globally, oilseed producers face similar challenges but respond differently based on soil, climate, and policy context. For example, Brazil relies on high P and K inputs in highly weathered soils, Argentina uses a low-input strategy on fertile soils, and Europe and North America emphasise precision nutrient management. This article compares fertiliser costs and nutrient use efficiency for soya bean, sunflower, and canola in South Africa with those of major global exporters.

Methodological background

Input cost (R/ha) and nutrient use efficiency of NPK fertiliser (NUE fertiliser) for soya bean, sunflower, and canola production by major global exporters and South Africa are discussed, based on agri benchmark data. This data focusses only on key soya bean-, sunflower-, and canola-producing areas, using actual NPK application rates reported by producers in those areas.

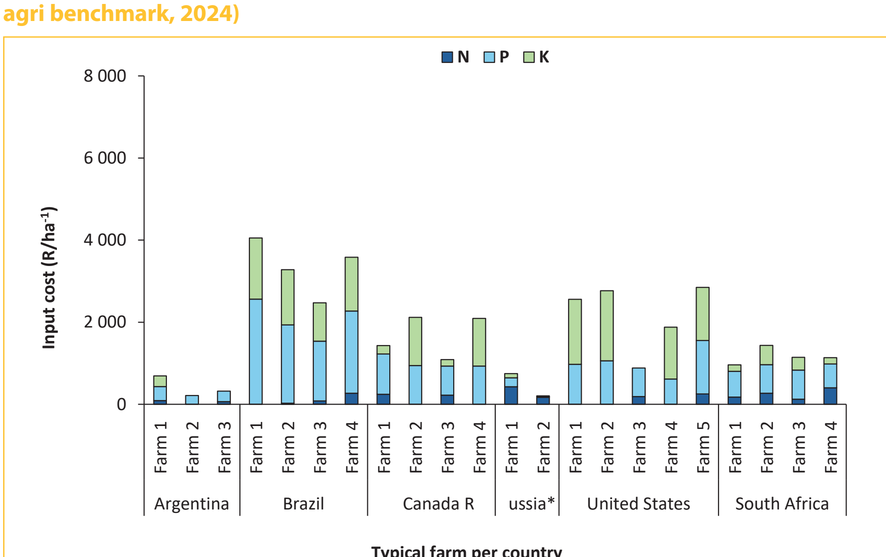
The fact that producers were able to provide data on their fertiliser usage for the agri benchmark analysis may suggest they actively track their input usage. This could indicate a greater focus on optimising fertiliser management, potentially resulting in higher nutrient use efficiency (NUE) values compared to the national average, which includes a broader spectrum of producers with varying levels of input monitoring and efficiency. (Read more about this in "South African oilseed nutrient use efficiency and further opportunities" elsewhere in this section.)

Soya bean production

Brazil has the highest fertiliser costs, with a focus on P and K to compensate for soils inherently low in plant-available P (*Figure 1*). Fertiliser costs in the United States (US) are also high and focussed on maximising productivity, with K being the most expensive nutrient, followed by P.

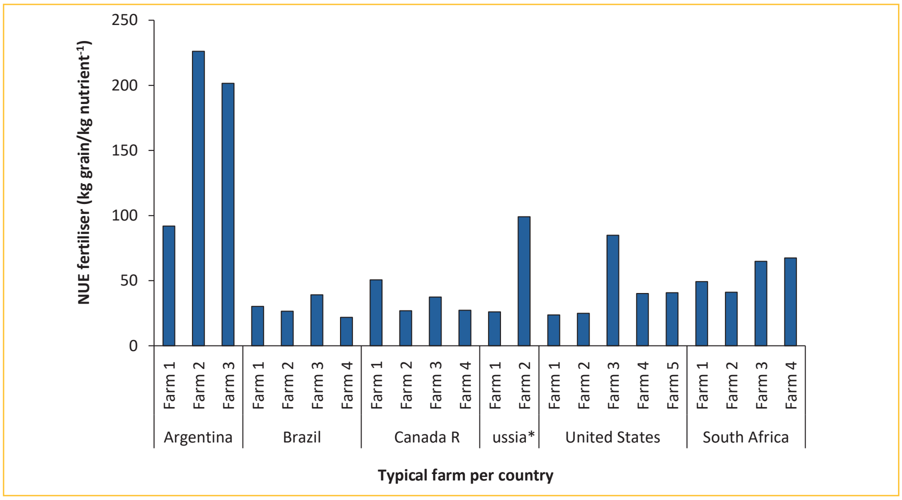
South African soya bean producers adopt a more moderate, region-specific fertilisation strategy, depending on soil and climatic conditions. Although total costs are lower than in Brazil and the US,

Figure 1: Average N, P, and K fertiliser input cost (R/ha-1) for soya bean (2019 to 2023) under rainfed conditions by South Africa and top global producers. (Source: agri benchmark, 2024)



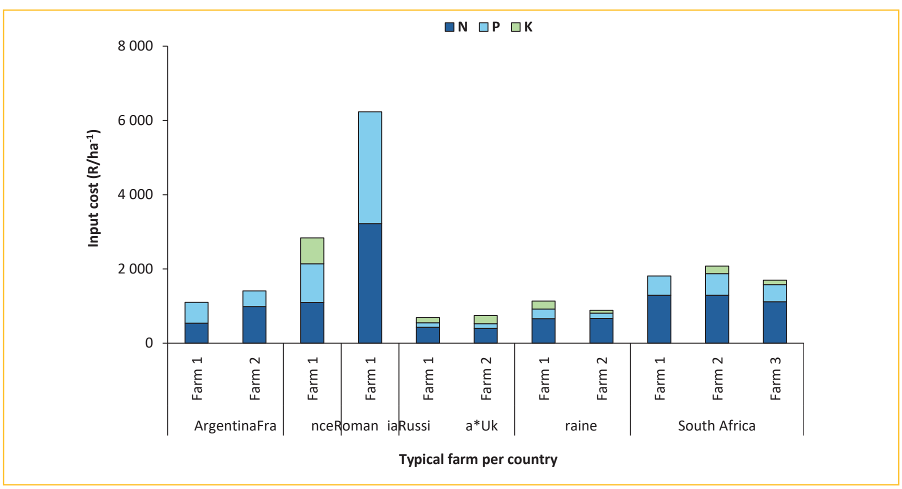
**Russia's data includes only 2019 and 2020 due to unavailability caused by the Russia-Ukraine war.*

Figure 2: Average dryland fertiliser NUE for soya bean production between 2019 and 2023 for major global exporters, including N, P, and K. (Source: agri benchmark, 2024)



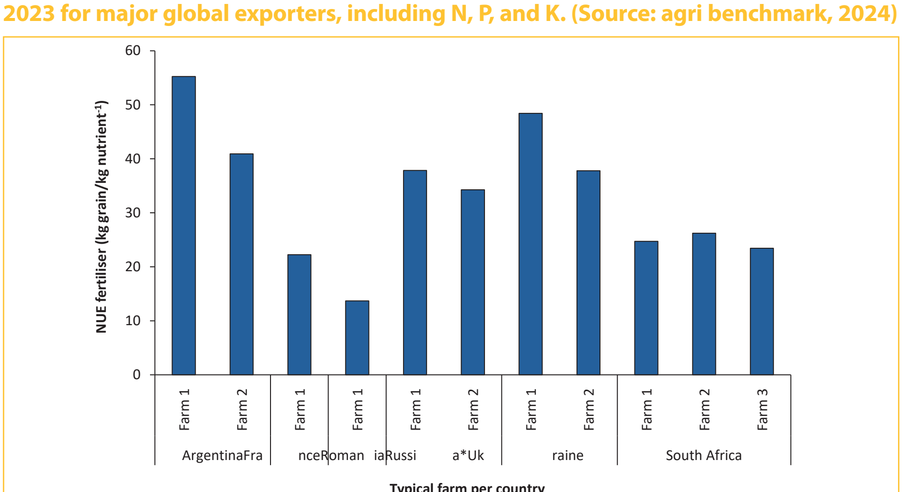
**Russia's data includes only 2019 and 2020 due to unavailability caused by the Russia-Ukraine war.*

Figure 3: Average N, P, and K fertiliser nutrient input cost (R/ha⁻¹) for sunflower (2019 to 2023) under rainfed conditions by South Africa and top global producers. (Source: agri benchmark, 2024)



**Russia's data includes only 2019 and 2020 due to unavailability caused by the Russia-Ukraine war.*

Figure 4: Average dryland fertiliser NUE for sunflower production between 2019 and 2023 for major global exporters, including N, P, and K. (Source: agri benchmark, 2024)



**Russia's data includes only 2019 and 2020 due to unavailability caused by the Russia-Ukraine war.*

investment is directed more towards P fertilisers to address widespread soil deficiencies. P accounts for 49 to 65% of total fertiliser costs but only 33 to 45% of total fertiliser applied each season. Variation in fertilisation practices across South Africa is mainly driven by soil variability and established producer decision-making, particularly in regions such as the Free State, where sandy soils dominate and are low in organic matter and N.

Argentina has the lowest fertiliser cost per hectare, reflecting a low-input system shaped by government taxes and policy disincentives, despite fertile soils and efficient production systems. In contrast, Russia shows the highest average N application rates and costs per hectare due to low fertiliser prices, low inherent soil N, and cold climates with short growing seasons that restrict biological N fixation and increase reliance on mineral N inputs.

Despite spending less than many competitors, South Africa's average NUE for soya bean production is higher than that of the US (except for one farm) and Canada (*Figure 2*). This shows that the targeted P strategy is successful. However, the country lags Argentina, the leader in resource use efficiency. High variability in NUE was observed across Argentinean fields, reflecting differences in agronomic management principles across regions based on soil fertility, yield targets, and climate conditions.

Align Russia with other countries

South Africa's K use efficiency is much higher for soya beans compared to the US and Brazil, but lower than in some Canadian and Russian regions. Because K fertiliser inputs are considerably lower than N and P in South African soya bean systems (*Figure 1*), and K use efficiencies remain high, there is a clear need for soil K replenishment following multiple soya bean harvests due to high soil K removal events.

Sunflower production

Producers in Romania and France invest heavily in fertilisers to achieve high sunflower yields (*Figure 3*). Romania applies substantial N and P because soil P levels are generally low, while France uses higher K rates, reflecting long-term declines in soil K and P from intensive cropping.


NUTRI-SOIL
Soil Life Activator
Approved by ECOCERT INPUTS
product suitable for use in organic Agriculture conforming to the annexes of the EU regulation n'2018/848 and 2021/1165 and of NOP Regulation.
Control ECOCERT F-32600
eco-GREEN PLANT HEALTH
• Improve Soil Health
• Enhance Germination
• Promote Root Development
PLANT IN FURROW WITH NUTRI-SOIL
Contact Us
Customer Care : +27 (0)21 871 1303
info@ecogreenagri.com
www.ecogreenagri.com


UNLEASH THE GREEN REVOLUTION!
WORLD FOCUS agri
World Focus Agri products act as an organic growth stimulant throughout the plants life cycle.
ORGANIC GROWTH STIMULANT
ORGANIC LEAF NUTRITION
MICRONIZED LIME GYPSUM
SOIL HEALTH ENHANCER
CCM
Complex CalSus
Complex CalSul
Gliogrow
GlioGrain
Approved by ECOCERT INPUTS
Contact us
082 452 8983 | 083 542 3106
at@worldfocusagri.co.za
www.worldfocusagri.co.za
Address: 9 Silver Crescent, Delmas, 2210

Figure 5: Average N, P, and K fertiliser nutrient input cost (R/ha^{-1}) for canola (2019 to 2023) under rainfed conditions by South Africa and top global producers. (Source: agri benchmark, 2024)

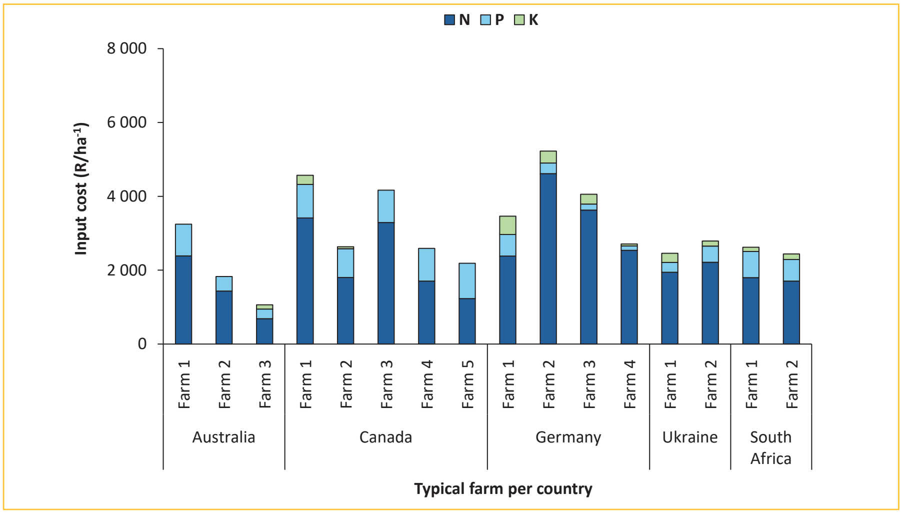
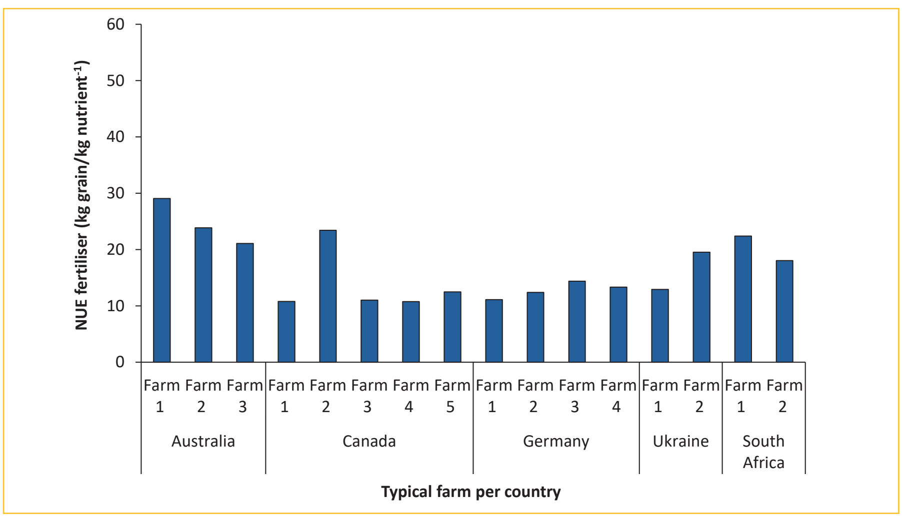


Figure 6: Average dryland fertiliser NUE for canola production between 2019 and 2023 for major global exporters, including N, P, and K. Includes winter and spring canola. (Source: agri benchmark, 2024)



In contrast, South African producers are more conservative than those in Argentina, Russia, and Ukraine. Because most sunflower production occurs in regions with variable rainfall, such as the Free State and North West, high fertiliser investment carries financial risk and can reduce profitability.

Fertiliser use efficiency on South African farms appears moderate to low relative to major exporters (*Figure 4*), but this reflects a deliberate risk-averse strategy. Producers prioritise input investment in maize rather than sunflower and avoid over-fertilisation under erratic rainfall and frequent mid-season heat and drought stress. This approach reduces financial exposure and also likely indicates greater reliance on residual nutrients from maize-based rotations.

Canola production

South African canola fertiliser costs are, on average, comparable to those in Ukraine, lower than in Germany, and also lower on some Australian and Canadian farms (*Figure 5*). Australian and Canadian producers apply less K fertiliser than German, Ukrainian, and South African producers. Western Canadian soils generally provide sufficient plant-available K to support profitable canola yields, owing to the abundance of K-containing minerals in the parent material.

Germany, a major canola producer, invests heavily in N to achieve the highest possible yields. South African producers in the Western Cape spend less on N and K but more on P, directly responding to the needs of the shallow soils common in the Swartland and Southern Cape production regions. Furthermore, decades of practising conservation agriculture management principles have improved soil fertility and nutrient cycling, thereby reducing the need for heavy fertiliser applications.

South Africa's fertiliser NUE for canola production is slightly higher than in some major producing regions, reflecting the success of implementing long-term conservation agriculture strategies (*Figure 6*). By improving soil organic matter content and nutrient cycling through the incorporation of N-fixing crops into crop rotation systems, soils can sustain long-term crop production. This also means producers use less external inputs such as inorganic fertilisers.

Nutrient use efficiency is fairly similar across countries, except for one Canadian farm in the Central Alberta region and one in Australia, which show the highest NUE among farms. In general, the NUE for canola is typically lower than for other crops, indicating higher fertiliser application rates per unit of yield and a lower return on investment in terms of grain harvested, as canola generally requires more nutrients than other small-grain cereal crops.

A final word

South African oilseed producers use region-specific fertilisation to manage risk and maintain profitability. Despite lower fertiliser costs, nutrient use efficiency remains competitive, especially for rainfed soya bean and canola.

Soya bean systems depend on targeted P and K use, and biological N fixation (higher long-term K inputs may be needed in maize-based rotations). Sunflower producers in variable rainfall regions rely on residual nutrients to limit risk. Canola in the Western Cape benefits from conservation agriculture that improves nutrient cycling and reduces N and K inputs. Precision tools and local research are needed to sustain competitiveness and environmental resilience.

Send an email to helga@bfap.co.za for more information.

Herbicide-resistant weeds associated with glyphosate

By Dr Charlie Reinhardt

According to the authoritative website that collates scientifically verified herbicide resistance cases globally, the International Herbicide-Resistant Weed Database (*www.weedscience.org*), there are currently 537 unique cases (species x mechanism of action) of herbicide-resistant weeds globally, with 273 species (156 dicots and 117 monocots) involved.

Weeds have evolved resistance to 21 of the 31 known herbicide sites of action and to 168 different herbicides. Resistance has been reported in 102 crops across 75 countries. This website has 3 423 registered users, with 742 weed scientists contributing new cases of herbicide-resistant weeds.

As shown in *Figure 1*, herbicide resistance commenced 'low and slow' and only leaped into an exponential trajectory during the heyday of herbicide development in the 1970s and 80s. In those eras, little attention was paid to herbicide resistance, although insect resistance had already raised its money-chewing mandibles. Initially, it was assumed that because plant life cycles are longer than those of insects, it was unlikely that weeds could present similar resistance problems. In hindsight, this assumption was both wishful and unscientific reasoning.

The herbicide group contributing most to resistance during the 1970s and 80s was the sulfonylureas, specifically those used in small grains, principally wheat. What surprised many was that their relatively low dosages – in the order of 10g product/ha – for effective weed control did not provide protection against weeds evolving resistance. It was the high potency of the sulfonylureas, coupled with their single site of action, the enzyme acetolactate synthase (ALS), and their long persistence in soil, which led this group to be cursed with high selection pressure for rapid resistance development.

Multiple- and cross-resistance

From a herbicide-resistance management perspective, exacerbating factors are 'multiple resistance' and 'cross-resistance' phenomena. **Multiple resistance** occurs when a weed species evolves resistance to two or more herbicides with different sites (mechanisms) of action.

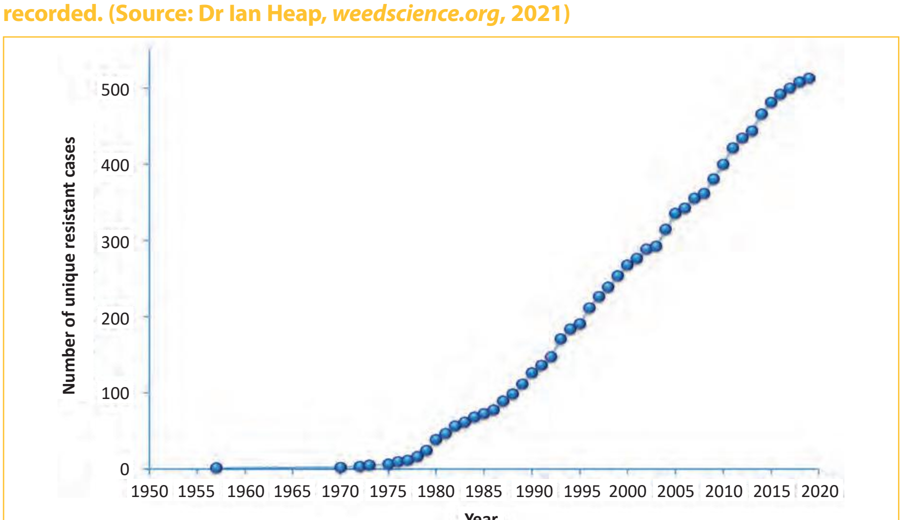
Cross-resistance refers to a single plant resistance mechanism that confers resistance to multiple herbicides, regardless of whether they have a single or different sites of action. Cross-resistance's mechanisms are twofold: site-of-action resistance, where a mutation (molecular change) occurs at the site of action (such as an enzyme); and metabolic resistance, which involves reduced herbicide absorption and/or mobility, and/or enhanced breakdown within the plant.

Weeds with cross-resistance are difficult to control, especially when a species is resistant to five or more herbicide sites of action, as is the case with *Amaranthus palmeri* (Palmer amaranth) and the *Lolium* (ryegrass) complex. Both species are serious weeds in South Africa and have proven resistance to otherwise valuable herbicides. Fairly recently, research by the South African Herbicide Resistance Initiative (SAHRI), based at the University of Pretoria (UP), revealed that one of South Africa's most ubiquitous weeds, *Amaranthus hybridus* (pigweed), is starting to show a herbicide resistance profile similar to that reported for *A. palmeri*, both locally and abroad.

Bear in mind that not all cases of real resistance are reported on the herbicide resistance website, due to numerous reasons. Firstly, for cases to be scientifically verified, a prescribed research (dose-response bioassay technique) procedure must be followed, while the means to do it may not be readily available.

Secondly, resistance can be misinterpreted or wrongly diagnosed as inadequate herbicide efficacy due to several factors, including environmental (temperature, soil moisture, rain, and humidity) and management (sprayer calibration, quality of sprayer apparatus, and timing of application) issues.
Lastly, resistance may be suspected but deliberately avoided for selfish reasons. This is a worst-case scenario which, hopefully, is not a prevalent issue among stakeholders in the crop production industry.

Figure 1: Timeline and trend of scientifically verified herbicide resistance cases recorded. (Source: Dr Ian Heap, *weedscience.org*, 2021)



Development of resistance

Resistance to herbicides typically evolves (develops) in a stepwise manner. It may begin with just a few plants, or even a single plant, of a specific species that have evolved quite naturally a mutation in the structure of the herbicide's target enzyme. Those few individuals, representing the resistant biotype, are unaffected by the herbicide targeting that specific enzyme.

It is important to note that 100 plants/m² extrapolates to one million per hectare. The initial, relatively low number of herbicide-resistant individuals, for example 1 000/ha, typically go unnoticed as they remain 'invisible to the observer' on a field scale. However, in the following season, the hundreds or thousands of offspring from the resistant biotype may be observed as an issue of 'less effective weed control', which likely will be attributed to a range of other factors of an environmental or management origin.

Typically, within three to five growing seasons, the resistant biotype will have become the dominant weed, and the realisation that it might be due to resistance will set in.

Proof of herbicide resistance requires a dose-response bioassay conducted under controlled conditions, such as in a greenhouse, to confirm the existence of three classes of weed response: susceptibility (sensitivity), tolerance, or resistance. At any given time in a particular crop field, different percentages of those three classes exist.

The intermediate resistance phase of 'tolerance' is already concerning, as it provides a stepping stone for the rapid progression to fully-fledged 'resistance' dominating a field.

The repercussions of both 'herbicide-tolerant' and 'herbicide-resistant' weeds are manifold. Poor or inadequate weed control can reduce crop yields, while additional input costs arise from supplemental weed control methods, such as tillage, hand-weeding or extra herbicides to manage those weeds left poorly controlled or uncontrolled by the main herbicide in the programme. Furthermore, enforced crop rotations can be less profitable or may not fit in with the farming enterprise's resources and strategy.

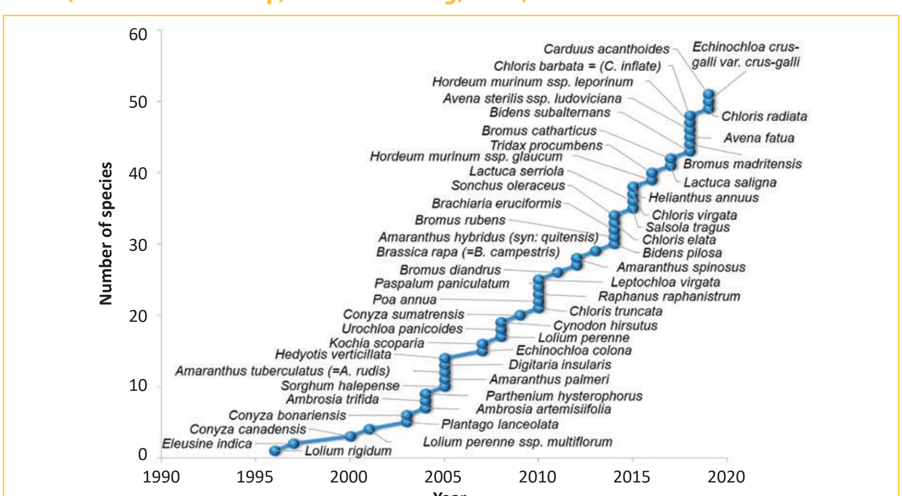
Documented cases

Glyphosate-resistant weeds account for 386 records on the International Herbicide-Resistant Weed Database, including seven from South Africa, spanning the period 1996 to 2024. In total, South Africa has 15 records for all herbicides, covering a timeline from 1986 (*Avena fatua* [wild oats] resistance to ALS- and ACCase-inhibiting herbicides) to 2024 (*A. hybridus* resistance to glyphosate). The latter record was contributed by SAHRI.

Among the 15 South African records on the website, several cases of multiple resistance have been documented:

- Resistance to both glyphosate and paraquat in *Lolium rigidum* in a vineyard setting.
- Resistance to both glyphosate and paraquat in *Plantago lanceolata* in a vineyard setting.
- Resistance to several ALS- and ACCase-inhibiting herbicides in small grains, mainly wheat.

Figure 2: Weed species recorded with glyphosate resistance on a global scale until 2020. (Source: Dr Ian Heap, *weedscience.org*, 2021)



In total, 58 different weed species have thus far been linked to glyphosate resistance worldwide or in various cropping systems (*Figure 2*). Of these, 33 species are also found in South Africa. Seven cases of proven glyphosate resistance emanate from the country, with the last record (2024) being for *A. hybridus* contributed by SAHRI. In 2018, this research team reported glyphosate and chlorimuron-ethyl resistance in *A. palmeri*.

The primary reason glyphosate is associated with weed resistance is likely due to its widespread use and the high global volumes sold. Such a scenario would place high selection pressure on any herbicide for weeds to evolve resistance against.

Glyphosate under pressure

The severe threat posed by glyphosate-resistant weeds to sustainable and profitable crop production has been exacerbated by the otherwise laudable practices of zero and reduced tillage, and the technology of glyphosate-resistant crops. Without mechanical weed control through soil tillage, reliance on herbicides increases, and nowhere more so than in glyphosate-resistant crops.

This resistance-promoting duo of zero tillage and glyphosate-resistant crops is, for good reasons, very popular in conservation agriculture circles in South Africa. The glyphosate-resistant trait dominates the local seed market for maize, soya bean, and cotton. Obviously, the ramifications of this scenario place sustainable glyphosate use under pressure.

With diminishing herbicide options due to the deregistration threat hanging over stalwarts such as glufosinate-ammonium and paraquat, as well as a prolonged dearth of novel herbicides reaching the market, the onus in the foreseeable future falls on all stakeholders to preserve and innovate with the remaining tools, namely herbicides integrated with other weed control methods.

Dr Charlie Reinhardt is a research leader at the South African Herbicide Resistance Initiative (SAHRI) at the University of Pretoria, and an independent consultant on weeds and herbicides. For more information, contact him at 083 442 3427 or dr.charlie.reinhardt@gmail.com

South African oilseed nutrient use efficiency and further opportunities

By Helga Ottermann, Stephano Haarhoff, Karen Truter, Ferdi Meyer, Divan van der Westhuizen, and Pieter Swanepoel

South African oilseed producers face persistent pressure from rising fertiliser and input costs, making nutrient use efficiency (NUE) a critical factor in maintaining profitability. Over the past decade, soya bean and canola have shown strong improvements in NUE, supported by better genetics, seed technology, improved soil and crop management, and the wider adoption of conservation agriculture. Sunflower have seen only modest gains, reflecting variable rainfall, soil constraints, and disease risk.

As fertiliser prices remain volatile, further progress will depend on whole-system nutrient management, the effective use of biological and organic inputs, and increased adoption of precision agriculture to improve the economic and environmental efficiency of NPK (nitrogen [N], phosphorus [P], and potassium [K]) fertiliser use.

This summary draws on findings published by the Bureau for Food and Agricultural Policy (BFAP) and Stellenbosch University researchers in the *South African Journal of Plant and Soil* (Ottermann *et al*., 2026), which benchmark fertiliser use in South African oilseed production. It is further supported by the group's complementary analysis of national fertiliser trends published in *Agrekon* (Ottermann *et al*., 2025).

Methodology

The NUE analysis combines national fertiliser supply data with national oilseed production figures. Total N, P, and K supplied to agriculture were allocated to soya bean, sunflower, and canola using typical fertiliser practices for each crop and region. NUE was then calculated as:

- **Total NUE:** grain produced per kg of total fertiliser nutrient (N+P+K).
- **N-NUE:** grain produced per kg of N applied.
- **Cost efficiency:** rand value of grain per rand spent on fertiliser.

Values were compared across two historical periods (2013 to 2015, and 2021 to 2023) and a projected period (2032 and 2034) using BFAP outlook data. This national-scale method captures broad, system-level changes in fertiliser efficiency, driven by management practices, crop rotation patterns, technology adoption, and changes in fertiliser prices.

Oilseed NUE performance

Figure 1 presents the NUE for the total South African harvest of soya bean, sunflower, and canola across the periods 2013 to 2015, 2021 to 2023, and a projected period (2032 to 2034). The analysis considers total fertiliser efficiency (N, P, and K, measured as kg of grain per kg of fertiliser applied, calculated as previously discussed), NUE (kg of grain per kg of N applied), and a cost-benefit ratio incorporating grain price and fertiliser cost (expressed as the rand value of grain per rand spent on fertiliser).

The results in *Figure 1* divide total South African oilseed production by total oilseed fertiliser use per crop and therefore do not illustrate regional differences, although regional differences were considered in preceding steps of the calculation.

Soya bean has made remarkable progress over the last decade, with yields increasing by 46% to 2,37t/ha. From 2013 to 2015 and 2021 to 2023, total fertiliser use efficiency rose by 43%, and NUE increased substantially, from 145kg of grain per kg of N to 232kg. This trend is expected to continue into 2032 to 2034. This success is attributed to a combination of genetic advances, better pest and disease management, improved soil health practices, more effective inoculation strategies, and nutrient carryover effects when rotated with maize. The economic outcome, however, was more modest; while efficiency gains were high, fertiliser cost efficiency increased by only 15%, a figure limited by the global surge in fertiliser prices.

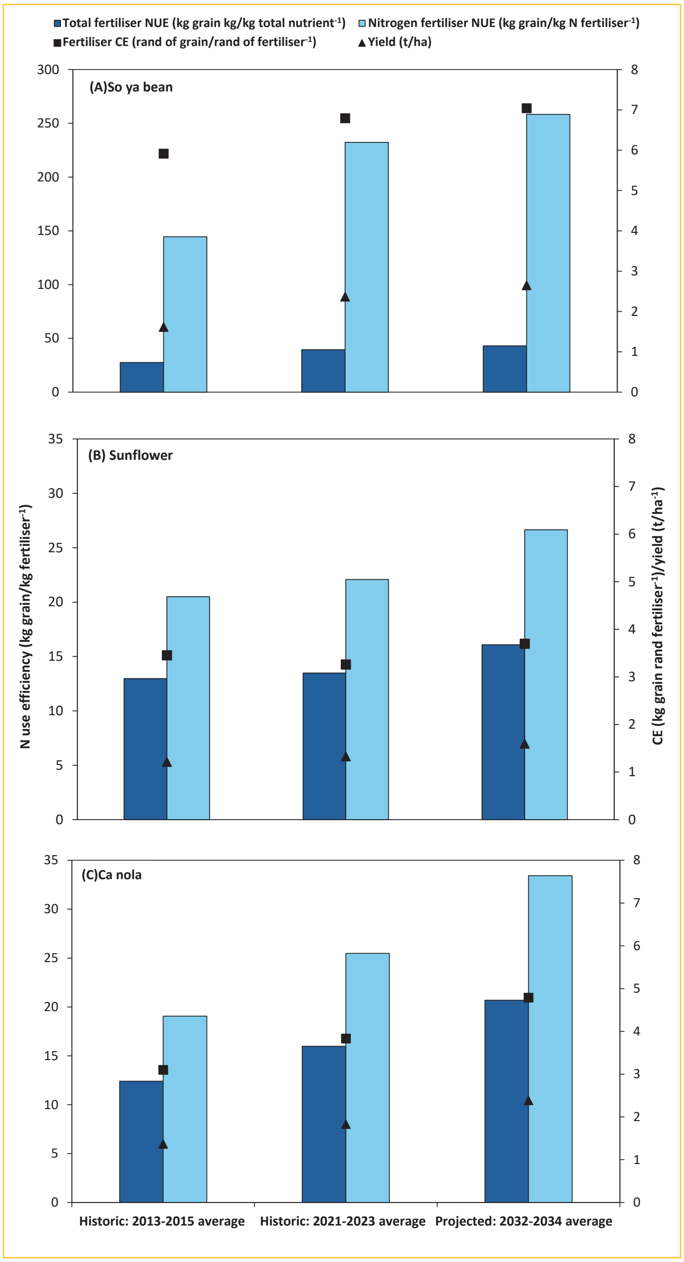
Sunflower has faced more significant challenges, although the crop is still commonly grown across the western production region of South Africa in rotation with maize. The total fertiliser use efficiency and N fertiliser use efficiency increased slightly for South African sunflower production between 2013 to 2015 and 2021 to 2023. While yields increased by a modest 10%, the economic outcome was negative, with fertiliser cost efficiency decreasing by 6%, as high input prices completely offset the small yield gains. Sunflower production continues to be hampered by erratic rainfall patterns and disease pressure such as *Sclerotinia sclerotiorum*.

These factors make profitability inconsistent and underscore the urgent need for more resilient and effective nutrient management strategies for this crop. Sunflower yield is projected to increase by 20% by 2032 to 2034, which may allow the fertiliser cost efficiency to increase by 13% over the same period.

Canola has performed well, particularly in the Western Cape. Between 2013 to 2015 and 2021 to 2023, total fertiliser use efficiency improved by 29%, while N use efficiency rose by an even greater 34%. These gains translated into a solid economic outcome, with fertiliser cost efficiency increasing by 24%, driven by high oilseed prices and strong yields due to improved soil and crop management practices that enabled canola plants to utilise applied NPK nutrients more effectively.

A key contributing factor to this success has been the widespread adoption of conservation agriculture, a practice that has significantly improved soil health and the crop's NUE. Previous research by the Department of Agronomy at Stellenbosch University found that N fertiliser rates across South Africa's major canola-producing regions may need to be reconsidered, particularly under conservation

Figure 1: Average total and N use efficiency, cost efficiency (CE), and yield of soya bean (A), sunflower (B), and canola (C) in South Africa during historical and projected periods.



agriculture systems where improved soil conditions reduce the crop's dependence on applied N (Crous *et al*., 2021).

Soil organic carbon levels increase under long-term conservation agriculture management in the grain-oilseed cropping systems of the Western Cape, suggesting that soil N mineralisation potential increases, leading to reduced dependence on N-fertiliser inputs for economically viable crop yields.

Future improvement

To build on this progress, producers can select several strategic agronomic opportunities. A primary focus should be the adoption of system-based nutrient management, which considers nutrient cycling across entire crop rotations rather than treating each crop in isolation. This approach requires evaluating crop nutrient removal across different soil types and production systems and assessing fertiliser strategies for their long-term impact on soil health under different tillage systems.

Secondly, enhancing soil health through biological inputs offers significant potential. By investigating and applying biofertilisers and organic amendments, producers can improve soil activity and reduce dependence on costly chemical fertilisers. Thirdly, optimise fertiliser management for oilseed crops, focussing on rates, timing, application, and foliar feeding; specifically, examining N and P fixation and evaluate effects on yield, NUE, and environmental losses.

Finally, the implementation of precision agriculture technology is crucial. Using decision-support tools such as remote sensing, drones, and artificial intelligence-driven recommendations enables real-time, site-specific nutrient management, ensuring inputs are applied only where and when needed, thereby reducing environmental losses and costs.

Conclusion

South African oilseed producers have successfully improved NUE to mitigate severe market pressures, with clear gains in soya bean and canola. Continued investment and focus on soil health, advanced nutrient management, and precision technology are essential to ensure the sector's long-term profitability and sustainability.

Send an email to helga@bfap.co.za for more information.

Oilseeds market 2026: Five-item watchlist

By Marguerite Pienaar, economist, Grain SA

The oilseed sector heads into 2026 with plenty to pay attention to. After a few seasons of major production shifts, strong demand from crushers, and volatile global prices, soya bean, sunflower, and canola are set for another interesting year. Producers and industry have built a solid base, but the months ahead will still bring a mix of opportunities and challenges – from weather and input costs to trends in global markets.

1 Weather and local production

South Africa's summer grain season is at a critical stage, with crop conditions varying widely across regions after an unusually wet start to the 2025/26 planting period. Excessive rainfall from October to December slowed planting, caused waterlogging, and raised concerns about shallow root development in especially the North West and Free State, where many fields had to be replanted.

The Eastern Highveld finished planting earlier, but unplanted patches, hail damage, and a lack of heat units remain challenges. Limpopo also experienced severe runoff and delayed planting.

Sunshine during January has helped western areas recover, but crops will need consistent follow-up rainfall, especially given the uncertainty around root depth. Ongoing wet conditions have also made weed control difficult, forcing some producers to rely on drones and aircraft to manage rapidly spreading weeds.

The production forecast should be considered alongside current crop conditions to provide a comprehensive view of the season. For soya bean the intention to plant is estimated at 1 179 200ha, representing a 2,45% year-on-year increase and, if realised, a new record. In contrast, the sunflower area is forecast to decline by 4,43% year-on-year to an estimated 531 100ha.

Groundnuts recorded the largest reduction in estimated plantings, down 12,23% year-on-year to 42 240ha. As the season remains in its early stages, developments through to March will be critical in determining final crop size.

The Crops Estimates Committee's preliminary area planted report and first production estimate – released at the end of January and February, respectively – will therefore be key indicators to monitor.

2 Global market signals

On 13 January, the United States Department of Agriculture released three key reports: the *World Agricultural Supply and Demand Estimates (WASDE)*, the grain stock report, and the crop production report. These reports sent signals to global markets. Combined with production developments in other major oilseed-producing countries, these factors are expected to filter through to South Africa's local markets.

For soya beans in particular, markets to watch include the United States, Brazil, and China. According to the latest US supply and demand estimates for 2025/26, oilseed production is forecast to increase to 126,2 million tonnes. Production of soya beans, canola, and sunflower seed is expected to rise, while groundnut production declines.

Globally, oilseed production for 2025/26 is revised upwards by 2,4 million tonnes, largely due to higher soya bean output. Global soya bean production is projected to increase by 3,1 million tonnes to 425,7 million tonnes, driven by improved growing conditions in Brazil and the US, despite lower production in China. Global crush and soya bean meal trade are rising, particularly in Brazil and the US; the European Union (EU) is importing more soya bean meal and reducing soya bean imports and crushing volumes.

Global soya bean exports are projected to decline slightly to 187,6 million tonnes, and Brazil's higher exports are offset by reduced shipments from the US. Global ending stocks are expected to increase by two million tonnes, led by higher inventories in the US and Brazil.

Higher stocks, reduced Chinese imports, and favourable weather conditions in the US and Brazil mean increased volumes of oilseeds are entering the international market. America's intentions to plant for the next season will be released in March this year and is also on the list of factors to monitor.

3 Local price trends

Ample international soya bean supplies, particularly from Brazil and the US, continue to pressure global markets and push South African soya bean prices closer to export parity. With ample crops available worldwide and strong competition among exporters, domestic prices are receiving limited support from global fundamentals. Sunflowers appear more competitive than soya beans this season.

However, several local factors could still influence price movements in the coming months. Weather conditions up to March remain critical for crop development in the summer grain regions, and any periods of heat or insufficient follow-up rain could shift expectations and market sentiment.

In addition, exchange rate volatility continues to play a significant role, with fluctuations in the rand having the potential to either cushion or amplify global price trends in the local market.

4 Crushing capacity and local demand

South Africa's soya bean outlook for 2025/26 points to a sharp rise in total supply, increasing from 2,29 million tonnes to 2,89 million tonnes, driven mainly by a larger crop and higher producer deliveries. Imports are expected to fall sharply to just 12 000 tonnes, reflecting improved local availability.

On the demand side, total usage is projected to grow from 2,15 million tonnes to 2,46 million tonnes, with soya bean crushing remaining the main driver at 2,07 million tonnes. Increased demand from the animal feed sector, along with slightly higher seed use, also contributes to growth.

Despite the higher consumption, the larger crop leads to a substantial rise in closing stocks, from 140 704 tonnes to

421 969 tonnes. This represents roughly two months (69 days) of supply by the end of February 2026 – a marked improvement compared to the previous season (National Agricultural Marketing Council [NAMC] projected figures for 2025/26).

South Africa's sunflower seed outlook for 2025/26 points to a notable increase in total supply, rising from 766 958 tonnes in 2024/25 to an estimated 819 089 tonnes. This growth is driven by a larger crop estimate and higher producer deliveries, supported by expected imports of 35 000 tonnes.

On the demand side, total usage is projected to increase from 694 169 tonnes to 767 730 tonnes, largely due to stronger processing demand, with the sunflower crush forecast at 740 000 tonnes. Despite the larger crop, higher demand reduces ending stocks from 72 789 tonnes to 51 359 tonnes, leaving South Africa with tighter stock levels – equivalent to just 0,8 months (25 days) of supply by the end of February 2026 (NAMC projections). The lower ending stocks could provide support for local prices.

Soya bean and sunflower seed prices are expected to remain under pressure in the short term due to ample local supply and strong global availability, especially soya beans. The sharp rise in soya bean production and much higher projected ending stocks suggest that local soya bean prices may continue trading close to export parity, limiting upward movement unless weather conditions or exchange rate fluctuations influence the market. For sunflower seed, tighter stocks and steady processor demand could provide some price support, but large global oilseed supplies and weak international vegetable oil markets are likely to cap substantial gains.

Figure 1: Prices of whole soya bean delivered to Randfontein. (Source: Grain SA)

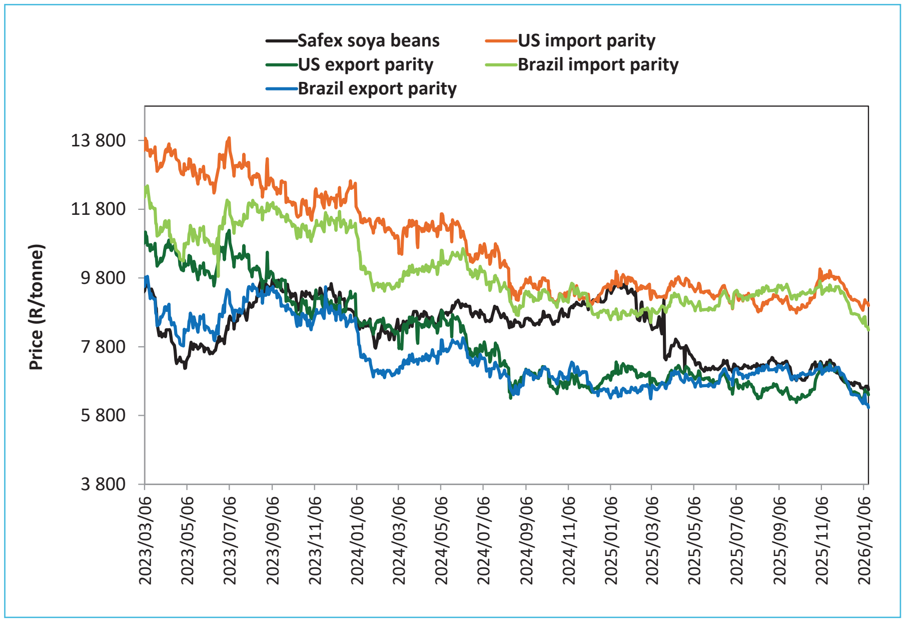
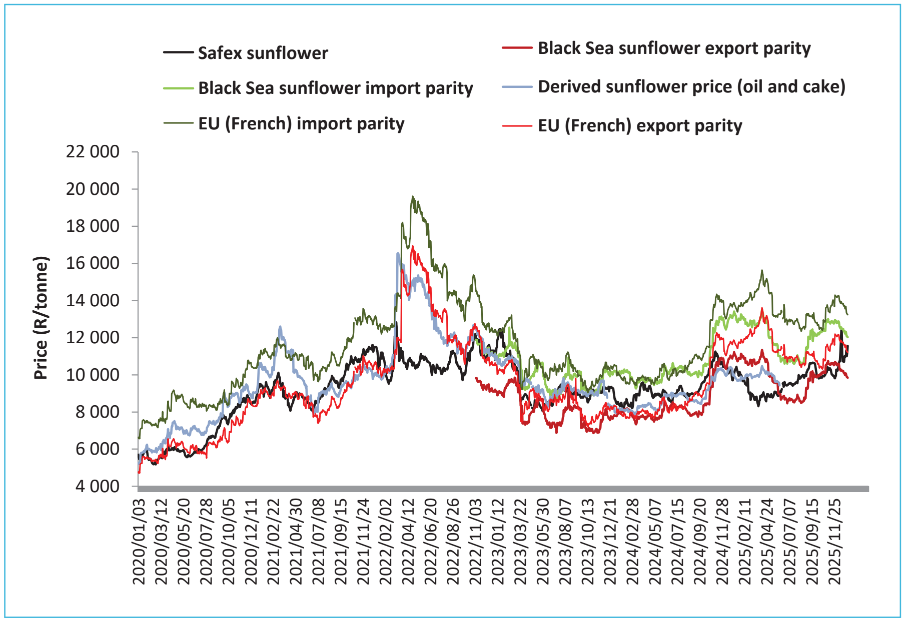


Figure 2: Prices of EU sunflower seed delivered to Randfontein. (Source: Grain SA)



5 Policy and trade

Expanding export markets will become more important as South Africa faces rising soya bean supplies and limited domestic demand growth. With higher output and growing ending stocks, the domestic market alone cannot absorb the surplus without further pushing prices towards export parity. Access to stable, diversified export markets would help ease supply pressure, support producer prices, and unlock new opportunities across the oilseed value chain. Over the long term, stronger export channels improver sector resilience by reducing dependence on domestic demand fluctuations and boosting market competitiveness.

A final thought

Together, these dynamics or five watchlist items suggest a market where oilseed prices may remain relatively subdued, with global fundamentals pushing prices down and local factors such as weather risks from January through March, crush demand, and the rand-dollar exchange rate create room for short-term volatility.

In essence, the oilseed complex is entering a period where global oversupply pressures lower prices, but local uncertainty could still generate price swings, particularly if late-season weather threatens yields or if the rand loses strength.

Send an email to marguerite@grainsa.co.za or visit *www.grainsa.co.za* for more information.

Soya bean production in 2025: The production and price aftermath

By Dr André van der Vyver and Juan-Pierre Kotzé, Sacota

Gold prices have enjoyed an impressive run in recent months, but there is always the constant awareness that a downturn is inevitable. The agricultural sector is no stranger to extremes – whether in rainfall, production volumes, or commodity prices, cyclical highs and lows are the norm.

The 2025/26 marketing year is no exception. The season delivered a significantly larger crop than expected, accompanied by lower prices, leaving a substantial carryover stock that will further complicate the 2026/27 season.

From drought to surplus

Producers experienced a dry spell from October to November 2024, delaying summer grain plantings, with many only sowing as late as mid-January 2025. Another dry period followed in late January and early February. Yet, when the rains returned, production areas experienced excessive rainfall through April, raising concerns about potential damage to summer grain and oilseed crops. Coming off a previous drought season, pessimism was widespread in the industry, particularly among producers.

Initial forecasts from the Crop Estimates Committee (CEC) reflected these concerns. In reality, however, this proved not to be the case, as illustrated by the comparison between the monthly estimates and the final harvest.

Despite the negative sentiment from the previous season, coupled with high prices during the drought year (import parity) and concerns about crop size and quality, prices remained high far longer than they should have (*Figure 1*). They dipped in October 2025 before recovering, only beginning to decline in early November when the crop's true size became apparent. Lower international prices and a stronger rand likely accelerated this drop.

By the final estimate on 27 November 2025, South Africa had produced a record-breaking crop of 2,771 million metric tonnes (mt). The sheer size of the harvest led to significant increases in surplus stockpiles, although it was too late to fully capitalise on export opportunities.

Some positive factors contributed to the reduction of carryover stocks, including record-high local crush and some soya bean exports to Zimbabwe and Eswatini. Current carryover stock predictions in the trade range from 300 000 to 375 000mt, with the National Agricultural Marketing Council's South African Grain and Oilseeds Supply and Demand Estimates Committee predicting 421 696mt, including pipeline stocks (9 January 2026 estimate). This is likely to decrease in their next estimate, given the higher crush numbers that have since been published.

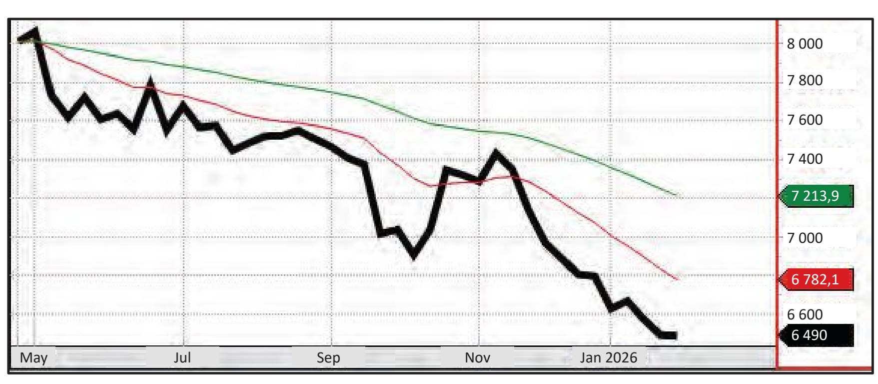
New season challenges

In the cyclical nature of South Africa's commodity market, an ideal scenario would unfold as follows: prices should be high at planting time (October/November) to incentivise producers; if the new crop is good, prices should move towards export parity at harvest (April/May) to encourage exports; and finally, once the bulk of the surplus has been exported (currently around 20% of the soya bean crop), prices would likely rise again, most probably in July, initiating a new cycle. Any disruption in this cycle can have secondary implications.

Unfortunately, such a disruption occurred in May last year. Due to uncertainty around production, stocks, and prices no deep-sea exports took place. As a result, the relatively high carryover stocks are now being carried into the 2026/27 fiscal year. Complicating matters is the fact that South Africa is expecting another record soya bean crop this year.

Industry talk suggests the crop could reach as much as three million tonnes. Combined with low international prices, this means local prices may need to fall further to reach export parity and make deep-sea exports viable. It is important to note that when global prices decline and/or the rand strengthens, export parity also drops. Therefore, even if local prices

Figure 1: March 2026 soya bean Johannesburg Stock Exchange (JSE) futures contract (R/mt).



follow suit, the gap for exports is not automatically closed.

Another key consideration is how analysts calculate export parity, which is typically as a 'breakeven' figure. Profit margins and risk factors must also be considered, meaning that local prices often need to dip slightly below export parity to encourage profitable exports and trade.

Export markets

South Africa has several options when it comes to export markets. Over the past three years we have entered and/or exported to a number of new markets. Indonesia and Egypt were opened in response to the drought two years ago, representing markets we had not previously accessed.

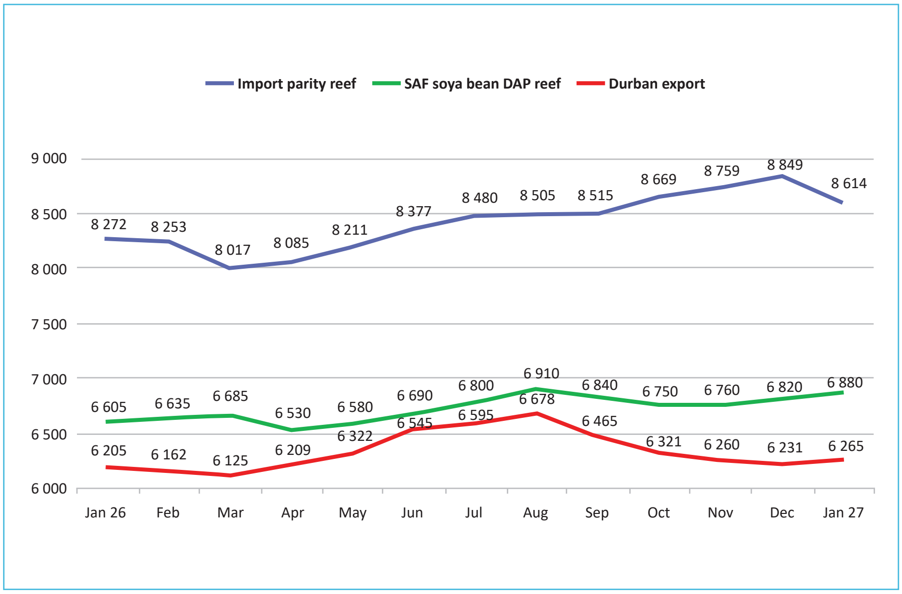
South Africa is particularly competitive in Southeast Asia and China, benefiting from a logistical advantage over the United States (US), Argentina, and Brazil. In addition, unlike many competitors, South African beans are typically high in protein and low in moisture.

Deep-sea exports from South Africa began only recently, with 253 000mt in 2022/23 and 620 000mt in 2023/24. However, the 2024/25 drought has so far prevented further exports. If rainfall returns in the 2026/27 season, South Africa could have a deep-sea exportable surplus of around 575 000mt, excluding 210 000mt of cross-border exports and 200 000mt in pipeline stocks. The two main challenges appear to be prices and harbour efficiencies.

Export timing and prices

The US dominates the global export market from October to January, immediately following its harvest. Brazil's peak harvesting occurs from February to April, though it remains active in the market for much longer. South Africa is typically most competitive between May and August, as shown in the monthly forward basis (*Figure 2*). Argentina primarily competes in soya bean cake exports. At the time of writing, local delivered prices were roughly R200 to R250/mt above export parity. For exports to become viable, the green price trendline would need to fall below the red line between May and August 2026.

Figure 2: Monthly forward basis: SAF soya bean vs exports vs imports. (Source: Chester Africa)



Harbour terminals and transport

The Port of Durban is South Africa's most competitive gateway for grain and oilseed exports. It has three grain terminals: two owned by South African Bulk Terminals (SABT), namely Maydon Wharf and Island View; and a third, Maydon Wharf Agriport, owned by Transnet Port Terminals (TPT). The Maydon Wharf terminals have a limited draft, accommodating only handymax vessels of around 35 000mt, whereas Island View can handle supramax vessels of around 55 000mt. Other terminals are East London and Maputo, both of which can only handle handymax vessels.

A challenge arises from the fact that maize and soya bean are grown in the same production areas. High yields in one means high yields in the other. Indications point to a record maize crop of about 17 million mt, translating to an exportable deep-sea surplus of roughly 2,7 million mt. This will push the Port of Durban to maximum capacity, making it necessary to utilise both East London and Maputo. This will require further price cuts in the local market.

Efficient and cost-effective transport to the ports is critical for South Africa's global competitiveness. Historically, rail costs were about two-thirds of road transport, but Transnet's deregulation process has cast doubt on the scope of rail services. Only a few years ago, the target was to transport around 30% of exports by rail; this came to roughly 6% in the most recent export year. Road and rail transport costs will therefore have a significant impact on export performance and competitiveness.

Conclusion

There appears to be a significant surplus of soya bean stocks available for export. Soya bean prices have already fallen sharply and are approaching export parity. Removing this surplus is essential to support price increases in the next production cycle and the industry's future growth.

It is important to note that only around 20% of the crop is sold at export parity. The drawback of removing surplus stocks at lower prices is far outweighed by the benefits to the local market once prices recover. Nevertheless, the logistical challenges, particularly at the harbours, should not be underestimated.

Send an email to andre.vandervyver@sacota.co.za or info@sacota.co.za for more information.

World oilseeds market and trade, February 2026: EU soya bean meal imports signal another year of strong demand

Issued by the United States Department of Agriculture's Foreign Agricultural Service

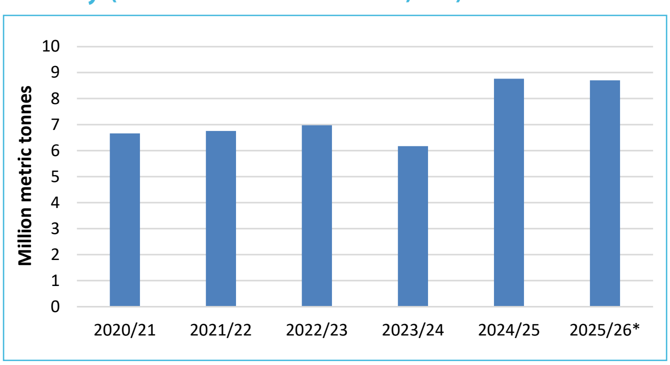
The United States Department of Agriculture (USDA) raised the 2025/26 (October to September) European Union (EU) soya bean meal import forecast in February by one million tonnes to 19,5 million tonnes, moving closer to last year's decade-high of 20,6 million tonnes.

EU-reported soya bean meal imports for the first two months of the marketing year show a strong 3,9 million tonnes, keeping pace with last year. Analysing data reported by major soya bean meal suppliers, including Brazil, Argentina, India and Ukraine, with appropriate lags to approximate delivery time, EU imports through February were expected to continue at last year's pace.

The EU's large soya bean meal imports in 2024/25 were on top of strong soya bean imports, enabling the highest soya bean meal consumption since 2008/09. Soya bean meal usage increased in part to offset reduced availability of rapeseed and sunflower seed meals as well as feed wheat, another alternative protein source, due to below-average production of these crops in 2024/25. Low global soya bean meal prices made soya bean meal an attractive alternative for feed producers. EU import unit values (CIF) averaged below US$400/t for the first time since 2019/20, declining from a peak of US$550/t in 2022/23.

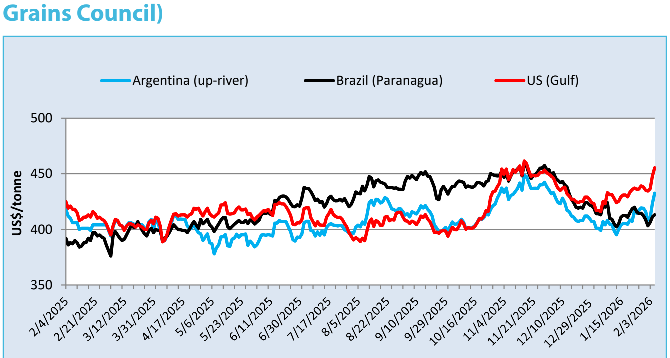
In 2025/26, soya bean meal consumption is expected to remain strong, though its share relative to other oilseed meals is reduced from last year. Large EU rapeseed and wheat crops are expected to enable a recovery in their feed usage. However, global soya bean meal prices remain low, which should continue through 2025/26 as record harvests in South America enable further crushing and export of soya bean meal. Price competitiveness driven by record global soya bean meal production will have a major positive influence on EU imports of soya bean meal in the remaining months of the marketing year.

Figure 1: EU soya bean meal imports from October to February. (Source: Trade Data Monitor, LLC)



**Estimated using exporter data.*

Figure 2: Soya bean export prices. (Source: International Grains Council)



All prices are free on board (FOB): US Gulf, Argentina Up-river, and Brazil Paranagua.

Overview 2025/26

Global oilseeds production has been raised on Brazil and Paraguay soya beans. Global oilseeds trade is increased on higher Canada rapeseed (canola) exports and EU sunflower seed exports, more than offsetting lower Australia rapeseed exports. Global crush is up on higher Brazil and Paraguay soya bean crush.

Global oilseeds stocks increased on higher Brazil soya bean carryout. Global protein meal trade is raised on higher Brazil soya bean meal exports. Global vegetable oil trade is raised on increased Malaysia palm oil and larger global soya bean oil exports from major suppliers. Vegetable oil stocks are unchanged. The projected United States (US) season-average farm price for soya beans is unchanged at US$10,20 per bushel.

Export prices

China's recent soya bean purchases, a weakening US dollar, and expectations of supportive biofuel policies pushed US soya bean prices to a two-month high. Meanwhile, favourable crop reports and weather conditions in Brazil bolstered expectations for a record soya bean harvest, widening the price gap between US and Brazilian origins. Soya bean meal prices held steady despite increased crushing activity, as declining Brazilian soya bean prices kept meal prices subdued.

Vegetable oil markets rallied over January and February. Rising petroleum prices and optimism surrounding US biofuel policy boosted soya bean oil prices across all origins, with US premiums climbing. Palm oil followed suit with Malaysia's discount to Indonesia narrowing amid falling Malaysian stocks.

For more information and the full report, visit *www.fas.usda.gov*

Assessing soya bean processing add-backs in soya bean meal via a dietary broiler performance test

By SC Wells, KN Gaffield, RD Goodband, CA Umberson, ES Greene, KB Nelson, and MT Kidd

Soya bean meal is the most commonly used oilseed meal in United States poultry diets. Soya beans are primarily grown for their oil content, and a by-product of the oil extraction process is defatted soya bean meal. Soya bean meal is often referred to as the 'gold standard' of protein ingredients used for poultry because it contains a high amount of protein, for example 44 to 49% crude protein (CP), and an amino acid profile that is complementary to that of maize and other cereal grains (Cromwell, 2012).

However, there are other by-products produced through the production of purified soya bean oil, namely gums and soapstocks, which this research investigates. These by-products will be referred to as soya bean 'add-backs'. Soya bean add-backs are lipid-based compounds removed from crude soya bean oil during the oil refining process. They include soya bean gums and soya bean soapstocks.

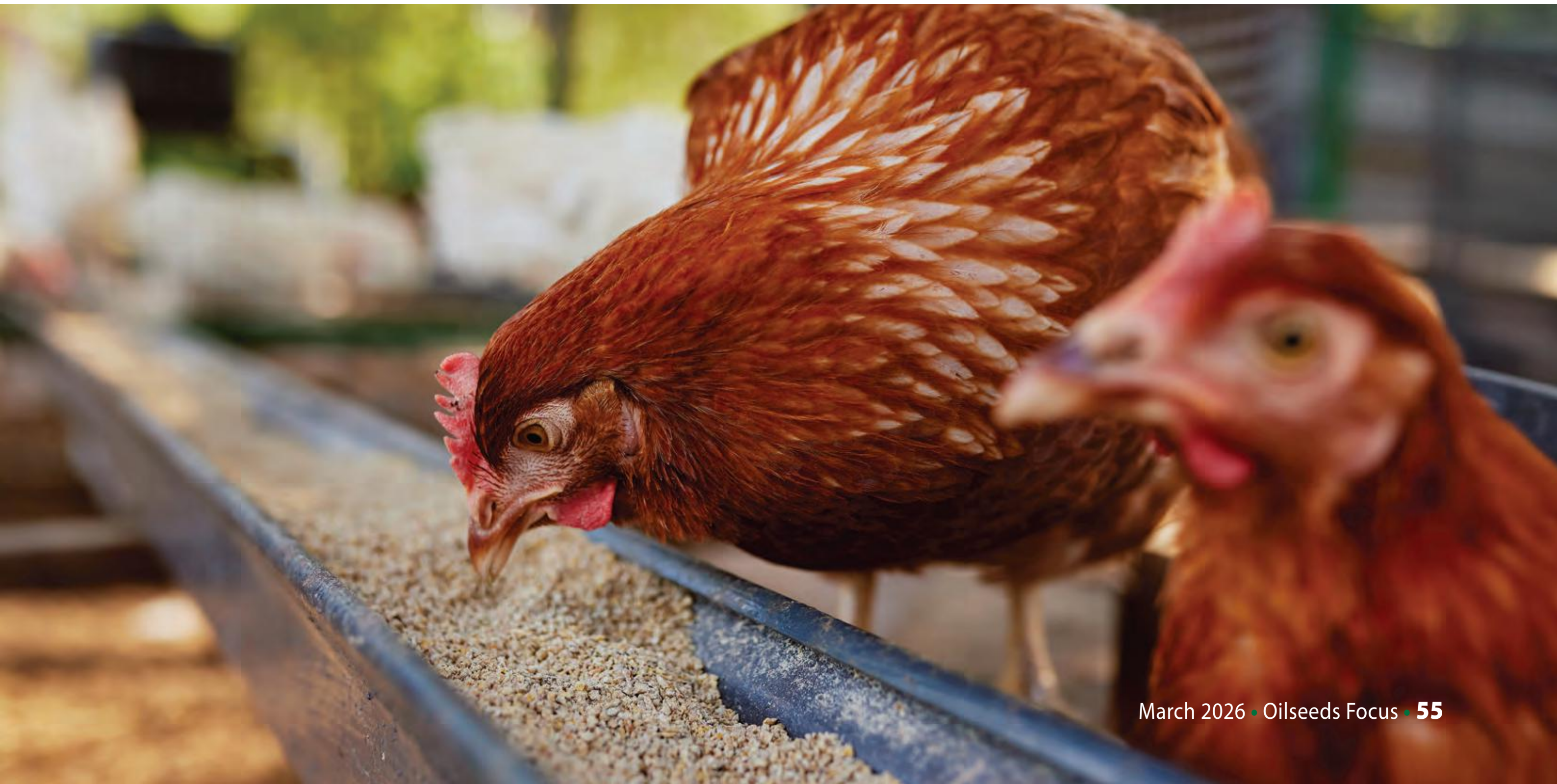
Soya bean gums are removed from soya bean oil through a process known as 'degumming'. In this process, phosphoric acid and water are added to crude soya bean oil, which causes the phospholipid-based gums to precipitate (Daun, 2004). After degumming, sodium hydroxide is added to precipitate the soapstocks from the oil, which are composed of free fatty acids and a mixture of mono- and diglycerides (Viera *et al*., 2015).

Because soya bean gums and soapstocks are lipid based, these authors hypothesised that they could be incorporated into the soya bean meal portion of the diet with no negative consequences on broiler performance, or possibly even improvements due to higher dietary energy. Therefore, the objective of this research was to investigate the effects of including soya bean add-back ingredients in broiler diets on live performance, gut health, processing characteristics, and body composition.

Experimental diets

Cobb 500 chicks used in this research were vaccinated for Marek's disease, infectious bursal disease, and coccidiosis, and then vent-sexed. All research herein and bird care were approved by the Division of Agriculture Institutional Animal Care and Use Committee of the University of Arkansas System.

Experimental diets were fed throughout the entire duration of the growing cycle (zero to 45 days) and were broken into three feeding phases: starter (zero to 14 days), grower (15 to 28 days), and finisher (29 to 45 days). Five maize- and soya-based diets (ten replicates per treatment)



were formulated with soya bean meal containing various levels of soya bean gums and soapstock, or the addition of an inert filler. The soya bean gums and soapstocks were included as treatments without assigned energy values, to mimic soya bean crush plant additions of these add-backs to soya bean meal. Calculated energy values of test diets were based solely on the energy contributed from the other ingredients.

Diet one contained soya bean meal with no add-backs, whereas diets two through five contained soya bean meal with either 4% gums, 4% soapstocks, 2% gums and 2% soapstocks, or 4% of an inert filler, respectively. Diet one was mixed independently. However, to reduce variability caused by differences in feedstuff composition, a common basal diet was formulated for diets two through five to which the add-back ingredients were added to create the experimental treatments.

When mixing diets two through five, the basal diet, minus the soya bean meal, was first mixed and set aside in the starter, and then moved to a designated bin in the grower and finisher mixes. Subsequently, the soya bean meal was added to the mixer along with the add-back ingredients. After the add-back ingredients were incorporated into the soya bean meal, the correct amount of the basal diet was added to the mixer, and the diet was mixed further prior to pelleting.

Prior to formulation, samples of maize and soya bean meal used in experimental diets were submitted for analysis of proximate and amino acid content. Analysis procedures followed methods from the Association of Official Analytical Chemists (AOAC, 1990) for methods 942.05 (ash), 930.15 (dry matter), 920.39 (fat/oil), 990.03 (CP), 978.10 (crude fibre), 982.30 (amino acids by hydrochloric acid), 994.12 (amino acids by performic acid), and 988.15 (amino acids by sodium hydroxide).

All diets were formulated to have the same energy level, except for any additional energy obtained by the addition of add-back ingredients. All essential amino acids were formulated to meet minimum ratios (Cobb, 2022) across the five treatments.

All diets were mixed in a vertical screw mixer, pelleted at 65,5°C, and bagged. Representative composite samples were collected during bagging, prior to analysis of proximate contents and total amino acids. Analysis procedures followed the AOAC methods.

Table 1: Influence of soya bean add-backs on broiler live performance during the zero- to 45-day growing period.

Treatment[1]	BW gain (kg)	Feed intake (kg)	FCR (kg)	Gut integrity[2]
Diet 1	3,584	5,598	1,539[a]	91,67
Diet 2	3,573	5,393	1,503[ab]	81
Diet 3	3,602	5,467	1,499[b]	81,67
Diet 4	3,606	5,44	1,506[ab]	100,26
Diet 5	3,646	5,536	1,505[ab]	82,57
SEM	0,037	0,053	0,01	5,936
P-value	0,679	0,0636	0,0229	0,0689

[1] Diet one served as the control and was devoid of soya bean add-backs. Treatment diets two through five contained soya bean add-backs or a filler replacing 4% of soya bean meal inclusion (1,6% of the diet). Add-back treatments represented: 4% gums (diet two); 4% soapstocks (diet three); 2% gums and 2% soapstocks (diet four); or 4% of an inert filler (diet five). [2] Gut integrity is plasma FITC-D concentration (ng/mℓ).

Table 2: Influence of soya bean add-backs on broiler carcass yields at 45 days.

		Dressed yields[2] (%)					
Treatment[1]	**Live BW (kg)**	**Peritoneal fat**	**Carcass**	**Breasts**	**Tenders**	**Wings**	**Legs**
Diet 1	3,679	1,05	74,46	22,63	4,28	7,52	22,29
Diet 2	3,651	1,09	74,43	22,44	4,17	7,57	22,31
Diet 3	3,66	1,08	74,34	22,22	4,16	7,65	22,41
Diet 4	3,715	1,09	74,93	22,53	4,22	7,62	22,41
Diet 5	3,65	0,95	74,59	22,45	4,18	7,63	22,46
SEM	4,105	0,05	0,25	0,23	0,05	0,04	0,15
P-value	0,788	0,174	0,522	0,802	0,558	0,234	0,932

[1] Diet one served as the control and was devoid of soya bean add-backs. Treatment diets two through five contained soya bean add-backs or a filler replacing 4% of soya bean meal inclusion (1,6% of the diet). Add-back treatments represented: 4% gums (diet two); 4% soapstocks (diet three); 2% gums and 2% soapstocks (diet four); or 4% of an inert filler (diet five). [2] All part yields are expressed relative to the BW of processed birds (live BW), with breast attributes being boneless and skinless, and leg quarters and wings being bone-in and skin-on.

Results and discussion

Analysed proximate contents and amino acid levels for the experimental diets were in close agreement with calculated total levels and remained similar in all diets. Average bodyweight (BW) at day 45 was 3,671kg, with an average mortality of 6,67%. Most of the mortality occurred near the end of the growing cycle due to heart attacks. Mortality was not influenced by dietary treatments ($P > 0,05$).

There was no significant effect of soya bean add-back ingredients on BW gain, feed intake, or plasma FITC-D concentration (*Table 1*). However, there was a significant effect of dietary treatment on feed conversion ratio (FCR). Birds fed diet one had a higher FCR compared to birds fed diet three, with birds fed diets two, four, and five being intermediate (*Table 1*). Diet one contained overall less fat compared to diets four and five.

Dietary fat has been shown to reduce passage rate of digesta through the gastrointestinal tract, which may allow for better nutrient absorption and utilisation, leading to a reduced FCR (Peebles *et al*., 2000; Baião and Lara, 2005; Latshaw, 2008). Regarding carcass traits, no significant responses were observed for dietary treatment on processing yields (*Table 2*),

Table 3: Influence of soya bean add-back ingredients on 45-day broiler body composition using dual-energy X-ray absorptiometry.

Treatment[1]	Protein (%)	Fat (%)	BMC[2] (%)
Diet 1	16,49	12,96	2,01
Diet 2	16,31	13,46	1,94
Diet 3	16,38	13,25	1,93
Diet 4	16,15	13,66	1,97
Diet 5	16,51	12,92	1,91
SEM	0,203	0,482	0,044
P-value	0,7293	0,8104	0,5382

[1] Diet one served as the control and was devoid of soya bean add-backs. Treatment diets two through five contained soya bean add-backs or a filler replacing 4% of soya bean meal inclusion (1,6% of the diet). Add-back treatments represented: 4% gums (diet two); 4% soapstocks (diet three); 2% gums and 2% soapstocks (diet four); or 4% of an inert filler (diet five). [2] BMC represents bone mineral content and consists of the ash fraction of the bird.

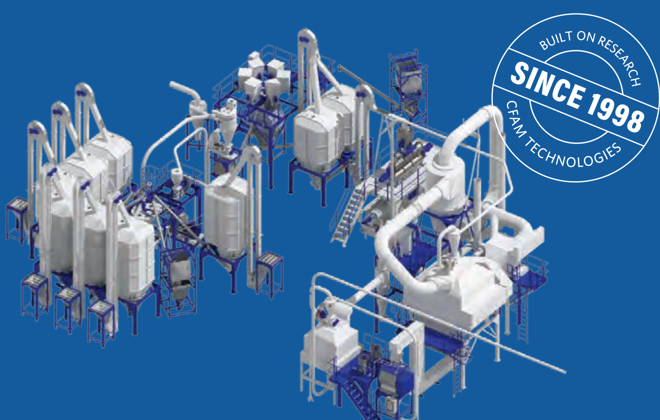
incidence or severity of woody breast, or body composition (*Table 3*).

The data demonstrate that overall bird live performance and processing characteristics were not affected by the inclusion of soya bean add-back ingredients. Soya bean gum and soapstock additives were incorporated into the diet at a level of 4% of the soya bean meal proportion without any loss in performance. It could prove beneficial for more research to be conducted under different settings, including lower diet energy levels, the use of lower-quality soya bean meal, and higher inclusion of the test ingredient. The characterisation of add-back ingredient quality is limited; once established, further research testing on add-backs with the incorporation of exogenous enzymes may prove applicable to the industry.

In this experiment, the basal diet energy levels were formulated according to current recommendations (Cobb, 2022). Therefore, any benefit that may have been conferred through the addition of added energy was minimised. Moving forward, it would be beneficial to observe how birds respond to soya bean add-backs when fed a diet limiting in energy. Moreover, no statistical difference was detected for any parameter aside from FCR, but some parameters approached significance: feed intake, P = 0,06; plasma FITC-D concentration, P = 0,07; fat yield, P = 0,17. Perhaps with higher inclusion of the test ingredients, these means could be statistically separated further.

Lastly, the rationale behind this experiment was that soya bean gums and soapstocks, which are considered impurities in soya bean oil, might be added back to soya bean meal to create a value-added, higher-energy soya bean meal. However, the soya bean meal used in this experiment had a CP level of above 48%, resembling excellent-quality soya bean meal. Adding these add-backs to a lower-quality soya bean meal (for example 44% CP) may have additional practical merit following the former rationale.

This article was condensed for publication in *Oilseeds Focus*. Visit *www.doi.org/10.1016/j.japr.2025.100596* for the full article or send an email to mkidd@uark.edu



New plant breeding techniques to boost the resilience of the food system

By DY Areche-Mansilla, FO Areche, DDC Flores, RJM Yapias, RL Gomez, JAJ Dominuez, WAC Poma, ERA Surichaqui, JDL Molina, CF Miranda, FP López, JQ Rodríguez, JZ García, and JCA Rojas

Food security and resilience are critical challenges in the 21st century, driven by a rapidly growing global population, climate change, and the depletion of natural resources (Mbow *et al.*, 2020). Ensuring everyone has access to sufficient, safe and nutritious food is essential for maintaining health and wellbeing, as well as for social and economic stability.

The resilience of food systems is equally important, as they can withstand and recover from various shocks and stresses such as extreme weather events, pest outbreaks, and economic fluctuations. In this context, plant breeding plays a pivotal role in enhancing food security and resilience by developing crop varieties that are more productive, nutritious, and resistant to biotic and abiotic stresses (Ngongolo and Mmbando, 2024).

The traditional methods of plant breeding, which have been applicable for thousands of years, involve selecting and crossbreeding plants with desirable traits. While these methods have been successful in improving crop yields and quality, they have significant limitations, including long development times and limited genetic diversity. New plant breeding techniques (NPBTs) have emerged as powerful tools for crop improvement to address such challenges.

NPBTs, such as clustered regularly interspaced short palindromic repeats (CRISPR)-Cas9, transcription activator-like effector nucleases (TALENs), zinc finger nucleases (ZFNs), and oligonucleotide-directed mutagenesis (ODM), allow for precise and targeted modifications of plant genomes, enabling the introduction of beneficial traits more quickly and accurately than traditional methods (Ahmad *et al.*, 2024).

This article aims to provide an overview of NPBTs and their potential to boost food system resilience.

History of plant breeding

Traditional plant breeding methods, which have been operational for millennia, involve the selection and crossbreeding of plants with desirable traits to produce improved offspring (*Table 1*). This process relies on the natural genetic variation within a species, which is often lengthy and iterative. Breeders select parent plants with specific traits such as disease resistance, higher yield or improved nutritional content, and cross them to produce new varieties that combine these traits (Bradshaw, 2017). This method has been instrumental in developing numerous crops, forming the basis of modern agriculture and contributing significantly to food production and security.

Table 1: History of plant breeding and genetics.

Period/year	Event	Significance
8000 BCE	Domestication of plants	Beginning of agriculture, selection of wild plants with desirable traits
1600s	First hybridisation	Early hybridisation techniques such as grafting in China
1865	Mendel's laws of inheritance	Modern genetics through pea plant experiments
1940s to 1960s	Green revolution	Development of high-yielding crop varieties
1980s	Genetic engineering	Direct manipulation of plant genetic material
2000s	Genetically modified organisms (GMOs)	GMOs with traits such as pest resistance
2020s	CRISPR and new breeding techniques	Precise genome editing for traits such as climate resilience

New plant breeding techniques

NPBTs encompass a range of advanced methods that enable precise and targeted modifications to plant genomes. Unlike traditional breeding methods, which rely on crossbreeding and selection based on natural genetic variation, NPBTs utilise molecular biology tools directly to alter DNA sequences. It enabled the introduction, deletion, or modification of specific genes with accuracy.

NPBTs' classification can depend on their mechanisms of action based on genome editing techniques, including CRISPR-Cas9, TALENs, and ZFNs, as well as targeted mutagenesis methods like ODM (*Figure 1*). These techniques represent a significant advancement in plant breeding, offering the potential to develop crop varieties with improved traits more quickly and accurately.

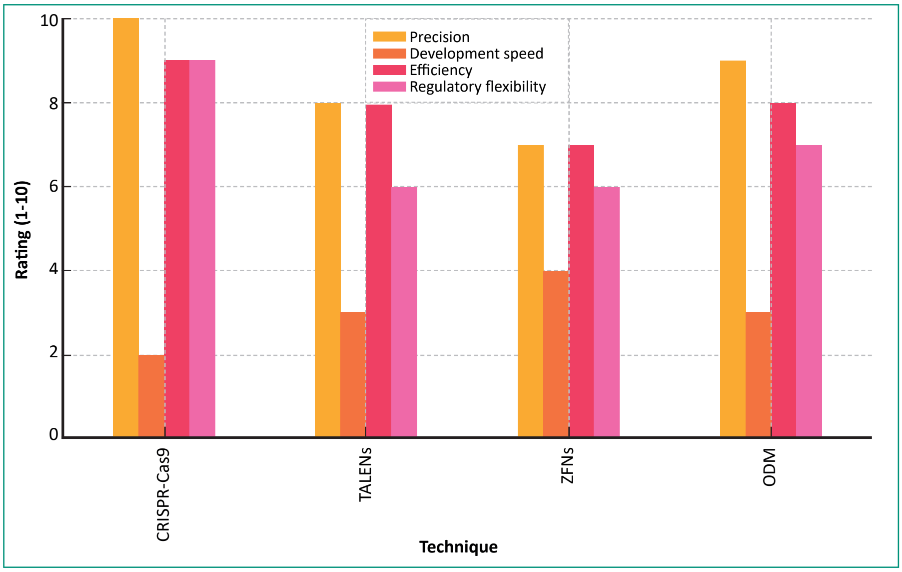
NPBTs in crop improvement

The applications of NPBTs in crop improvement are vast and transformative, offering precise and efficient methods to enhance crop traits. NPBTs enable targeted genetic modifications, significantly improving crop yield, quality, and resilience. These technologies have been aiding in developing disease-resistant varieties, reducing the need for chemical pesticides and increasing agricultural sustainability. They also enable the creation of crops with improved tolerance to abiotic stresses such as drought, salinity, and extreme temperatures, which is crucial in battling climate change.

Furthermore, NPBTs have been suitable to enrich the nutritional content of crops, such as increasing the levels of essential vitamins and minerals, and addressing malnutrition and health issues in developing countries (Singh *et al*., 2024).

The ability to introduce specific traits rapidly and accurately makes NPBTs invaluable for addressing global food security challenges, ensuring a stable and nutritious food supply in a changing world. *Figure 2* depicts the utilisation of NPBTs for augmenting crop development. It compares CRISPR-Cas9, TALENs, ZFNs, and ODM for their effectiveness in increasing yield, disease resistance, abiotic stress tolerance, and nutritional quality.

Figure 1: Overview of new plant breeding techniques



Enhancing yield and productivity

NPBTs offer unparalleled accuracy in editing the genomes of crops to enhance yield and productivity (Mbinda, 2024). By targeting specific genes that regulate plant growth and development, these techniques can increase photosynthetic efficiency, optimise resource allocation, and boost reproductive traits.

For example, CRISPR-Cas9 has been effective in knocking out genes that limit the number of flowers or seeds a plant can produce, resulting in higher yields (Sojka *et al*., 2024). TALENs and ZFNs can similarly modify genes involved in growth hormone pathways to produce larger and more robust plants. These modifications increase the amount of food produced per hectare and improve the efficiency of resource use, contributing to more sustainable agricultural practices.

Resistance to pests and diseases

NPBTs are instrumental in developing crops with resistance to pests and diseases, reducing the need for chemical pesticides and mitigating crop losses. Techniques such as CRISPR-Cas9 allow a distinct deletion or alteration of genes that confer susceptibility to diseases (Asif *et al*., 2024). For instance, scientists have used CRISPR-Cas9 to edit the genome of rice to bestow resistance to bacterial blight by disabling specific susceptibility genes. Similarly, TALENs have been able to develop tomato plants resilient to bacterial spot disease. These genetic modifications enhance the plant's innate immune system, enabling it to fend off pathogens more effectively.

Tolerance to abiotic stresses

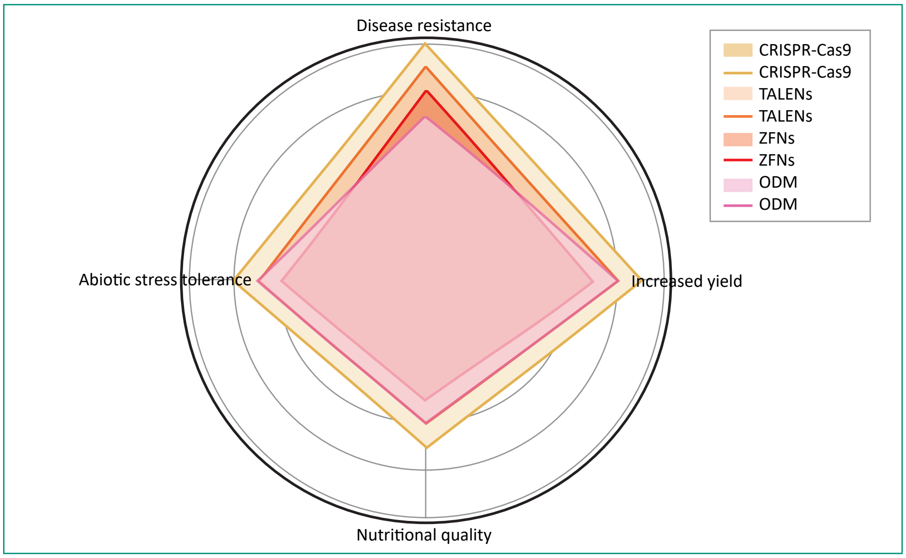
Abiotic stresses, such as drought, salinity, and extreme temperatures, pose significant challenges to agricultural productivity. NPBTs enable the development of crops that can withstand these harsh conditions by targeting genes involved in stress response pathways (Saeed *et al*., 2024). CRISPR-Cas9 has been beneficial in enhancing drought tolerance in maize by editing genes associated with water-use efficiency and root architecture (Saeed *et al*., 2024). Similarly, researchers have used TALENs to develop wheat varieties with improved salt tolerance by modifying genes involved in ion transport and osmotic balance.

Nutritional quality and shelf-life

Improving the nutritional quality and shelf life of crops is another critical application of NPBTs. CRISPR-Cas9 and ODM can be useful in raising the levels of essential vitamins, minerals, and other nutrients in crops (Saeed *et al*., 2024). For instance, the use of CRISPR-Cas9 has been increasing the beta-carotene content in rice, commonly known as 'golden rice', to address vitamin A deficiency in developing countries (Satyanarayana, 2024). Similarly, NPBTs can be effective in boosting the protein content in staple crops such as maize and wheat, providing better nutritional value.

Along with nutritional enhancements, NPBTs can improve the shelf life of fruits and vegetables by targeting genes responsible for ripening and spoilage. For example, CRISPR-Cas9 has helped effectively delay the ripening process

Figure 2: Applications of NPBTs in crop improvement.



in tomatoes by editing genes involved in ethylene production, extending their storage life and reducing food waste (Nie *et al*., 2024).

Crops improved through NPBTs

The application of NPBTs has notably improved various crops, intensifying their resilience and productivity. CRISPR-Cas9 has been benefitting the development of rice varieties with enhanced resistance to bacterial blight by targeting and disabling susceptibility genes such as OsSWEET14, resulting in higher yields and reduced reliance on chemical pesticides.

TALENs have been functional in producing wheat varieties resistant to powdery mildew by editing the Mildew Resistance Locus O (MLO) gene, which has led to more stable and increased yields with less need for fungicides (Wang *et al*., 2014). Additionally, ZFNs have been desirable in creating herbicide-resistant maize by introducing particular mutations in the acetolactate synthase (ALS) gene, allowing for more effective weed control and improved crop management.

These genetic advancements boost food security by ensuring more stable crop yields, as well as promote sustainable agricultural practices by lowering the dependency on chemical inputs and minimising environmental pollution (Wang *et al*., 2014).

Impact on food security

The improvements in these crops through NPBTs have a profound impact on food security and resilience. Enhanced disease resistance in rice and wheat ensures more stable yields, reducing the risk of crop failure and increasing food availability. Herbicide-resistant maize provides more effective weed control, leading to higher productivity and lower production costs. These advancements contribute to a more resilient agricultural system, capable of withstanding various biotic and abiotic stresses, thereby ensuring a stable food supply in the face of climate change and other challenges.

Emerging technologies

Emerging technologies and advancements in the field of NPBTs promise to further boost the precision, efficiency, and scope of crop genetic improvement. One such advancement is the development of CRISPR-Cas variants with improved specificity and reduced off-target effects.

Innovations, such as CRISPR-Cas12 and CRISPR-Cas13, expand the toolbox for genome editing by targeting different types of genetic material, including RNA (Nie *et al*., 2024). Additionally, progress in base-editing and prime-editing techniques allows for more precise modifications at the nucleotide level, enabling targeted changes without introducing double-strand breaks in the DNA. These technologies will minimise unintended mutations and improve the overall safety and efficacy of NPBTs.

Integration of NPBTs

Integrating NPBTs with other biotechnological approaches can remarkably enhance their capabilities and applications. For instance, combining genome editing with synthetic biology can enable the design of crops with complex, multi-gene traits tailored to specific agricultural needs. Synthetic biology approaches can be beneficial in constructing novel biosynthetic pathways and improving traits, such as nutritional content, stress tolerance, and disease resistance. Machine learning and artificial intelligence can further optimise NPBT applications by analysing large datasets to predict gene function and identify optimal target sites for editing.

Moreover, evolutions in high-throughput phenotyping and omics technologies (genomics, transcriptomics, proteomics, and metabolomics) can provide comprehensive insights into plant responses to genetic modifications, facilitating the development of more resilient and productive crops.

Future research and prospects

Future research in plant breeding will focus on integrating advanced genome editing tools such as CRISPR-Cas9, ZFNs, and TALENs to develop crops with enhanced resilience to environmental stresses (drought and salinity), pests, and diseases, while ensuring greater precision and reduced off-target effects. A significant emphasis will centre on developing climate-resilient crops by identifying and incorporating genes responsible for stress tolerance, supported by high-throughput phenotyping technologies for accurate trait selection.

Omics approaches, including genomics, transcriptomics, proteomics, and metabolomics, will deepen the understanding of complex plant stress responses, enabling more targeted breeding strategies. Advanced techniques like marker-assisted selection and genomic selection will streamline the breeding process. Meanwhile, speed breeding methods will shorten crop development cycles.

The prospects of plant breeding techniques hold immense potential to revolutionise global food systems by promoting sustainable agricultural practices. Enhanced breeding strategies will produce crops that require fewer inputs such as water, fertilisers, and pesticides, reducing the environmental footprint of agriculture.

Climate-resilient crops will play a critical role in ensuring global food security, especially in regions vulnerable to climate change, by thriving under adverse conditions and stabilising food production. Efforts to diversify crops will promote the use of underutilised but nutrient-rich species, broadening the agricultural base and improving ecosystem resilience. Future breeding programmes will also prioritise consumer preferences, enriching traits such as flavour, nutritional value, and shelf life to meet market demands.

Conclusions

NPBTs revolutionise crop improvement by enabling precise genetic modifications for enhanced yield, disease resistance, stress tolerance, and nutritional quality. These techniques help stabilise yields, reduce chemical inputs, and promote sustainable agriculture. Despite varying global regulations and public perception challenges, NPBTs are vital for ensuring food security amid climate change and population growth.

Collaborative efforts and regulatory harmonisation are crucial factors in addressing ethical and societal concerns in fostering trust and accessibility. The future of plant breeding lies in integrating NPBTs with other biotechnological innovations to create resilient, nutritious crops.

For references or the full article, visit *www.doi.org/10.54910/sabrao2025.57.4.11*

Money can't be eaten

By Hans-Jurie Moolman, Moolman & Pienaar Incorporated

When the last tree is cut down, the last fish eaten, and the last stream poisoned, you will realise that you cannot eat money. – Native American saying

According to the 2017 Census of Commercial Agriculture by Statistics SA, a total of 46,4 million hectares, or 37,9% of the country's total land area of 122 million hectares, are used for commercial agriculture. Of this, 36,5 million hectares are dedicated to grazing while only 7,6 million hectares are used for crop cultivation. 'Commercial agriculture' refers to farming activities conducted on a scale where products are sold – that is, where production exceeds household or subsistence needs.

With a growing population of around 63 to 64 million people and a volatile climate resulting in frequent droughts, floods and hailstorms, one cannot help but admire the resilience of South Africa's agricultural sector. Year after year, despite mounting challenges, farmers continue to produce. Yet, this also underscores how fragile our national food security is when nature falters or natural resources are depleted.

Pollution deepens the crisis

Beyond the tenacity of our producers and the many pressures they face, South Africa's rural areas are increasingly burdened by pollution, a growing threat to both agriculture and public health. Contamination of this nature undermines the fundamental right to a healthy environment, a right enshrined in Section 24 of the *Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)*.

Municipal sewage is routinely discharged into freshwater sources, while legal and even illegal mining operations continue to release hazardous by-products into the environment. Landfills, often poorly managed or entirely unregulated, are multiplying across the country. Despite these escalating threats, the political will to address the crisis effectively seems to be absent.

Meanwhile, vast tracts of South Africa's natural grazing land are being degraded through overgrazing. Experts warn that the rehabilitation of such areas can take anywhere from three to ten years – years during which the land must lie fallow to recover.

Applicable legislation

All these activities are governed by existing legislation which imposes severe penalties on individuals who commit environmental offences. The key laws and regulations relevant to the agricultural sector include:

- *National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA).*
- *National Environmental Management: Waste Act, 2008 (Act 59 of 2008).*
- *Environment Conservation Act, 1989 (Act 73 of 1989).*
- *National Water Act, 1998 (Act 36 of 1998).*
- *Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).*
- *Preservation and Development of Agricultural Land Act, 2024 (Act 39 of 2024).*

However, legislation is ineffective without proper enforcement. Individuals affected by pollution may, in future, have to take action themselves, for example by submitting sworn affidavits and lodging complaints with the relevant law enforcement authorities, as provided for in the legislation.

Communities may also unite to initiate group or class actions (as permitted by the *Constitution*) to compel offenders to comply with court orders and to hold authorities accountable for enforcement. Pollution control is a race against time, and in many cases delays in action can result in irreversible damage to natural resources.

Roll up your sleeves

If we, as citizens, are truly committed to South Africa's future and the preservation of its natural resources, each of us must take responsibility for managing our immediate environment. This begins with awareness, or recognising the impact of pollution and, with expert guidance, taking action to address it and hold offenders accountable. Technology can play a vital role in this effort by helping to gather and document evidence.

Responsible resource management is now widely recognised as an integral aspect of good corporate governance. This places a significant duty on businesses to strike a balance between profitability and sustainability. A quick drive through Johannesburg and other historic mining regions serves as a stark reminder of the environmental legacy we must avoid repeating.

Our time on this earth is limited. We owe it to future generations to leave South Africa, our beautiful home, in a better condition than we found it.

For more information, contact Hans-Jurie Moolman at hj@mmlaw.co.za or 018 297 8799 (Potchefstroom) or 033 032 0241 (Pietermaritzburg).

King IV vs King V: What is new?

Edited for Oilseeds Focus

The Institute of Directors of South Africa released the *King V Report* on 31 October 2025. This report will be effective for financial years that start on or after 1 January. It is crucial that businesses familiarise themselves with this report, as it supersedes the *King IV Report*. SME South Africa compiled the following article to highlight the differences between *King IV* and *King V*, as well as give background as to why changes were necessary.

Changing times and landscapes

The governance landscape is constantly changing, and so are the challenges faced by organisations. This environment makes the need for updated, robust standards of corporate governance, as provided by the new *King V Report*, more essential than ever for long-term sustainability and value creation.

It's essential to gain a clear understanding of why the King Committee exists, and how the *King Report* has progressed from *King I* all the way to *King V*. The King Committee began just over three decades ago in 1992 by the Institute of Directors in Southern Africa, whose name is now known as the Institute of Directors South Africa (IoDSA).

The intention behind this committee was to ensure that standards were set for corporate governance as a means to benefit the South African economy and those affected by it.

When the King model for governance began, South Africa was transitioning from a system of unequal opportunity to one of equality, and a new governance model was needed to reflect this societal shift.

At the time, governance codes worldwide, such as the *Cadbury Code* in the United Kingdom, focussed narrowly on financial control and shareholder primacy. South Africa needed something broader and more inclusive. Encouraged by Nelson Mandela, King assembled a diverse, 'rainbow' committee that represented the social and political transformation of the time.

To reject the purely shareholder-focussed approach, the committee introduced a new philosophy. Companies should make decisions in the long-term interest of the organisation, while taking into account the needs, interests, and expectations of all stakeholders. This was the birth of the stakeholder-inclusive governance model, which became the cornerstone of the *King Reports*.

The first *King Report on Corporate Governance* was *King I*, released in 1994. This report established South Africa as a thought leader. Following that first report was *King II* (2002) and *King III* (2009), which introduced groundbreaking concepts such as sustainability, integrated thinking, and integrated reporting. This recognised that corporate performance extends beyond financial metrics and included environmental, social, and governance (ESG) impacts.

Why a new *King Report*?

The governance landscape evolves, and so do business challenges. This means a new report is required to reflect today's global challenges. Some of these challenges include sustainability, technological evolutions, supply chain issues, and more.

There was a need for a *King Report* that simplifies previous frameworks, removes technical jargon, and introduces a new approach to governance. This allows organisations to govern more transparently and effectively.

King IV vs *King V*: Key differences

To gain an understanding of the need for an updated report, let's have a look at the key differences between the *King IV* (2016) and *King V* (2025) codes.

1 Simplification and accessibility

***King IV*:** Very detailed and extensive, with multiple sections, annexes, and sector-specific supplements. Covered all types of organisations, but it could be complex for small businesses.

***King V*:** Streamlined code and separate disclosure framework. Written in simpler language, making it easier to understand and apply. Designed to scale to businesses of all sizes, from SMEs to large corporations.

Key takeaway: You don't need to read hundreds of pages. Focus on the principles relevant to your business size and sector. *King V* is more practical and adaptable.

2 Outcome-focussed governance

***King IV*:** Introduced the concept of 'apply and explain', where you implement practices and explain how. Emphasised ethical leadership, sustainability, stakeholder relationships, and integrated thinking.

***King V*:** Moves beyond just applying practices. It focusses on four real governance outcomes: ethical culture, value creation and sustainable performance, effective conformance and control, and legitimacy and trust in stakeholders.

Key takeaway: It's no longer enough to just follow processes. Your business must demonstrate actual results: ethical behaviour, fair treatment of stakeholders, and long-term value creation.

3 New governance areas

King V introduces:

- Data, information, and technology governance (including artificial intelligence, cybersecurity, and digital risks).
- Stronger emphasis on systems value creation; your business exists within economic, social, and environmental systems.
- Embedding the Ubuntu-Botho philosophy. It emphasises care for people, community, and society as part of leadership culture.

Key takeaway: You need to think beyond finances. Protect your data, consider environmental and social impacts, and build a company culture that reflects ethical values as well as community responsibility.

4 Stakeholders and leadership

***King IV*:** Encouraged stakeholder inclusivity, ethics, and accountability.

***King V*:** Takes it further. Ethical leadership must start from onboarding, and stakeholders are central to governance outcomes. Public sector engagement is highlighted, and corruption prevention and accountability are core.

Key takeaway: Integrate ethics and stakeholder responsibility into your business culture from day one. It shapes employee behaviour and brand trust.

5 Disclosure and reporting

***King IV*:** Placed an emphasis on reporting governance practices.

***King V*:** Introduces a formal disclosure framework. You must show not only what you do, but also whether your governance practices achieve the intended outcomes.

Key takeaway: Prepare to show real results to investors, customers, and regulators. Reporting should reflect both processes and the impact of your governance.

6 Proportionality and flexibility

King V emphasises adapting practices to your business size, complexity, and context. SMEs and small organisations are not required to adopt the same measures as multinational corporations, but the principles still apply.

Key takeaway: You can scale governance requirements to fit your business while still meeting *King V* standards. Focus on ethical decision-making, accountability, and value creation relative to your resources.

Principles and practices

The *King V* code outlines a set of recommended practices based on the current climate faced by businesses. These principles and practices vary from leadership, all the way to risk:

Leadership

A strong company starts with its leadership. This means you must ensure the leadership in your company lead the team with honesty and integrity, is competent and fully understand the company's vision, approve policies and ensure they are followed, and is responsible.

Ethics

Your governing body must create an environment where there's an ethical culture. To ensure this happens, the governing body should provide direction by setting clear ethical standards, approve policies and programmes that affect the organisational ethics, and oversee and monitor the implementation of policies.

Strategy, performance, and value

Your strategy should focus on long-term success, not just short-term gains. Make sure the strategy matches the business's purpose and values. Track progress with clear goals and targets, and assess how risks and opportunities affect results.

Reporting

Good reporting keeps stakeholders informed. Best practices include publishing reports that show financial results and sustainability efforts, being clear about risks and how the business affects people and the environment, and ensuring reports are accurate and readable.

Board composition

A balanced board improves decision-making. There should be alignment in terms of a balanced composition. Best practices include having mostly non-executive members (the majority of whom are independent), including people with different skills and backgrounds, planning for board renewal and succession, and managing conflicts of interest openly.

Committees

The governing body ensures that arrangements for delegation to committees and individuals within its structures promote the objective and effective discharge of its obligations. Each committee has clear responsibilities, and the right skills and experience. The board remains accountable for all decisions.

Management and delegation

The governing body should appoint strong managers and ensure there's a clear clarification of authority: The CEO links the board and management, determine which decisions the board makes and which management handles, and have plans for key role succession.

Risk

Managing risks is essential. Recommended practices include identifying risks and emerging threats, making plans to reduce or manage risks, and including risk management in daily decisions.

Compliance

Following laws and rules is key. Best practices involve creating policies to ensure compliance, monitoring compliance and fixing issues quickly, and including compliance in strategy and risk management.

Technology and information

Technology is vital for modern businesses. With cyber risks, it's important to protect your business through good practices. Leaders should align IT with business goals, protect data and ensure cybersecurity, and monitor technology risks and opportunities.

Remuneration

Organisations and businesses must ensure they pay people fairly and responsibly. Align pay with business goals and performance. Be transparent about how decisions are made.

Assurance

Assurance gives confidence that governance is effective. Recommended practices include using audits, risk reviews, and compliance checks, and ensuring those providing assurance are independent.

Stakeholders

Your business depends on people. Best practices include engaging regularly with employees, customers, suppliers, and communities, considering the interests of stakeholders in decisions, and building relationships that benefit all parties.

The original article can be read at *www.smesouthafrica.co.za*

Seasonal workers in the agricultural sector

By James Pretorius, legal advisor, LWO Employers Organisation

Seasonal employees are vital to South Africa's agricultural sector, especially when producers depend on additional labour during peak periods such as planting and harvesting. While seasonal employment is an operational necessity, there is often uncertainty or a lack of awareness regarding the labour legislation governing it. This can result in avoidable disputes at the Commission for Conciliation, Mediation and Arbitration (CCMA) or compliance orders following inspections by the Department of Employment and Labour.

Appointment of seasonal workers

A seasonal employee is appointed for a defined period to meet increased labour demands during a particular season. These employees are typically employed under fixed-term contracts, as additional workers are required only for a specific seasonal period.

In terms of the *Labour Relations Act, 1995 (Act 66 of 1995)*, and depending on factors such as the size of the business and the employee's remuneration level, fixed-term contracts are permissible when the nature of the work is genuinely temporary. However, this must be clearly stated in the employment contract. Employers should ensure that the written contract specifies the temporary nature of the employment, including the start and end dates, the specific seasonal purpose, and that the contract will automatically terminate when the period, project, or season concludes.

Rights of seasonal workers

A common misconception is that seasonal workers have fewer rights than permanent employees. In fact, both are entitled to fair treatment under South African labour legislation. Employers must comply with the *Basic Conditions of Employment Act, 1997 (Act 75 of 1997)* and *Sectoral Determination 13 (SD13)* for farm workers.

The most common examples of this include:

- **Working hours:** Even during peak seasons, employers must comply with statutory provisions on working hours, overtime, and rest periods.
- **Equal treatment:** Employees on a fixed-term contract should be subject to the same treatment, disciplinary rules, and workplace policies as permanent employees.
- **Payment:** Work performed on Sundays or public holidays must be compensated at the higher rates prescribed by law.
- **Unemployment insurance:** Employers in the agricultural sector must register seasonal employees working more than 24 hours per month with the Unemployment Insurance Fund (UIF).

Seasonal employment contracts typically end automatically on the agreed date or upon completion of the relevant season or project. However, complications can arise when:

- The contract is renewed without a valid reason. Employers should seek advice before doing so.
- The employer has created a reasonable expectation of renewal.
- The contract refers to a specific season but lacks a clear end date, and the employee is not given sufficient notice.

In such circumstances, termination may amount to unfair dismissal. Employers are therefore advised to avoid repeatedly renewing fixed-term contracts without proper justification.

Record-keeping and compliance

Labour inspectors frequently visit farms during peak seasons. The most requested documents during these inspections are:

- Signed employment contracts.
- Attendance registers.
- Detailed payslips.
- A list of employee identity numbers.
- Proof of registration for unemployment insurance.

This list is not exhaustive but provides a solid foundation for ensuring compliance with labour legislation. Plan your seasonal labour needs well in advance, consult a labour law specialist, and prepare employment contracts early so that they can be signed before work begins.

Treat seasonal workers fairly and consistently to prevent disputes, and maintain clear communication so that employees fully understand their terms of employment, rights, and obligations.

By using appropriate employment contracts, adhering to the provisions of *SD13*, and maintaining accurate records, employers can maximise the benefits of seasonal labour while remaining regulatorily compliant.

The LWO Employers Organisation assists employers to comply with labour law, and to use it to their advantage to protect their business. As a registered employers' organisation with the Department of Employment and Labour, the LWO has the right to represent members at the Commission for Conciliation, Mediation and Arbitration (CCMA). Take note that this article is not legal advice – consult one of our legal advisors about any specific legal problem or matter. For more information, send an email to info@lwo.co.za or visit *www.lwo.co.za*

LWO
WERKGEWERSORGANISASIE
EMPLOYERS ORGANISATION


JONSSON
WORKWEAR