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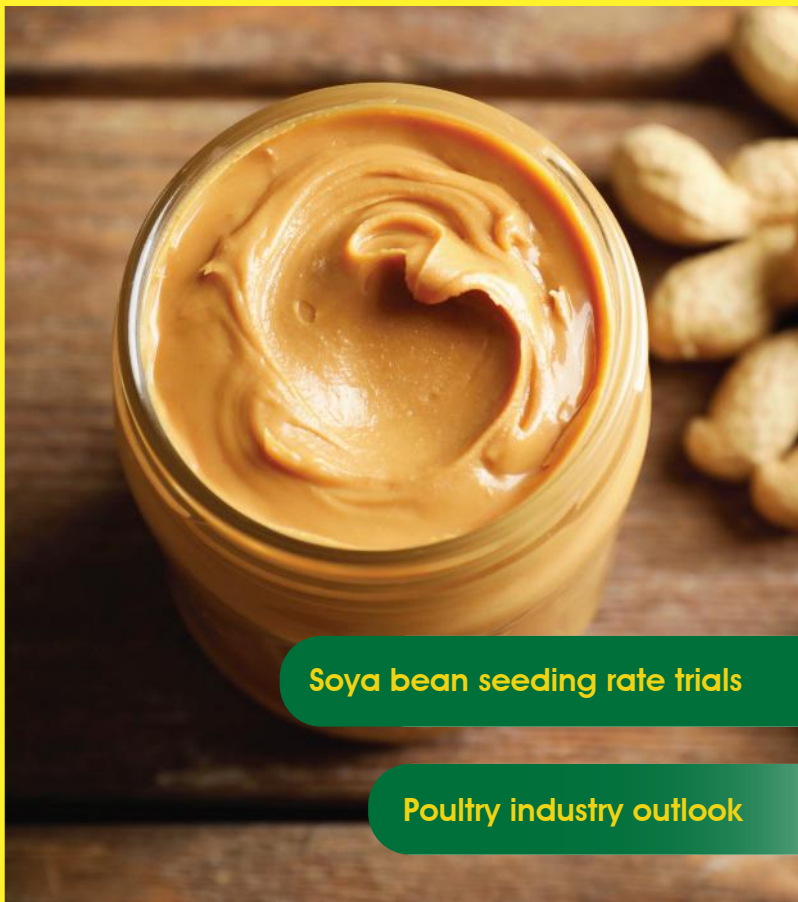
# OILSEEDS focus

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

Canola flowering vs planting date

Global fertiliser trends



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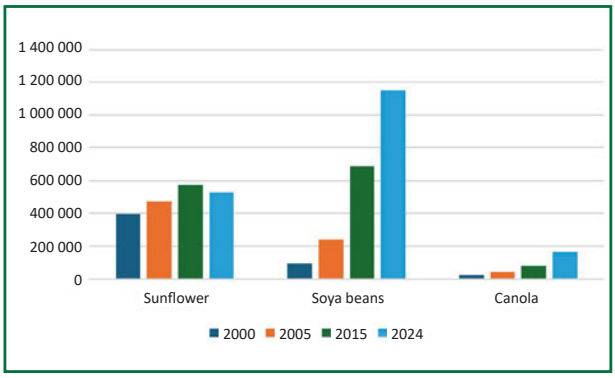
# Role of the grain storage industry in preserving oilseed quality in South Africa

*By Dr Charl van der Merwe, grain desk general manager, Agbiz Grain*

South Africa's oilseeds industry has become a key agricultural sector in the country's efforts toward food security, rural development, and agricultural sustainability. Over the last 20 years, oilseed production has grown markedly as part of the industry's strategy to replace imports with locally grown produce.

The introduction of new cultivars, expansion of crushing capacity in South Africa, ongoing research into production methods, and the adoption of conservation agriculture have all contributed to this focussed approach. The progress made in production is reflected in *Figures 1a* and *1b*.

**Figure 1a: Oilseeds area. (Source: SAGIS)**




## Storing oilseeds is essential

The production of oilseeds, like other agricultural commodities, is seasonal even though they are used throughout the year. Therefore, storage is necessary to ensure a continuous supply to processors and to support food security. The risk of oil becoming rancid is also reduced if the seed is not pressed until the oil is needed. Storing oilseeds is therefore an important aspect of the value chain and acts as a vital link between producers and processors.

The storage of oilseeds is affected by climate conditions, including high ambient temperatures and fluctuating humidity levels. These conditions, if left unmanaged, can speed up the breakdown of unsaturated fatty acids in oilseeds, leading to rancidity, lower oil yields, and off-flavours.

Oil-rich crops are particularly susceptible to self-heating when stored with excess moisture, creating an ideal environment for mould and mycotoxin development. This not only reduces their economic value but also compromises food and feed safety. Effective storage systems and good management practices are therefore essential to prevent financial and post-harvest losses, and to maintain the nutritional quality of the harvested crop.

## Preserve quality, prevent losses

Best practices within the storage industry (including continuous monitoring, routine inspection, effective fumigation, cleaning, and drying) aim to minimise the effects of moisture, heat, pest infestation, and fungal contamination, and focus on preserving the economic and nutritional value of the crop. Hence, the storage sector in South Africa has made significant capital investments – including investments in dryers, automated aeration systems, real-time temperature and humidity, and quality monitoring software.

Well-trained and skilled people who understand the science of grain preservation and implement best practices are a vital aspect of effective storage. Training and skills development are therefore critical in the continued drive to preserve oilseed quality during storage and to prevent post-harvest losses.

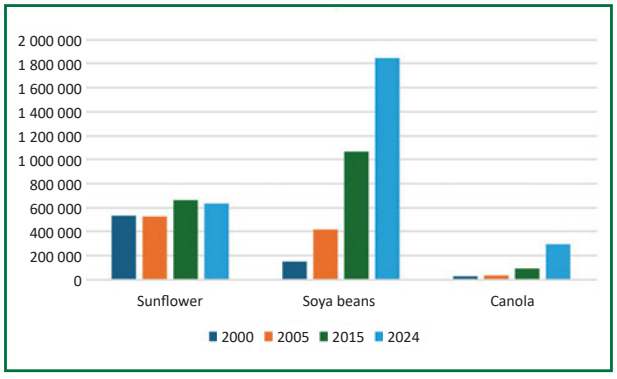
The grain storage industry is continuously focussing on industry-based efforts regarding capacity building, certification, and training programmes. One of the initiatives in this regard is the grain depot management course offered by the Peritum Agri Institute in Bloemfontein. This initiative is supported by Agbiz Grain.

## Focussing on collaboration

As South Africa positions itself to meet growing domestic and export demand for high-quality oilseeds, collaboration between storage operators, producers, research institutions, and the government will be essential. Policy frameworks must also evolve to support sustainable storage investments and incentivise the adoption of technologies.

When storage is done right, oilseed quality is preserved, post-harvest losses are minimised, and the entire value chain – from the producer to the end consumer – benefits.

**Figure 1b: Oilseeds volume (tonnes). (Source: SAGIS)**

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# A strong year for global oilseed production

Global oilseed production is projected to rise to 690 million tonnes in 2025/26, driven primarily by soya beans, palm oil, and rapeseed. Soya beans continue to dominate the oilseed sector, accounting for 39% of the global market.

## Outlook for oil production

Demand for plant-based oil, protein for animal feed, and biofuel production continues to support robust growth. Brazil's soya bean harvest for 2025/26 is forecast at 175 million tonnes – well ahead of the United States' (US) 117 million tonnes – underscoring Brazil's expanding role in global supply. Argentina is also showing a substantial increase, with 2024/25 production estimated at 49 million tonnes.

Together, palm oil and soya bean oil account for 63% of the world's vegetable oil production. For 2025, palm oil output is projected at 80,4 million tonnes and soya bean oil at 70,8 million tonnes, followed by sunflower oil at 56,3 million tonnes and rapeseed/canola oil at 34,5 million tonnes. Malaysia and Indonesia remain the top palm oil exporters, with production expected to increase, while China and India continue as the largest importers.

## Ukraine holds fast despite war

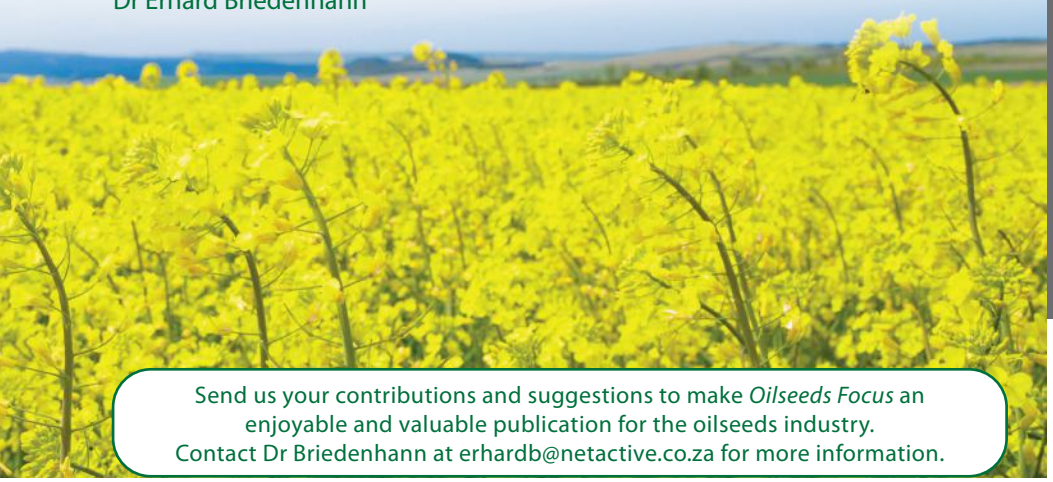
Russian sunflower production for 2025/26 is projected to reach a record 18 million tonnes, securing its position among the world's top producers. Ukraine's sunflower seed output, estimated at 14,4 million tonnes for 2024/25, accounts for roughly 25% of global production but is expected to remain stable. Despite ongoing challenges from the war with Russia, Ukraine maintains its status as the world's leading sunflower producer. The country is placing greater emphasis on domestic processing, strengthening its role as the leading sunflower oil exporter with a commanding 57% share of the global market.

Global canola production is forecast at 89,5 million tonnes, with Canada leading at 19,5 million tonnes, followed by the European Union. Rapeseed production for 2025/26 is estimated at 18,5 million tonnes, with France and Germany the major producers. Rising biofuel production, along with advances in seed development and farming practices, continues to drive oilseed production growth worldwide.

## Demand for biodiesel on the rise

Biodiesel production surged by more than 10% in 2024, reaching an estimated 76,3 million tonnes. Growth is being fuelled by rising demand, supported by government mandates encouraging biofuel adoption and assisted by advances in production technology. The US, Brazil, and Indonesia together account for 60% of global output.

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.

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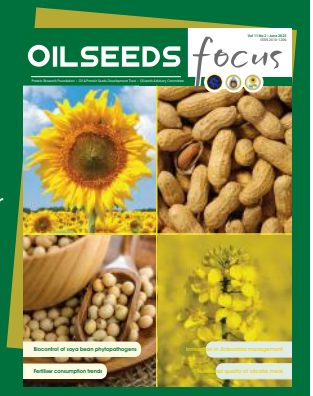



# CONTENTS





# NEWS

## Could the grain industry soon operate rail lines?

South Africa's grain industry has a clearer idea about the future of rail transport after Moshe Motlohi, acting chief executive of the newly established Transnet Rail Infrastructure Manager (TRIM), met with officials of Agbiz, Agbiz Grain, and the South African Cereals and Oilseeds Trade Association (Sacota) on 22 July.

The meeting was aimed at informing the grain industry about TRIM's planned strategy. The 'new' Transnet Freight Rail will in future compete with private network operators that will be licenced to use rail infrastructure. Private entities wishing to offer network operator services must apply for a licence from TRIM. The first closing date for applications was 27 February this year (98 applications were received).

It is possible that Sacota members, in collaboration with a network operator and Agbiz Grain members (storage operators), could form a consortium to engage with TRIM. Sacota plans to survey its members to gauge interest in participating in such a consortium.

In South Africa, the cost of rail is approximately two-thirds more affordable than road transport. This potential saving often means the difference between whether South Africa is competitive in the grain export market or not. – *Dr André van der Vyver, executive director, Sacota*

## NWK hopeful despite dry spell

Although NWK Limited's group income rose by R156 million to just under R6 billion for the 2024/25 financial year, profit after tax dropped by 50% to R114,3 million. The decline comes as no surprise given that grain receipts were down by 43,4% compared to the previous year. This is a direct result of severe drought conditions experienced across NWK's operating area, resulting in the driest season in 52 years and the worst since 2012. The impact was most visible in NWK's grain division, where income dropped by R349 million to R572 million – the lowest since 2016/17.

One of the big wins of the year came from NWK's sunflower oil press, Epko, which turned a record profit of R87 million. Despite the dry season, sunflower crops delivered good oil and protein content, and a new power line helped to ensure consistent processing. The company now looks forward to ramping up production, with a new refinery expected to be fully operational in the coming season. – *NWK press release adapted by Plaas Media*

## Better canola without sacrificing quality

Future Canadian producers will be able to expect both better yield and more stress tolerance out of their canola crop if researchers at the University of Guelph have anything to say about it.

The Guelph team is well into the process of developing a more robust, transgenic canola plant that produces bigger stems and increased biomass without impacting oilseed quality.

"We have increased numbers of stems up to 60%, increased numbers of siliques (seed pods) up to 40% and a total seed yield per plant increase of 35%," said Ian Tetlow, a professor with the university's department of molecular and cellular biology. "We're using gene editing to improve canola yield, but as a result of some of the work we've done it has also enabled us to protect that yield and increase stress tolerance in the plants that we've produced."

The high-biomass canola may be less prone to lodging, although researchers have not yet been able to test that theory in the field. It does, however, appear to perform well under drought and heat. – *The Western Producer*

## India accelerates ethanol production

India's drive to produce more ethanol is leading its producers to switch away from growing oilseeds, undermining government efforts in the world's largest buyer of cooking oils to reduce costly imports.

Helped by record maize and rice harvests, New Delhi is using more of the grains to make ethanol and meet its target of blending 20% of the biofuel additive with gasoline. The process, however, produces distiller's dried grains with solubles (DDGS), a protein-rich byproduct that is flooding the animal feed market.

The DDGS glut is weakening demand for oilmeals, depressing oilseed prices, and prompting producers in the South Asian nation to plant more maize and rice in the place of soya beans and groundnuts – despite New Delhi's push to grow more of the oilseeds to ease imports. DDGS production in India has soared some 13-fold over the past two years to an estimated 5,5 million tonnes by 2025, according to industry officials.

"DDGS is a pain in the neck," said Aashish Acharya, vice president at Patanjali Foods Ltd, a leading soya bean processor. "Feed makers are substituting oilmeals with DDGS since it is cheaper." – *Japan Times*

## ITAC reviews peanut butter duties

RCL Foods recently applied to the International Trade Administration Commission (ITAC) for increased import duties on peanut butter, citing the need to level the playing field for local manufacturers. The company has asked for a change of the customs duty rate on peanut butter from 0,99c/kg to 25% *ad valorem*.

In 2020/21 RCL Foods submitted a similar request that was halted due to the then Minister of Trade, Industry and Competition's concerns about the impact such a duty would have regarding the price raising effects of a staple product for poor households, namely peanut butter.

However, RCL has reapplied, stating that a 10% customs duty on groundnuts was implemented on 21 October 2003; importers are circumventing this duty by importing peanut butter, leading to a 24% increase in imports from 2023 to 2024; imported peanut butter prices are 19,3% lower than local production costs, causing distress in the Southern African Customs Union (SACU) industry; RCL has sacrificed volumes to maintain margins, resulting in a decline in market share; and without relief, local manufacturers may exit the market, leading to increased prices for imported peanut butter. – *ITAC Notice, edited*

## Canada faces China anti-dumping duty

China has announced a preliminary anti-dumping duty on canola imports from Canada, a statement from the commerce ministry said. The provisional rate would be set at 75,8%.

China, the world's largest canola importer, sources nearly all its imports from Canada but those supplies are now likely to be priced out by the provisional duties. Beijing announced the probe in September 2024, and it was initially set to conclude in September this year with a possible six-month extension, in response to Ottawa's tariffs on Chinese-made electric vehicles.

Canadian exports totalled C$5 billion in 2023, the last full year before the investigation began. – *Reuters*

## GOSA workshop: Guarding grain, growing trust

The development of audit criteria for health and safety – specifically regarding the grain storage industry and the growing problem of grain theft in the country – was a key topic at a recent workshop of the Cape branch of the Grain Handling Organisation of Southern Africa (GOSA), held on 16 July at Aan de Doorns Wine Cellar near Worcester.

Jaco Joubert, health and safety manager at Overberg Agri, briefed GOSA Cape members on the importance of dedicated audit criteria for health and safety. He also shared updates on the progress made by Agbiz Grain in developing an industry-specific audit protocol tailored to the grain storage sector.

"What I see emerging from this protocol is the establishment of a standard for the industry. Right now, everyone is still doing things their own way, but the results of the audit protocol will guide us forward." – *Hugo Lochner, Plaas Media*

## China's soya bean imports hit record high

China, the world's largest soya bean consumer, set a second consecutive monthly import record, driven by abundant supplies from Brazil and sustained domestic demand.

According to customs data compiled by Reuters, China imported 11,67 million tonnes of soya beans in July this year, up 18,5% from 9,85 million tonnes a year earlier and well above analysts' forecasts of 10,48 million tonnes. The record follows June's high intake of 12,26 million tonnes, a 10% year-on-year increase. Analysts say the surge is underpinned by Brazil's bumper harvest, which has extended its peak export season.

The Unites States Department of Agriculture's Foreign Agricultural Service (FAS) projects China's soya bean imports in the 2025/26 marketing year will reach 112 million tonnes, matching the record set in 2023/24. Domestic production is forecast at 21 million tonnes, the highest on record, but consumption is expected to hit 133 million tonnes, surpassing last year's 126,9 million tonnes.

Data from the Brazilian Ministry of Development, Industry, and Trade shows that Brazil exported 16,9 million tonnes of soya beans to China during the first quarter of 2025. This was almost 7% higher compared to the 15,8 million tonnes exported during the same period in 2024. – *Milling Middle East & Africa*

# Is canola's flowering date more important than its planting date?

*By Piet Lombard and Prof Johann Strauss, Western Cape Department of Agriculture*

Over the last decade, there has been an increase in the variability of rainfall and temperatures in the Western Cape. In Australia, similar factors have prompted earlier sowing of canola. Improved agronomy and the release of cultivars with greater vigour, suited to a wider range of environments, have facilitated the expansion of canola production into new areas. During the last ten years, the number of hectares under canola production in the Western Cape increased from 95 000 to 160 000.

In order to maximise grain yield at earlier sowing dates and in new production areas, growers must be knowledgeable about the most suitable development pattern for the Swartland and Southern Cape, as well as the ideal sowing date to reduce production losses associated with diseases, frost, heat, and drought at flowering.

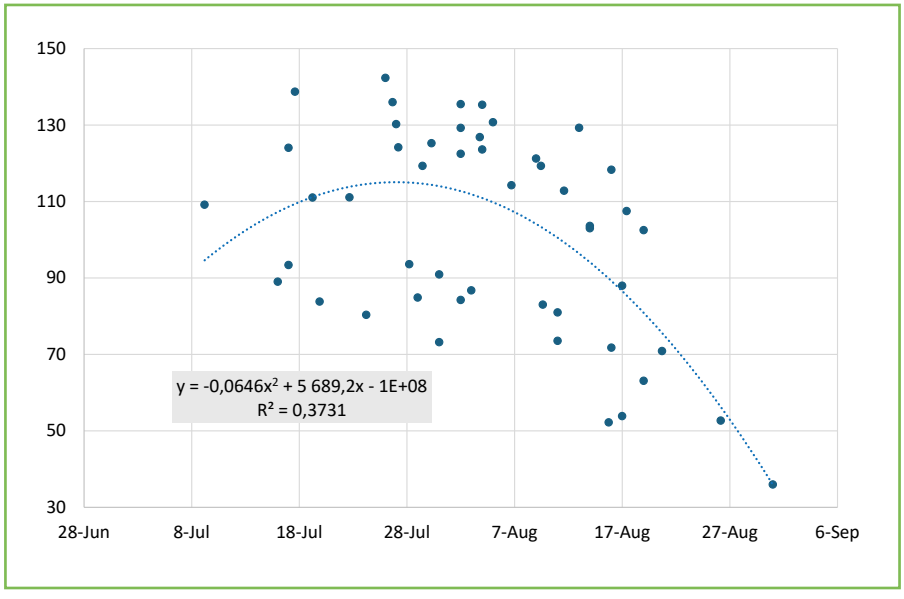
## Optimum flowering time

Lilley *et al*. (2019) found that the optimum time of flowering in Australia was mid to late July in all the locations. Research has shown that earlier sowing of canola can improve productivity and reduce the economic risks associated with canola production when the crop flowers during the appropriate window period.

The optimum time of flowering is the range of dates when flowering is most likely to maximise yield. Flowering too early increases the risk of frost damage or insufficient biomass, while flowering too late results in an increase in the chance of heat and water stress combined with insufficient biomass.

To optimise yield, growers must match the sowing dates and crop varieties to ensure flowering occurs within the optimum time of flower for their specific region. A combination of time to flower and flowering time within a particular period for a given location is one of the most important drivers of grain yield in canola.

**Figure 1: Day of start of flowering (50% of the plants have one open flower) and seed yield at Tygerhoek.**




## Thermal time and photoperiod

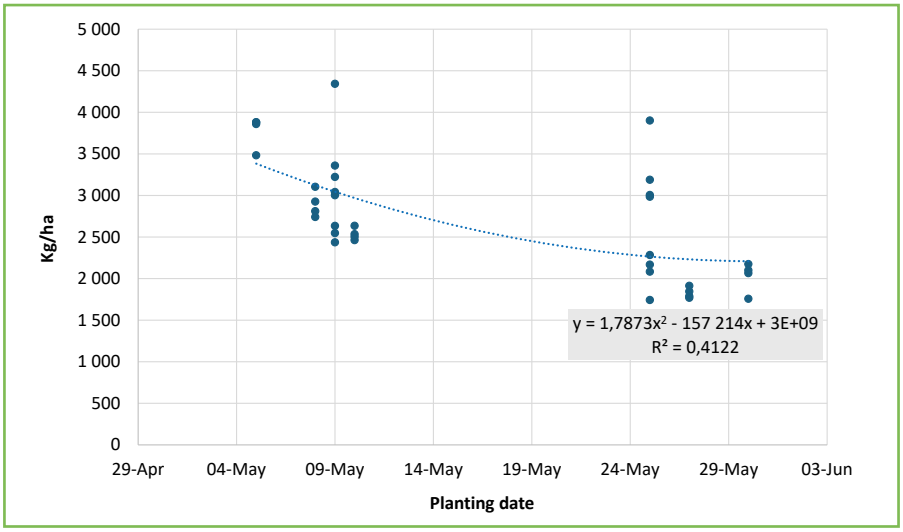
During the leaf production stages of canola growth, varieties can be influenced by the thermal time, photoperiod (the developmental response of plants and animals to the length of day and night) or vernal time, or a combination thereof. For instance, winter varieties require a period of vernalisation (cold temperatures) before they switch from vegetative stages (leaf production) to reproductive stages (flower production).

The time taken within the reproductive stage for buds to elongate and initiate flowers is also influenced by the thermal time and photoperiod. There is no vernalisation requirement within the reproductive stage.

The differences observed in flowering times show that the varieties still have different thermal and photoperiod requirements before they begin flowering. Early spring varieties such as Nuseed Diamond and Ceres Cl do not require a lot of thermal time for them to shift to reproductive stages and to start flowering.

When these varieties are sown early, they can be exposed to warmer temperatures soon after sowing which increases the accumulated thermal time that results in them beginning their flowering earlier. In contrast, slow spring varieties such as 45Y95 and HyTTech Trifecta require a longer period of thermal

**Figure 2: Planting date (if seed was planted in dry soil planting date used was that of the first significant rainfall) over nine seasons and seed yield.**




time before they begin flowering. Varieties planted in different environments will change the length of time it takes for those varieties to begin flowering; however, fast spring cultivars will still be the fastest cultivars.

## Planting and flowering times

In the Western Cape the flowering time differs significantly between years and between Langgewens in the Swartland, and Tygerhoek in the Rûens. The number of days to flower at Langgewens varied between 69 (2020), 84 (2022), 83 (2023), and 79 in 2024. The number of days to flower at Tygerhoek varied between 91 (2020), 90 (2022), 89 (2023), and 85 in 2024. On average, the time to flowering is ten days longer at Tygerhoek. That is mainly driven by the earlier planting date in the Southern Cape.

The seed yield over ten years is summarised and compared with the date of start of flowering (when 50% of the plants have one open flower) in *Figure 1*. This data at Tygerhoek corresponds with the Australian data which found that the optimum time for the start of flowering is the middle of July to early August.

The planting date data at Langgewens is summarised in *Figure 2*. Where the seeds were planted in dry soil, the planting date used was that of the first significant rainfall. There is a better correlation between the planting date and seed yield in the Swartland at Langgewens. In order to explain the difference between Tygerhoek and Langgewens we must be aware of the fact that there are two types of vernalisation, namely 'facultative' and 'obligate'

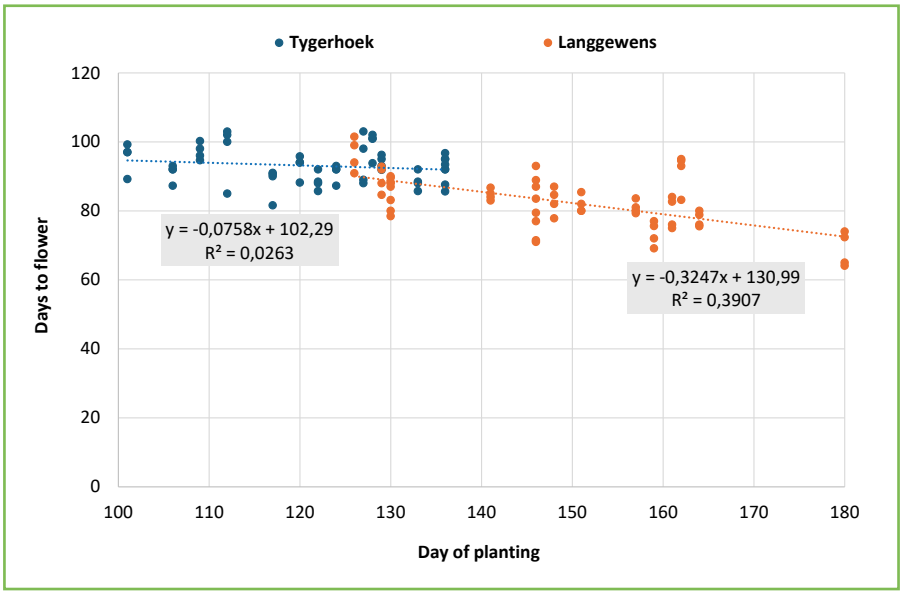
With the later planting dates and consequent cooler night temperatures at Langgewens after planting, the time to flower is driven by facultative vernalisation and the photoperiod. The early cultivars remain the fastest and the later cultivars the slowest. Facultative vernalisation is when canola that is grown in cooler climates require less thermal time to flower than when it is grown in warmer environments.

If the optimum flowering date is from the middle of July, what should the planting date be to obtain the correct flowering date at Tygerhoek? *Figure 3* provides a summary of the planting date and the time to flowering. The decline in days to flower is 3,1 over a 40-day planting period. However, at Langgewens the decline is 13 days over a 40-day planting period.

Canola cultivars differ in their flowering times depending on where and when they are sown. Sowing a fast variety too early can lead to flowering when the risks of frost and disease are high, while sowing a slow variety too late increases the risk of heat and moisture stress.

According to the average time to flower at Tygerhoek, the optimum time to plant should start around 15 April in the Southern Cape. For example, Diamond (early flowering cultivar) can be planted later while 44Y94 must be planted before 15 April. In the Swartland the planting date in most seasons is determined by the first significant rainfall.

**Figure 3: Summary of the planting date and time to flowering at Tygerhoek and Langgewens.**

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# **Pixels to patterns:** Concepts of remote sensing to support soya bean disease detection

*By Marais Cloete and Dr Lisa Rothmann, University of the Free State*

Remote sensing holds potential for tracking changes in healthy green leaf tissue and detecting where disease develops across a field. Knowing where and how much of your field is affected provides valuable insight for effective disease management. This is where remote detection technologies come in by making disease detection more representative, available in season, and reducing the time compared to a visual survey.

This article explores how remote sensing contributes to soya bean disease detection and crop protection. It begins by unpacking what makes remote sensing 'remote', what 'sensing' involves, and key considerations for capturing and interpreting imagery. Finally, it then highlights how this technology can be applied to support early detection and more efficient responses in the field.

## Evolution of remote sensing

Remote sensing techniques, defined as the gathering and processing of data by a device separated from the object under study (Lizarazo, 2025), are becoming a key tool for studying how agricultural systems function at scale.

Remote sensing has evolved significantly over time in terms of the devices used and the scale at which they operate. In the past, handheld sensors were the main option, allowing for point-based spectral readings on individual plants. As technology advanced, sensors were mounted on tractors to capture data across larger areas in real time during field operations.

The use of aerial photography from human-crewed aircraft became popular between the 1980s and 2000s, although it was still costly and used infrequently. Unmanned aerial vehicles (UAVs), more commonly referred to as drones, ushered in a new era, offering high-resolution at the field or plant-specific scale. Additionally, higher-resolution satellite imagery became commercially available, making its use more accessible and frequent.

## Imaging of plants

Healthy and diseased plants reflect light differently, which can be captured in a spectral image containing reflected wavelengths. Sensor choice will depend on the producer's needs. Available sensors include RGB (red, green and blue), multispectral (most popular), or hyperspectral (more detailed, but also expensive) sensors (Kouadio *et al*., 2023). Multispectral sensors capture bands including blue (~450 to 520nm), green (~520 to 600nm), red (~630 to 690nm), and near-infrared (NIR, ~760 to 900nm). The vegetative indices are mathematical calculations using these bands for more applicable results.

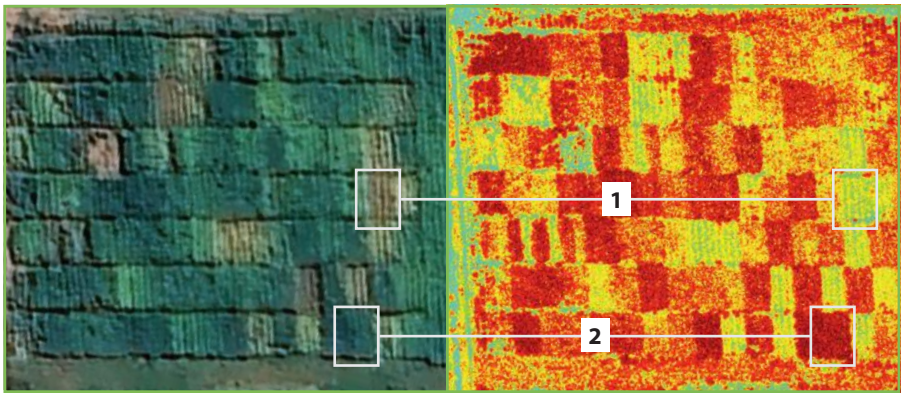
The most popular vegetative index is the normalised difference vegetation index (NDVI), which compares the red and NIR bands. Healthy plants strongly reflect near-infrared light and absorb red light due to active photosynthesis. In contrast, plants under stress show low NDVI levels, low NIR reflectance, and higher red band reflectance. It is important to note that NDVI detects general plant stress, not specific diseases. More advanced imaging and classification tools are needed to distinguish between abiotic and biotic diseases.

## Drones versus satellites

When choosing between drones and satellites for remote sensing, it is important to start thinking about the kind of information you need from the images. For general monitoring of your fields, satellite images will be the cheapest. Images consist of pixels, where smaller pixel sizes result in higher spatial resolutions, meaning more detail is visible in the image. Most software and applications offer 10 x 10m resolution images; 3 x 3m can be requested.

Various platforms exist for acquiring satellite data, such as Fieldview, Cropwise, EOS Data Analytics, Agemo, Agroscout, and many more. However, better resolution comes at a price. A satellite image will not be available if it is a cloudy day, and most platforms only provide a new image every one to two weeks. Despite this, several studies using satellite data have successfully detected disease in crops even before the eye can see a visual symptom, as is the case for soya bean's sudden death syndrome (SDS).

In Iowa in the United States, when enough historical satellite images are




*The images, collected at a soya bean cultivar trial, compare a short grower (1) with a longer grower (2). Because of senescence, cultivar 1 showed less healthy green leaf area than cultivar 2, but if this were the only NDVI image of cultivar 1, it would be impossible to be sure if it had a disease or not.*

available, predictions of future SDS outbreaks were possible with a high degree of accuracy (~80 to 95%). However, the timing of disease progression matters: in some seasons, disease severity may stay low between image dates and increase rapidly. To improve prediction accuracy, more frequent image sequences and more extended monitoring periods will be essential (Bi *et al*., 2020).

On the other hand, drones equipped with a multispectral sensor can capture 1 x 1cm images, depending on flight altitude and resolution. Drone imaging is, however, more expensive than satellite imagery, as a technician has to come out to the farm, and special software is needed to analyse the image and associated data. Using drone data under a pivot would be worthwhile, where yields are significantly higher, and the return on investment will be better than dryland.

For more usable data, obtaining drone images at least before, during, and after flowering is advisable, giving you a better chance of identifying emerging disease spots. Equally important is timing the flights to align with crop stages when the plant is most susceptible to infection, such as flowering for *Sclerotinia* stem rot, to ensure meaningful detection.

A study in Brazilian soya beans showed that drones with high-resolution cameras can detect and distinguish between leaf diseases, such as target spot and powdery mildew. By combining drone images with deep learning models, researchers achieved over 99% accuracy in classifying diseases directly from aerial photos taken under field conditions. Although to make these predictions reliable, high-quality images are essential. Once the model highlights potential problem areas, producers or agronomists can scout those specific spots in the field to confirm the diagnosis and apply targeted interventions.

Although drones can fly as close as 1m to the crop, it is not recommended, as rotor blade turbulence at that height can shake the leaves and interfere with image quality. Heights above 1m, combined with appropriate camera lenses, are better suited for capturing consistent, high-quality images (Bi *et al*., 2020).

## Image analysis

The real value of remote sensing lies in processing a raw image, turning it into usable insights or visuals. In the last 20 years, there has been a shift from statistical learning and non-parametric models to artificial intelligence (AI)-based image analysis, including deep learning models such as convoluted neural network (CNN) algorithms. These models learn from thousands of images to recognise subtle patterns from pixels and signs of stress or disease, helping us detect yield limitations across fields. The shift has sped up the processing time and can handle more complex datasets.

Most soya bean remote sensing research has been done on yield predictions, while disease detection has received comparatively less attention, highlighting a lot of potential for growth and innovation.

## Precise disease management

Early disease detection through remote sensing can guide timely diagnostics, potentially reducing a substantial portion of the world's yield losses by enabling targeted scouting and informed decision-making (Gudkov *et al*., 2023). The better and more effectively you can measure something, the better the quality of decision-making becomes. Disease management is ultimately about understanding and managing risk, which varies across seasons, location, and field history.

Remote sensing tools can help identify areas with a higher likelihood of disease development and help determine whether fungicide applications are needed. In this way, remote sensing supports more precise and cost-effective disease management, using targeted sprays, which promote sustainable stewardship of active ingredients.

Marais Cloete and Dr Lisa Rothmann from the University of the Free State, Division of Plant Pathology, are investigating the use of remote sensing for the early detection of *Sclerotinia* stem rot in soya bean. The research aims to work towards optimising the timing of targeted fungicide applications. Importantly, the goal of remote sensing is not to replace producers' decision-making, but rather to complement their expertise, making every trip to the field targeted and decisions more informed.
For more information, contact Dr Rothmann at coetzeeLA@ufs.ac.za

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# Integrated thinking and thoughtful combinations for canola success

*By Dr Charné Viljoen, Prof Johann Strauss, and Robin Riet*

Weed control in canola production is becoming increasingly complex, particularly in the Western Cape where herbicide-resistant ryegrass is widespread. While herbicides have long been the backbone of weed management, their reliability is being challenged by the steady rise in herbicide resistance. This has led to an interest in non-chemical strategies such as increasing canola plant density and the selection of more competitive cultivars to support weed suppression and protect yields.

Canola can compensate for lower plant populations. This compensation has encouraged many producers to reduce seeding rates as a cost-saving measure, particularly given the high price of canola seed. However, lower plant populations can create gaps in the canopy, giving weeds more space to establish and compete. By contrast, higher seeding rates increase early canopy closure, reduce weed growth, and improve yield, especially when paired with a vigorous, fast-growing cultivar.

A two-year field study (2023 to 2024) conducted by Stellenbosch University in collaboration with the Western Cape Department of Agriculture in the Swartland, investigated the effectiveness of these approaches. The aim was to evaluate whether higher seeding rates and cultivar choice could improve weed suppression and crop performance, with or without the use of herbicides. In doing so, the study sought to offer additional strategies for improving canola crop competition that could result in improved yields and reduced reliance on chemical weed control.

## Comparing treatments

In this study, two herbicide-tolerant canola types were evaluated: Clearfield (CL) canola and Triazine-tolerant (TT) canola. The cultivars were planted at seeding rates ranging from 1 to 4kg/ha and either received cultivar-specific herbicide applications or were left unsprayed.

The trials were conducted over two growing seasons. In 2023, the conditions were favourable for establishment, while in 2024 heavy rains early on and waterlogging created challenges.

In 2023, CL cultivars outperformed TT cultivars in terms of both biomass production and yield. Even in the absence of herbicide, CL cultivars showed strong early growth and canopy development, which contributed to reduced weed biomass. Yield improved steadily with increasing seeding rate, with the best yields recorded at 4kg/ha.

The TT cultivar, in contrast, showed a clear dependence on herbicide application for production, and it struggled to compete under weedy conditions without herbicide application. Weed biomass in the CL cultivar were often lower than weed biomass in the TT cultivar. Although the CL cultivar suppressed weed biomass more effectively, it did not consistently reduce weed density.

The 2024 season presented a different challenge. Heavy rainfall following planting had a greater effect on the CL cultivar, delaying germination and resulting in patchy stands. The TT cultivar was less affected by the wet conditions and ultimately produced greater biomass and higher yields.

Despite the difference in cultivar performance between the two seasons, higher seeding rates continued to have a positive effect on yield, even though they did not substantially reduce weed biomass. Herbicide treatment remained the most effective method for reducing both weed density and biomass.

## Importance of cultivar choice

The most dominant weed species observed throughout the study were ryegrass (*Lolium* spp.), knotweed (*Polygonum aviculare*), wild radish (*Raphanus raphanistrum*), and medics (*Medicago* spp.). These species contributed the highest percentage of total weed biomass collected across treatments. Based on weed species composition, it also became clear that cultivar choice influenced weed community structure, likely due to differences in cultivar-specific herbicide regimes.

While neither seeding rate nor cultivar choice alone was sufficient to eliminate weed competition in the two-year fields trial, their combination provided important information. In the favourable conditions of 2023, the high biomass production of CL played a key role in suppressing weeds and achieving high yields, even without herbicide.

In 2024, TT's relative resilience under wet conditions allowed it to outperform the CL cultivar, despite its weaker performance the previous year. It is important to note that the cultivar with the lower thousand seed weight in a particular year, and therefore higher plant population, performed better in that specific year.

Overall, the study demonstrated that increased seeding rates improved canola yield across both cultivars and seasons, but that higher plant density alone was not enough to substantially reduce weed pressure. Herbicides remained an essential part of the management system. However, the research also confirmed that cultivar choice and seeding rate can significantly influence both crop performance and weed dynamics, making them valuable tools in an integrated weed management approach.

## Conclusion

These findings reinforce the importance of integrated thinking in canola production, where no single tactic provides all the answers, but thoughtful combinations offer the best chance for maintaining yields, managing costs, and reducing long-term weed pressure. Re-analysis based on actual plant populations is underway, and a follow-up article will communicate the updated findings.

For more information, send an email to Dr Charné Viljoen at charneviljoen@sun.ac.za


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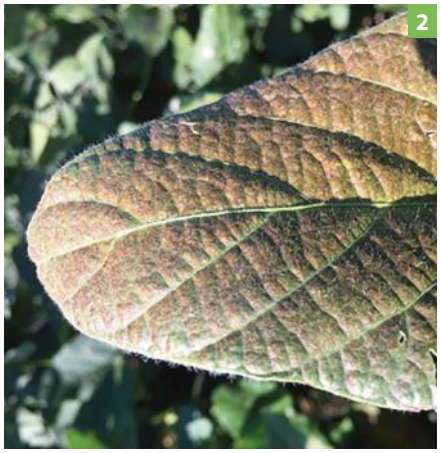
# An overview of *Cercospora* leaf blight in soya bean

*Cercospora* leaf blight (CLB), caused by multiple species of *Cercospora* fungi, is an important soya bean disease, particularly in the southern United States (US). This foliar disease can cause premature defoliation and yield loss. Historically, CLB was attributed to infections by *C. kikuchii*, but *C. flagellaris* has been reported to be the dominant species based on a recent sampling of symptomatic soya bean plants from a large area stretching from Texas east to Alabama and north to Missouri and Kentucky.

The main species causing CLB in other areas is not well understood. Additional species associated with CLB in the US include *C. alchemillicola*, *C. iranica*, and *C. sigesbeckiae*, and a previously unidentified species of *Cercospora*.


*Initial symptoms of Cercospora leaf blight are small, purplish specks on leaflets in the upper canopy. (Photograph: Chris Ward)*




*As the disease progresses, the upper canopy of the soya bean plant will develop a bronze to purple colouration, and the leaves develop a leathery feel. (Photograph: Trey Price, LSU AgCenter)*


*Purple lesions may develop on soya bean petioles. (Photograph: Trey Price, LSU AgCenter)*


*As the disease progresses, brown necrosis may occur on leaflets along with a greyish hue attributed to fungal sporulation. (Photograph: Trey Price, LSU AgCenter)*


*Purple seed stain on soya bean seed. The fungi associated with Cercospora leaf blight have also been associated with purple seed stain. (Photograph: Trey Price, LSU AgCenter)*

## Symptoms and signs

Symptoms of CLB usually are not observed until beginning seed (R5) or later, and symptoms may not appear at the same time. Small, purplish specks (*Photo 1*) may be visible on leaflets in the upper canopy. As the disease progresses, the upper canopy of the soya bean plant will develop a bronze to purple colouration, and the leaves develop a leathery feel (*Photo 2*).

Purple lesions may develop on the petioles (*Photo 3*). As the disease progresses, brown necrosis (blighting) may occur on leaflets along with a greyish hue that is attributed to sporulation of the fungi that cause CLB (*Photo 4*). In severe situations, or on an extremely susceptible variety, petioles, the main stem, and pods can all develop a dark purple colouration. The fungi associated with CLB have also been associated with purple seed stain (*Photo 5*).

## Conditions that favour disease

Hot (68 to 86F or 20 to 30°C) and humid (at least 92,5%) conditions with prolonged dew periods (eight to 24 hours) favour the development of CLB. Rainfall and wind can disperse spores and result in secondary infections. The fungi can also reproduce on additional crop and weed hosts (corn, cotton, pokeweed, ragweed, others) and

survive on previous crop residue, which contributes to the inoculum for the subsequent cropping season.

Late-planted soya bean may have a greater risk of CLB due to the higher inoculum levels being present later in the season. Later planted and later maturing susceptible soya bean varieties are more apt to develop CLB. Infected seeds may provide additional inoculum at planting.

## Yield losses and impact

Yield losses due to CLB can range from mild to severe. Fields can be completely defoliated under weather conditions favourable for the disease, although this is rare. The annual yield loss estimates compiled by plant pathologists throughout the US soya bean production system indicate that the estimated losses occurring between 2013 and 2023 ranged from US$46 to $166 million.

## Diagnosis

Since multiple symptoms are attributable to CLB and can be confused with other problems, diagnosis can be challenging in the field. Symptoms can vary with location and variety, further confounding diagnosis. Extension pathologists can help with CLB identification and/or samples can be sent to diagnostic laboratories to confirm the presence of CLB pathogens.

## Diseases, disorders and injury

*Cercospora* leaf blight can be confused with other diseases and disorders. We describe the most common in *Table 1*.

**Table 1: Symptom distribution and expression for diseases and disorders with symptoms similar to *Cercospora* leaf blight.**

| Disease/injury | Symptom distribution | Symptom expression |
|---|---|---|
| ***Cercospora* leaf blight** | Anywhere on upper leaf surface; upper canopy | Small, purplish specks turning to leaf bronzing; leaf loss |
| **Target spot** | Lower canopy | Red-brown lesions with yellow halos; may show concentric rings; leaf loss |
| **Frogeye leaf spot** | Upper leaf surface | Small, grey lesions with red margins; leaf loss |
| **Chloride toxicity** | Usually along leaf margins | Leaf tip scorching; leaf yellowing and bronzing; leaf loss |
| **Sunburn** | Upper and lower leaf surface, pods | Brick-red discolouration between leaf veins |


*Foliar symptoms of target spot. (Photograph: Trey Price, LSU AgCenter)*


*Stem lesions of target spot. (Photograph: Trey Price, LSU AgCenter)*

## Diseases

**Target spot** (*Corynespora cassiicola*) infects various soya bean plant parts. Initially considered minor, it now causes significant defoliation in susceptible varieties across the southern US. Lesions are reddish-brown and round to irregular with yellow halos and may contain a concentric ring pattern (*Photo 6*). Severe infections lead to defoliation, beginning in the lower canopy. Stem and petiole lesions are dark brown and can be confused with CLB lesions (*Photo 7*).

**How to distinguish target spot from CLB:** Petiole lesions caused by target spot generally are first observed in the lower canopy while CLB petiole lesions are initially observed in the upper canopy. Concentric ring patterns in lesions are present in target spot but absent in CLB. The presence of foliar symptoms in conjunction with petiole lesions in the lower canopy indicate target spot. Moreover, lesions associated with target spot tend to be smaller and not confined to the petiole.


*Purple petiole lesions of frogeye leaf spot. (Photograph: Trey Price, LSU AgCenter)*

**Frogeye leaf spot** (FLS) (*Cercospora sojina*) is characterised by the small grey lesions with reddish-brown borders on upper leaf surfaces. Lesions start dark and water-soaked, enlarging over time. Severe cases lead to premature leaf drop and can spread to stems and pods. The fungus that causes frogeye leaf spot may also cause purple petiole lesions (*Photo 8*) and infect seed.

**How to distinguish frogeye leaf spot from CLB:** The foliar phase of FLS is usually severe and easily distinguishable from CLB when FLS petiole lesions occur. The seed stain caused by *C. sojina* (the causal agent of FLS) is light purple to grey, while seed infection by CLB pathogens results in a royal purple colour.

**Injury**

**Chloride toxicity** symptoms in soya beans include leaf tip scorching, premature yellowing, bronzing of leaves, and leaf loss that may resemble CLB.

**How to distinguish chloride toxicity from CLB:** Chloridetoxicity injury typically manifests along leaflet margins as chlorosis and necrosis, while CLB can occur anywhere on leaflets.

**Sunburn**, also known as **sunscald**, appears as brick-red discolouration between veins of soya bean leaves. This condition primarily affects the lower leaf surface, distinguishing it from CLB, which causes discolouration on the upper leaf surface. Injury occasionally can be seen on pods.

**How to distinguish sunburn from CLB:** Sunburn is typically on the lower leaf surface, while CLB is predominately on the upper leaf surface.

## Management

Soya bean varieties with resistance to CLB may be available, and producers should plant varieties that have been evaluated near their farm. Since the fungi that cause CLB can overwinter on soya bean residue, rotation and/or tillage may reduce disease incidence.

Managing CLB mainly relies on using foliar fungicides from multiple fungicide classes and applying them at appropriate reproductive growth stages. However, QoI (Group 11) and MBC (Group 3) fungicides are likely no longer effective in managing CLB since widespread QoI resistance within the CLB pathogen populations has been confirmed in eight states. However, some SDHI (Group 7) and DMI (Group 3) premixes applied from beginning pod to beginning seed (R3-R5) using appropriate rates and water volumes (10 to 15 gallons per acre) (±38 to 57ℓ) are still effective.

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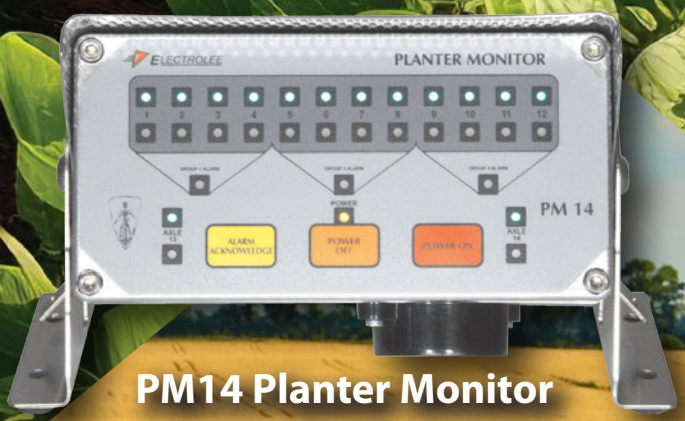


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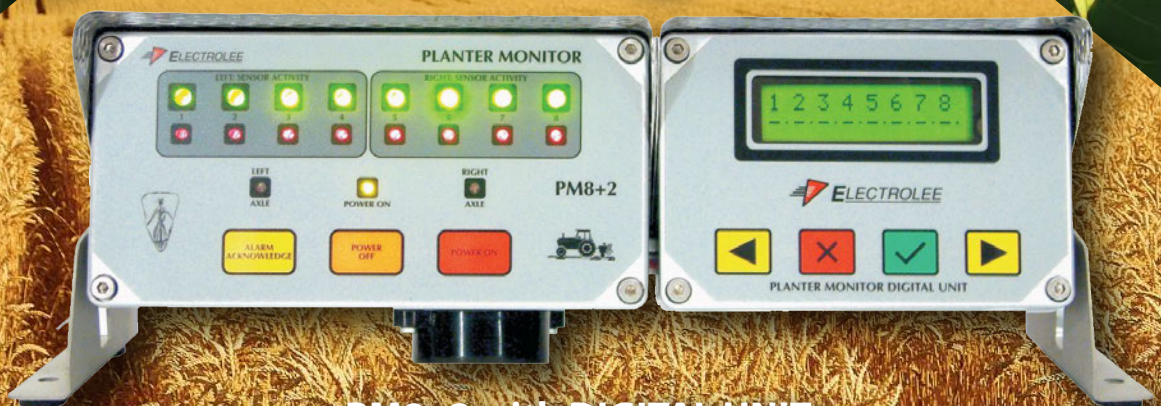


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# The multi-scale puzzle of atmospheric motion relating to the predictability of weather systems

*By Anika de Beer, meteorologist, Restore Africa*

Weather forecasting, at its core, is a complex, multidimensional numerical problem that involves physics, fluid dynamics, and atmospheric chemistry. The atmosphere behaves like a fluid, governed by thermodynamic laws, and seeking equilibrium by having equal distribution of heat and pressure. This sets in motion the large-scale circulations of the atmosphere in its unattainable quest for balance. Motion in the atmosphere is what causes changes in weather and creates the need for weather forecasting.

The atmosphere's behaviour is observed, modelled, and simulated to predict the changes in weather across different scales of motion. These range from planetary-scale circulations affecting global climate, to microscale processes spanning a few metres or less. Understanding these meteorological scales is essential for both operational forecasting and climate modelling. It helps forecasters to determine the type of models to use, anticipate the accuracy of predictions, and identify which physical processes are dominant in different scenarios.

This article is a summary of the multi-scale puzzle that is atmospheric motion, which comprises the four primary scales of meteorology: planetary, synoptic, mesoscale, and microscale.

## Planetary scale: Global atmospheric circulation

Starting with the largest systems, planetary scale meteorology (>5 000km, lasting months to years), include global weather phenomena such as the Hadley cell circulation, Rossby waves, jet streams, and the El Niño Southern Oscillation (ENSO).

These planetary motions in the atmosphere are mainly due to differential heating between the equator and the polar regions, the Earth's rotation and large-scale interactions between the atmosphere and the ocean. These circulations redistribute thermal energy, facilitating the transport of heat and moisture across hemispheres. This results in persistent wind systems that influence global weather circulation, ocean currents, regional rainfall regimes, and even storm tracks. Planetary circulations shape the climatological foundations upon which the smaller-scale weather circulations develop.

The forecasting confidence of planetary scale circulations are high, since planetary-scale systems evolve slowly and are strongly constrained by global boundary conditions and therefore exhibit high predictability over weekly to seasonal timescales. ENSO forecasts (the forecast of El Niño/La Niña), for instance, achieve skilful projections several months in advance. Shifts in the subtropical jet stream or the strength of the Hadley circulation can also be reasonably modelled using global climate models (GCMs).

However, even planetary-scale predictability has limitations. Complex ocean-atmosphere feedbacks, such as those governing ENSO, introduce nonlinear behaviour that can trigger sudden regime shifts, reducing confidence at longer lead times.

## Synoptic scale: Continental atmospheric circulation

The synoptic scale (100s to 1 000s km, lasting days to weeks) generally include the phenomena seen on a weather map; high- and low-pressure systems, fronts or extratropical cyclones, tropical cyclones, and tropical storms.

Synoptic systems typically develop due to temperature gradients causing pressure differences, which in turn drives air movement, creating wind that is organised into larger circulation patterns. Synoptic weather systems are influenced by the Coriolis effect and topographic features (such as mountains). The Coriolis force results from the Earth's rotation and deflects wind, causing low pressure systems rotation clockwise in the Southern Hemisphere and anticlockwise in the Northern Hemisphere, and *vice versa* for high pressure systems.

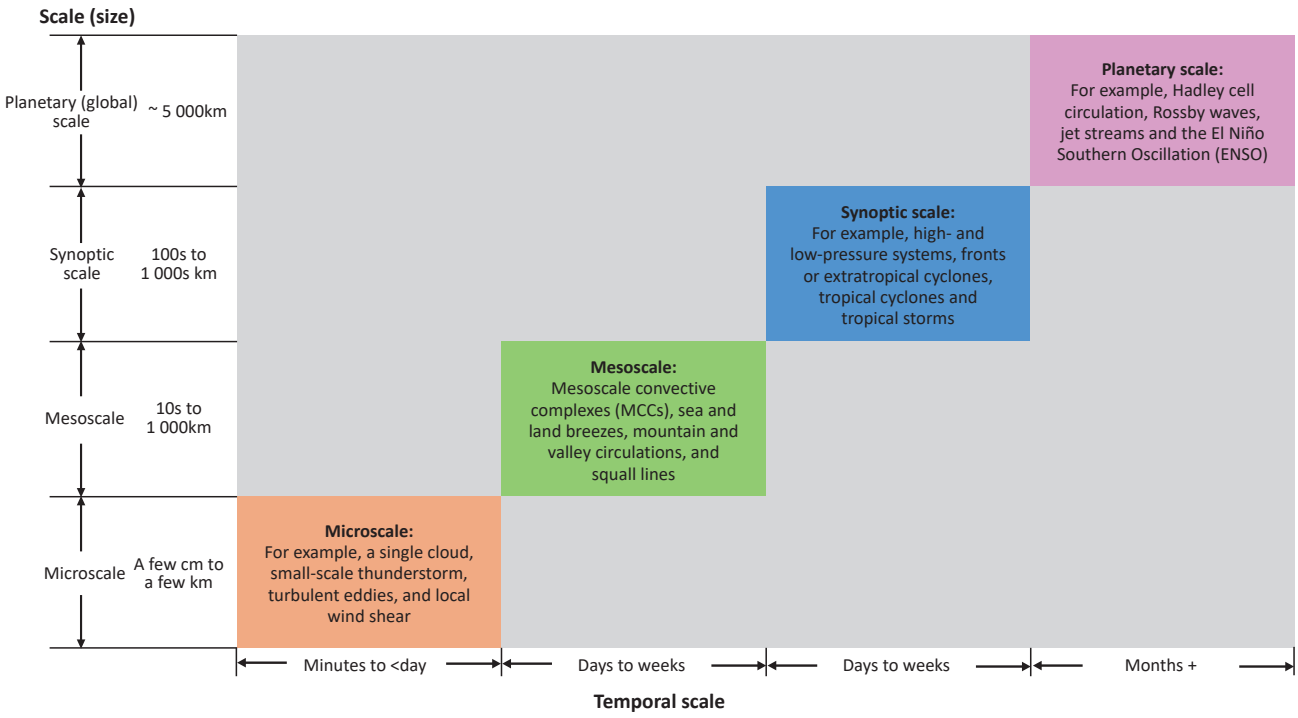
Synoptic weather systems are well captured by numerical weather prediction (NWP) models, and the forecast skill is high. These circulation patterns typically evolve over several days and due to their size, they are fairly accurately simulated in the forecasting models and predictability is high, especially three to five days in advance. However, from seven to ten days, the forecast skill drops significantly due to the high dependence on the model's initial conditions and the chaotic nature of weather.

## Mesoscale: Regional atmospheric circulation

Mesoscale (100s to 1 000km, lasting hours to days) weather systems are primarily thermodynamically driven. Here, the instability in the vertical temperature profile plays a significant role. Atmospheric instability, along with moisture and a 'trigger' mechanism, are the main ingredients for thunderstorm development. Mesoscale convective complexes (MCCs), sea and land breezes, mountain and valley circulations, and squall lines (organised line of thunderstorms spanning up to 100s of km) are all mesoscale weather systems. Mesoscale weather systems are influenced by local geography, surface heating, and lower troposphere moisture.

Due to their regional nature and rapid evolution, mesoscale systems are more challenging to forecast. Radar, satellite data, and high-resolution modelling help, but predictability remains medium due to their sensitivity to small-scale variations in surface and atmospheric conditions. A forecast lead time of one to three days is sensible to consider, but beyond that one should note that there is a significant drop in forecast skill of these systems.

**Figure 1: The meteorological scales of motion. (Source: Adapted from *Meteorology Today*, C Ahrens)**




## Microscale: Local atmospheric circulation

Microscale (centimetres to kilometres and lasting a few minutes to less than a day) weather phenomena operate at the finest spatial and temporal resolution, often within the planetary boundary layer (PBL). The PBL is the lowest part of the atmosphere which is directly influenced by the surface of the Earth.

Microscale processes govern heat, moisture, and momentum transfer between the Earth's surface and the lower atmosphere. These processes are strongly influenced by surface properties such as albedo, vegetation, roughness, urban infrastructure and involve non-linear interactions between the atmosphere and terrain within the PBL.

A single cloud or small-scale thunderstorm are examples of microscale weather phenomena. However, microscale circulation includes phenomena that are much smaller than that such as turbulent eddies, surface temperature gradients, and local wind shear. This level of meteorology is crucial for understanding urban heat islands, aerosol dispersion in pollution, frost pockets, and surface energy balances in agriculture.

In a matter of minutes, a microscale weather circulation can take place and accurately capturing the full spectrum of these motions of the atmosphere in a model is not yet possible. The predictability at this level is intrinsically limited due to the complexity involved and the high variability across space and time, necessitating physical parameterisation in numerical models.

Physical parameterisations are numerical 'substitutes' that represent processes that are too small scale and complex to be solved explicitly in the NWP model. Therefore, the forecast skill for mesoscale meteorology is generally medium to low. As a result, deterministic forecasting of these phenomena is not advised, necessitating probabilistic (likelihood forecast) or ensemble approaches.

An ensemble forecast uses various sets of initial model conditions aimed at capturing, at least to an extent, the model uncertainty in the forecast by generating an ensemble of forecast outcomes which guides forecasters to consider and communicate a range of plausible outcomes.

## Scale as lens of predictability

Understanding weather model limitations and forecasting skill are important for anyone using and interpreting weather forecasts. Nowadays, we are bombarded with weather data, and everybody has numerous weather applications and websites that they frequently consult. Yet, a disclaimer on how to interpret this information is not provided. For instance, one can get a 14-day weather forecast instantly, but nowhere does it state that the forecast skill at day 12 is significantly lower than day three. We need to be aware that a forecast for a cold front five days in advance can be trusted more than one for a thunderstorm at the same lead time, and that relates to the scale of the two systems.

While advances in computing and remote sensing push skill boundaries, chaos and complexity remain immutable characteristics of our atmosphere. Weather models are exactly that, models. It will always provide an answer, a forecast, but how one interprets and applies these are what is important. Recognising the scales of meteorology and using that as a lens to interpret weather forecasts are steps in the right direction.

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# DIFM-project: Lessons from on-farm variable soya bean seeding rate trials

*By Karen Truter, Marion Delport, Henja Glas, and Helga Ottermann*

Variable rate seeding (VRS) and precision agriculture technologies are gaining more attention with the rise of data-driven grain farming. VRS involves tailoring seeding rates based on the requirements of different parts of a field – unlike traditional farming methods, where the same rate of inputs is applied uniformly across a field. For example, VRS makes it possible to increase soya bean seeding rates in areas of fields where productivity is lower and decrease rates in more productive areas of the same field.

Implementing VRS requires careful planning with various methods for determining rates including soil maps, yield data, and normalised difference vegetation index (NDVI) images. Despite its complexity, many producers see the potential of VRS to boost productivity, profitability, and sustainability.

A key gap in our understanding of precision agriculture is determining whether variable rate seed applications can enhance on-farm profitability. To explore this, we analysed data from data-intensive farm management (DIFM) trials across three multi-season soya bean case studies. Over the past five years, the Bureau for Food and Agricultural Policy (BFAP) and DIFM-US have applied this methodology on various South African farms, with support from the Protein Research Foundation (PRF), Sasol Agricultural Trust, Grain SA, and Stellenbosch University.

## Methodology

The DIFM trials generate data on localised crop responses to site-specific inputs (Bullock *et al*. 2019). Trials typically test seeding and fertiliser rates using a checkered-board, randomised design. Each trial results in a large dataset with global positioning system (GPS) points connected to a seeding rate, fertilisation rate, and yield value. Various analytical processes are followed to clean the data and determine optimal seeding and fertilisation rates for either the whole field or management zones within the field.

An example of a soya bean seeding rate trial is shown in *Figure 1 A-B* (soya bean trial typically only includes variable seeding rates). The management zones are sections of a field grouped based on similarities in how they respond to seed and fertiliser input rates (*Figure 1 C*). We analyse trial data to divide the field into zones that qualify for different management strategies. The process relies on actual as-planted, as-applied, and yield data from each field.

The focus of this article is on three soya bean case studies – each spanning multiple seasons on the same farm over multiple fields. *Table 1* includes descriptions of the included trials. The initial DIFM trials were planted during three consecutive La Niña years with above-normal rainfall conditions. The 2023/24 summer rainfall season (harvest from May to June 2024) was drier in most of the production regions, compared to the previous seasons.

Profit was determined for each management strategy per field. Only the variable input costs (treatments such as seed costs) were considered when calculating the profits (i.e. indirect and other direct costs such as fuel expenditure were assumed constant and therefore omitted). While soil chemical and physical properties were not explicitly included in trial layouts, our methodology assumes that yield is influenced by multiple factors, including soil properties, weather, and input management. These properties either have a positive or negative influence on the yield outcome, which are then indirectly incorporated in the management zones we identify.

We did not directly compare uniform and variable application rates in field trials. Instead, we used data from the randomised trial to simulate both scenarios in the same field. Thus, the same data was used to determine the optimum flat rate and the optimum variable rate for three zones in the field (as illustrated in *Figure 1 C)*.

## Key findings

Findings from 12 site years of soya bean trials conducted in the Free State,

**Figure 1: Trial design (A), as-planted (B) maps, and delineated management zones (C) for a soya bean trial on a farm located in North West.**

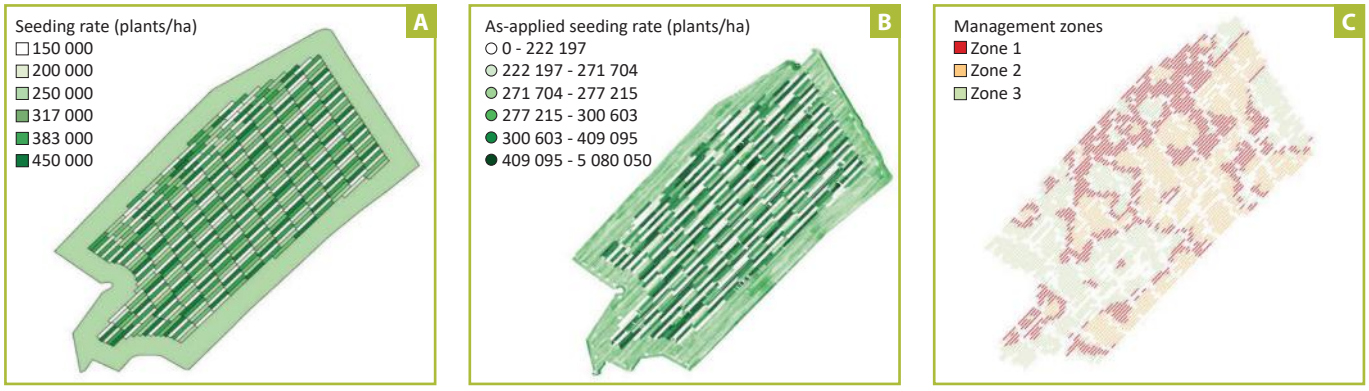

**Table 1: Field names, localities and trial design information for all included soya bean seeding rate trials.**

| Field | Province | Season | Cultivar | Plant date | Harvest date | *Status quo* seed rate | Min seed rate | Max seed rate |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Plants/ha | | |
| **Botesrust** | FS | 2020/21 | PAN1623R | 18 Nov 2020 | 12 April 2021 | 250 000 | 150 00 | 400 000 |
| **Vliegveld** | FS | 2021/22 | PAN1521R | 11 Dec 2021 | 22 April 2022 | 250 000 | 150 00 | 450 000 |
| **Uitsny** | FS | 2022/23 | SY 657 | 23 Dec 2022 | 19 April 2023 | 300 000 | 150 00 | 450 000 |
| **Vliegveld** | FS | 2023/24 | PAN1521R | 11 Nov 2023 | 12 April 2024 | 300 000 | 150 00 | 450 000 |
| **D3** | MP | 2019/20 | PAN1521R | 26 Oct 2019 | 9 May 2020 | 280 000 | 170 000 | 370 000 |
| **NK1** | MP | 2020/21 | PAN1521R | 26 Oct 2020 | 12 April 2022 | 280 000 | 180 000 | 380 000 |
| **D3** | MP | 2022/23 | PAN1555R | 19 Nov 2022 | 18 April 2023 | 280 000 | 200 000 | 400 000 |
| **NK1** | MP | 2023/24 | PAN1521R | 3 Nov 2023 | 11 April 2024 | 280 000 | 200 000 | 400 000 |
| **Geluk** | NW | 2020/21 | P64T39R | 12 Nov 2020 | 9 April 2021 | 300 000 | 100 000 | 400 000 |
| **Schietfontein** | NW | 2020/21 | Agriocare EC24 | 23 Nov 2020 | 5 April 2021 | 300 000 | 100 000 | 400 000 |
| **VDAMR** | NW | 2021/22 | P64T39R | 5 Nov 2021 | 6 May 2022 | 300 000 | 200 000 | 450 000 |
| **Geluk** | NW | 2022/23 | P64T39R | 24 Oct 2022 | 11 April 2023 | 300 000 | 180 000 | 370 000 |

*Producer preference and equipment influenced the increments of variation and number of seeding rate factors. Cultivar selection was mainly based on planting dates. FS: Equaliser planter with 0,915m row widths; MP: John Deere 1755 Seedstar2 with 0,76m row widths; NW: John Deere 1750 planter with six rows of 0,76m, 'skip rows', resulting in average row widths of 1,14m.*

Mpumalanga, and North West provinces underscore the importance of tailoring seeding rates based on seasonal and provincial conditions. Statistical analyses showed that yield differences were significantly influenced by the chosen seeding strategy. In all seasons, the variable rate strategy performed better than the *status quo* rate, but did not differ significantly from the optimal flat rate. Nonetheless, province and seasonal conditions still played a role in the yield outcome.

Key factors included:

- Rainfall distribution during reproductive stages (flowering to seed fill).
- Cultivar adaptability to stress and drought conditions.
- Planting date, affecting cultivar selection, and development timing.

The yield potential is influenced by multiple interactions including cultivar characteristics, planting date, row spacing, and environmental conditions. While maize typically exhibits a more predictable, linear relationship between plant density and yield, soya beans show a more flexible, non-linear response.

Modern cultivars can compensate for lower plant densities through increased branching and pod development. This means that under the right conditions, fewer plants can still result in good yields – ultimately saving input costs. However, even in dry years or seasons with erratic rainfall, increased seeding rates could not overcome the challenges posed by water stress at critical growth stages.

## Case study 1: Free State

Optimal flat rate recommendations varied by season. For two of four site-years, an increase in seeding rate was suggested. Notably, a 79% increase in 2021/22 increased yield by 940kg/ha, with 2022/23 only suggesting a 12% increase (50kg/ha). However, the 2020/21 season suggested a 40% reduction with minimal yield benefit (10kg/ha) and in 2023/24, a 45% reduction had no yield impact.

Where the variable rate calculations suggested adjusted plant populations based on field zones, optimal seeding rates on average ranged from 150 000 to 469 000 plants/ha. In three of four site-years, the optimal variable rate was higher than the *status quo*. Suggested increases were on average 69, 12, and 4% higher than the original *status quo* rates for respectively 2021/22, 2022/23 and 2023/24. The 2020/21 season was the only one where a reduced average seeding rate was suggested based on the management zones. Neglectable yield differences of approximately 85kg/ha were achieved in 2020/21, 2022/23 and 2023/24, while an 860kg/ha difference was measured in 2021/22.

VRS delivered the greatest profit in 2021/22, outperforming the *status quo* by R7 025/ha (33% improvement). In other years, profit gains were between R722/ha and R1 457/ha. Changes towards more optimal seeding rates had a positive impact on profitability in all four seasons. However, the magnitude of the profit difference ranged significantly.

## Case study 2: Mpumalanga

Optimal flat rate recommendations varied over seasons, suggesting both increases and reductions from the *status quo* of 280 000 plants/ha. A 32% increase in 2019/20 led to a 260kg/ha yield gain. However, in two subsequent seasons (2020/21 and 2021/22) lower seeding rates were suggested (16 to 28% reduction) with negligible or no yield penalty. In 2023/24, a 40% increase in seeding rate offered a minor 50kg/ha yield improvement, indicating limited return from uniform seeding adjustments.

Yield responses were again inconsistent when adjusting seeding rates by management zone. The 2019/20 season had the biggest positive influence on yield, where an 8% increase in seeding rate resulted in a 420kg/ha yield increase. All three consecutive seasons had a much smaller impact on yield response despite different suggested optimal seeding rates per management zone. The years 2020/21 and 2022/23 suggested on average 19% higher seeding rates compared to the *status quo*, but yield improved by only 30kg/ha or reduced by 50kg/ha depending on the season. In 2022/23, a 22% reduction in the average seeding rate was suggested, with a 30kg/ha yield improvement.

In the 2019/20 season, VRS significantly outperformed other strategies, with a profit increase of R9 300/ha. In other years, profitability was similar across

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**Figure 2: Soya bean seeding rates (plants ha$^{-1}$) and yields (tonne ha$^{-1}$) (A) and profit differences for *status quo* seeding rates, flat rate, and variable rate strategies (B) in the Free State. Standard error for variable rate approach is an average over the three zones.**

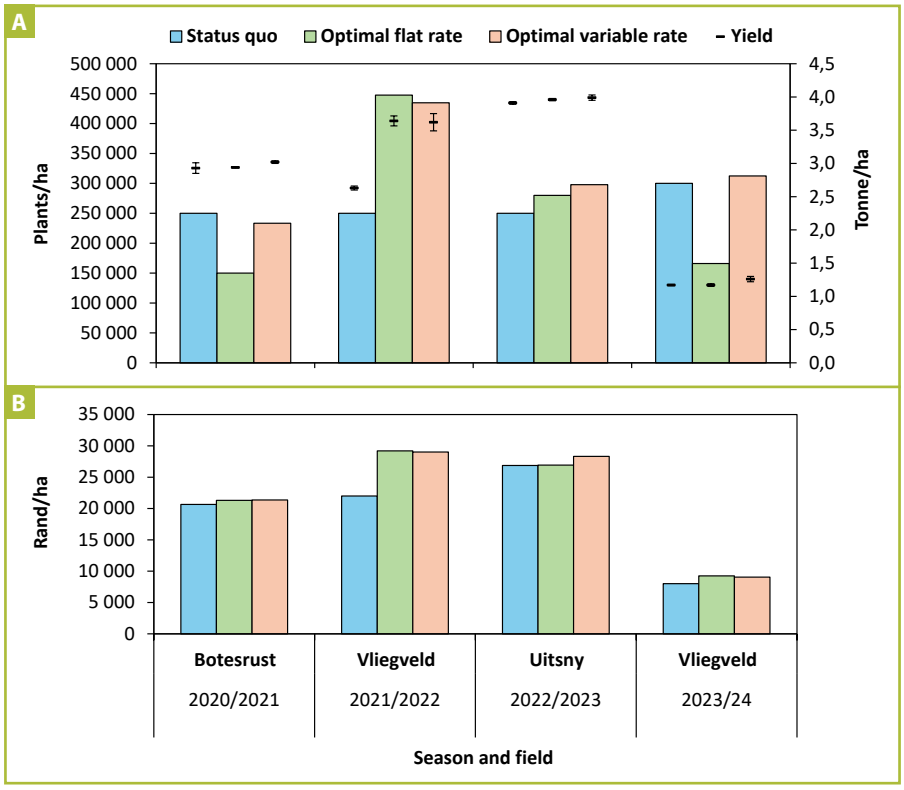
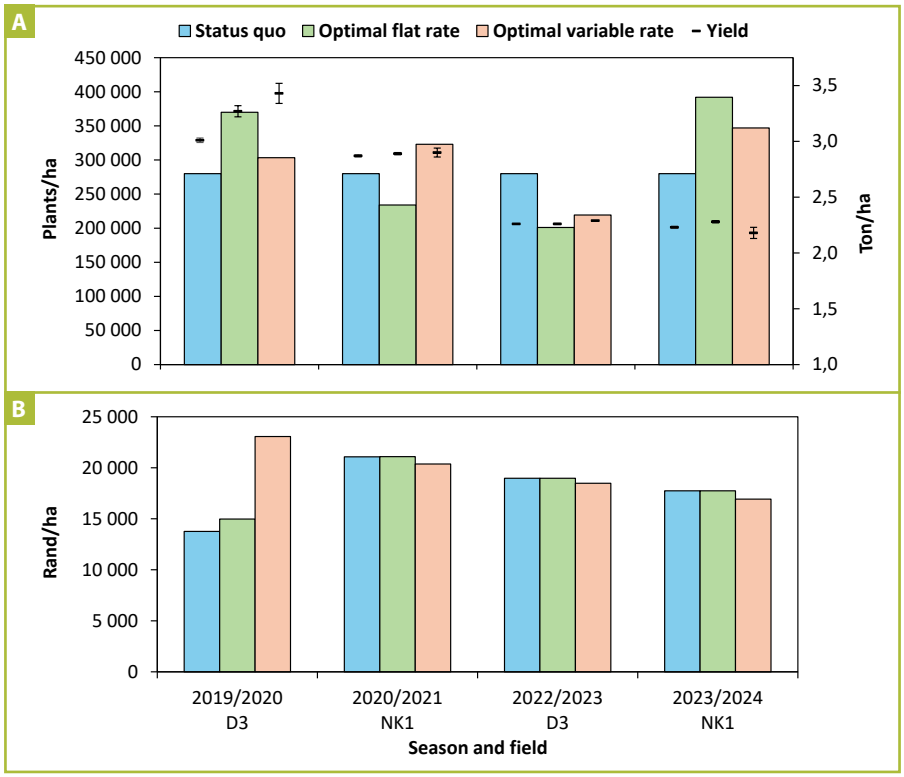



**Figure 3: Soya bean seeding rates (plants ha$^{-1}$) and yields (tonne ha$^{-1}$) (A) and profit differences for *status quo* seeding rates, flat rate, and variable rate strategies (B) in Mpumalanga. Standard error for variable rate approach is an average over the three zones.**




all approaches or slightly favoured the flat rate. Profit differences between the variable rate strategy and *status quo* differed on average with R667/ha (in favour of the *status quo*). The optimal flat rate preformed on average R672/ha better than the producer's usual *status quo*. These findings suggest that while VRS can offer substantial returns in favourable seasons, its profitability is not guaranteed under all conditions.

## Case study 3: North West

The North West province trials produced the highest yields (up to 5,8t/ha) and showed the greatest profitability from VRS. In two out of four site-years, higher flat rates were recommended, with seeding rate increases of around 98 000 plants/ha from the *status quo* rate (300 000 plants/ha). These increases were modestly rewarded with yield gains of 60 to 90kg/ha. In contrast, the following two seasons favoured lower seeding rates. In 2021/22, a 33% reduction in the seeding rate led to a 350kg/ha yield increase. Meanwhile, the 2022/23 season showed no yield change despite a slight decrease in seeding rate (5%), emphasising limited response to uniform rate adjustments under variable field conditions.

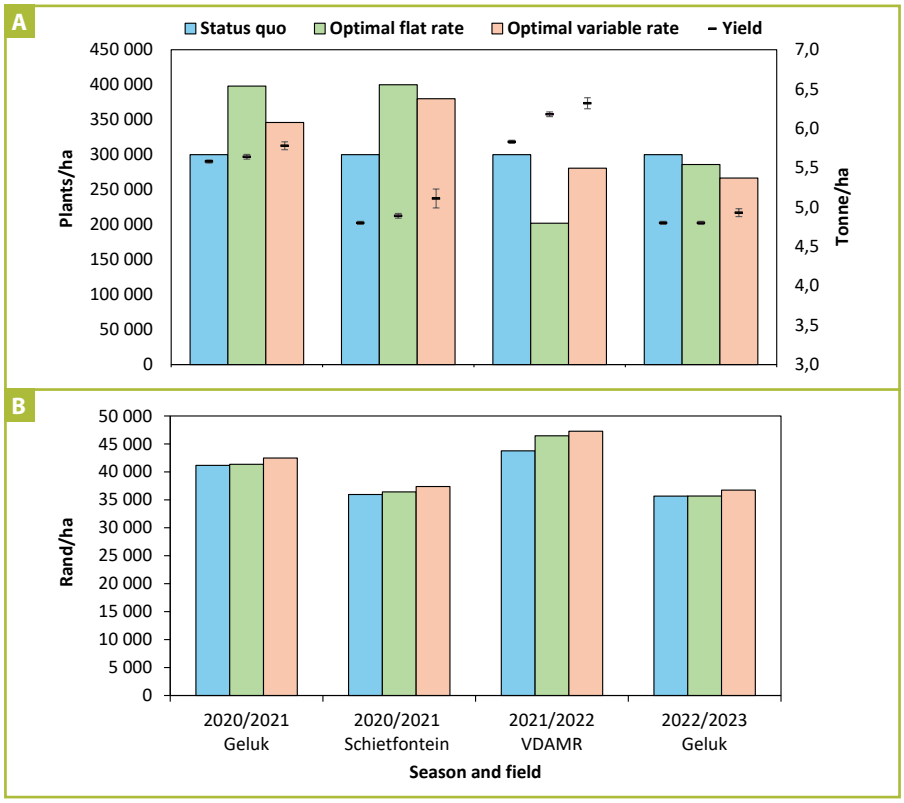
Suggested variable seeding rates ranged widely (between 190 000 and 461 000 plants/ha), influenced by within-field variability. Yield response to these rates was field- and season-specific. In 2021/22, good yields (6,25 to 6,45t/ha) were achieved at lower seeding rates in two zones, highlighting efficiency. Conversely, in 2020/21, stable yields across zones suggested tolerance to varied seeding rates.

VRS consistently delivered the highest profits across all fields and seasons. In 2020/21, profit increased by R1 370/ha on average over the *status quo*. In 2021/22, the highest overall profit was achieved, exceeding the *status quo* by R3 509/ha and the flat rate by R2 692/ha. Even during the lower-yielding 2022/23 season, VRS maintained a financial edge, albeit with smaller margins.

## Summary

Our findings highlight that an optimal flat rate or VRS strategy provides an improved management approach, but site-specific and seasonal variability still plays an

**Figure 4: Soya bean seeding rates (plants ha$^{-1}$) and yields (tonne ha$^{-1}$) (A) and profit differences for *status quo* seeding rates, flat rate and variable rate strategies (B) in North West. Standard error for variable rate approach is an average over the three zones.**




important role in yield responses. The observed differences in optimal seeding rates across provinces emphasise that a standardised seeding recommendation is insufficient. Instead, regionally tailored seeding rate approaches are necessary to account for interactions between plant population, environmental conditions, and management practices.

The optimal flat-rate seeding recommendations across the 12 site-years averaged 293 875 plants/ha, aligning with previous research. On average the recommended increase in seeding rates was 38% for six site-years and the average decrease was 28% in the remaining site-years.

Within provinces, yield was either similar or higher for the optimal flat rate seeding rates, with increases varying from 10 to 1 010kg/ha for the Free State, 60 to 250kg/ha for North West and 20 to 260kg/ha for Mpumalanga. While higher seeding rates in low-productivity environments can enhance yield potential, excessive plant populations may not always translate to higher profitability, particularly in resource-limited conditions.

VRS demonstrated statistically significant yield and economic benefits when compared to the *status quo* rates, but it did not differ from the optimal flat rate approach. Eight site-years resulted in an increased planting population of 22% for the variable rate approach, the remaining four site-years resulted in a decrease of 12% compared to the usual *status quo* rates. Only one site-year resulted in a yield decrease of 50kg/ha, while the rest increased between 30 and 990kg/ha (~260kg/ha).

VRS demonstrated economic benefits, particularly in fields with greater in-field variability, but magnitude of profit differed. The extent of economic advantage depended on specific field conditions and seasonal rainfall. The strongest profitability benefits were observed in North West and the Free State, whereas Mpumalanga showed mixed outcomes. Nine site-years demonstrated an increased profit margin compared to the initial *status quo* profit, while three of the site-years from the same province resulted in a reduced profit. These results align with global studies suggesting that variable seeding rates can optimise profit by tailoring plant populations to soil properties and historical productivity.

Ultimately, while seeding rate adjustments offer a valuable tool for improving profitability, the success depends on the integration with other agronomic practices such as cultivar selection, planting date optimisation, and soil management. Future research should further refine VRS recommendation based on site-specific yield potential and environmental stress factors.

As adoption of precision agriculture technologies continues to grow, South African producers can leverage data-driven, adaptive approaches to soya bean seeding, ensuring both sustainability and profitability across varying environments.

**What does this mean for soya bean producers?**

- ***No one-size-fits-all solution:*** Uniform seeding rates across all fields – or even within a single field – may result in missed opportunities for input cost savings and potential yield gains.
- ***Flexibility is key:*** Producers who are willing to adjust practices each season – based on local conditions and crop performance data – stand to gain the most in the long run.
- ***Room for optimisation:*** Even though no one-size-fits all solution exist, there remains room for improvement in terms of soya bean seeding rates.
- ***Environmental impact:*** Weather and soil conditions have the strongest impact on yield. Understanding rainfall patterns, soil type, and temperature is key to informed decision-making.
- ***Data-driven decisions payoff:*** VRS offers a promising way to balance input costs and yield potential, especially when coupled with soil chemical and physical maps – and yield history.

**Acknowledgements:** Stellenbosch University: Department of Agronomy, Grain SA, the Protein Research Foundation (PRF), and the Sasol Agricultural Trust.

For more information on cultivars, seeding, fertilisation rate and yield per management zones, send an email to trials@bfap.co.za

# Green soya bean seeds in South Africa:
## Understanding the challenge and managing the risk

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

Soya bean greening, where seeds remain green instead of turning yellow, reduces seed and oil quality, affecting producers, processors, and consumers. Plant genetics, environmental conditions such as heat or drought, and agronomic management practices can cause this issue. Our study reviewed global research to gain a better understanding of what causes soya bean seeds to remain green and how this affects seed quality.

From these insights, possible ways to reduce greening at soya bean breeding stations and on farms are suggested. Our review found that late-season stress conditions, such as high temperatures, very dry conditions, or early frost often cause seeds to stay green. Some soya bean types are more likely to remain green rather than yellow, and farming practices such as planting date and plant density can also play a role.

Greening can lower the oil content and increase the presence of poor-quality proteins in the seeds, resulting in lower-quality products for livestock and human consumption. Understanding these causes can help agricultural researchers, producers, and the industry to develop solutions to reduce greening and improve soya bean seed quality.

### Introduction

Soya bean production in South Africa has grown rapidly over the past two decades, with cultivated areas expanding from around 500 000ha in the early 2000s to over 1,1 million ha by 2024. This growth is driven by rising demand for soya bean meal and oil, improved seed technology, and the adoption of crop rotation systems that reduce reliance on maize monoculture. Key production regions are the Mpumalanga Highveld, Free State, North West, and KwaZulu-Natal, where favourable climate conditions and innovative agronomic practices have contributed to yield improvements.

However, alongside this expansion, a quality issue has emerged that may affect the value of South African soya bean crops: the occurrence of green seeds at harvest. These seeds retain chlorophyll despite reaching physiological maturity, resulting in undesirable oil colour, reduced protein quality, and compromised seed viability.

Green seeds are increasingly reported in local oilseed industry assessments, with some deliveries downgraded or rejected due to excessive greening. Understanding the causes and consequences of this phenomenon is essential for producers, seed companies, and processors seeking to maintain high-quality soya bean outputs.

### The science behind green seeds

Soya bean seeds typically transition from green to yellow as they mature, a process driven by the breakdown of chlorophyll. This degradation is tightly regulated by enzymes and hormonal signals during complex physiological processes. Under normal conditions, chlorophyll is dismantled through a pathway involving certain enzymes. However, environmental stress, particularly drought, heat, and premature desiccation, can disrupt this breakdown of the chlorophyll molecules inside the developing kernels, leading to incomplete chlorophyll breakdown and persistent green pigmentation.

Hormonal imbalances play a key role. Cytokinins help delay senescence and stabilise chlorophyll-protein complexes, while abscisic acid (ABA) promotes chlorophyll degradation. Under stress, ABA levels rise and cytokinin levels fall, tipping the balance towards premature senescence. This hormonal shift can damage chloroplast membranes and inhibit enzyme activity, further impairing chlorophyll breakdown.

### Genetic susceptibility

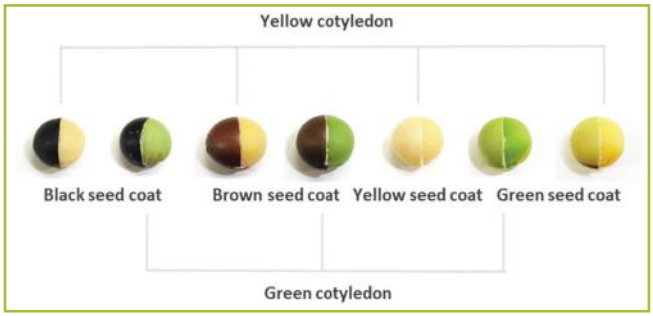
Not all soya bean cultivars respond to stress in the same way. Genetic variation influences how effectively seeds degrade chlorophyll under adverse conditions. The G-gene, for example, controls the transition from green to yellow seed coats. Cultivars with the recessive G allele are more likely to produce yellow seeds, while those with a functional G allele may retain chlorophyll under stress. Even cultivars bred for yellow seed coats can exhibit greening if environmental conditions are unfavourable.

Multi-environment cultivar trials are essential to identify genotypes that maintain seed quality across diverse conditions. This is particularly important in regions where late-season droughts and heatwaves are common.

### Environmental triggers

Late-season droughts, high temperatures, and early frost can accelerate seed dry-down, disrupting the enzymatic breakdown of chlorophyll. In certain regions, waterlogged soils may also contribute by inducing ethylene production and oxidative stress, which destabilise chlorophyll-protein complexes.

Research from Brazil and other soya bean-producing countries confirms that stress during the latter reproductive




*Varying soya bean seed coat and cotyledon colour, where the right half of each seed coat was removed to show the cotyledons (Tokumitsu et al., 2022).*

*Green soya beans (left) following rapid drying, and yellow soya beans (right) after slow drying (Lemes and Catão, 2024).*

growth stages (R5 to R8) is particularly critical. In South Africa, these stages often coincide with periods of climatic instability, especially in rainfed systems. Rapid drying due to hot, windy conditions can halt chlorophyll degradation prematurely, while cool, cloudy weather may slow maturation and prolong chlorophyll retention.

Disease pressure can also contribute, where the physiological processes involved with chlorophyll breakdown are impaired in infected plants. In addition, nutrient and water uptake by infected plants is reduced due to the pathogen's effect, causing plants to experience greater stress conditions. This leads to ineffective photosynthesis during the vegetative growth stages, as well as poor chlorophyll breakdown during autumn or early winter. All these effects lead to lower quality and yield.

## Agronomic practices

Producers have several tools at their disposal to manage green seed risk. Agronomic decisions, such as planting date, seeding rate, and desiccant application, can significantly influence seed maturation outcomes.

- **Planting date** is critical. Late planting increases the likelihood that seed maturation will occur during periods of high stress. Aligning planting with favourable environmental windows can reduce exposure to drought and heat during the R5 to R8 stages.
- **Seeding rate** also matters. Higher plant densities may buffer against environmental extremes by promoting uniform canopy development and reducing soil evaporation. Surprisingly, studies have shown that increased seeding rates can reduce green seed incidence, likely due to more efficient resource use and moderated microclimates within the leaf canopy from the beginning of the growing season.
- **Desiccant timing** is another key factor. Applying desiccants too early can halt chlorophyll degradation before it is complete. Research from Brazil indicates that certain agrochemicals may increase green seed occurrence if applied prematurely. It is important to follow label recommendations and apply desiccants only at appropriate growth stages (R7.1 or later).
- **Soil and water management** are foundational. Practices that improve soil moisture retention, such as cover cropping, reduced tillage, and organic matter enhancement, can mitigate drought stress during critical reproductive stages. In sandy soils, subsoiling may improve root access to deeper moisture reserves. Integrated weed management also supports soil water conservation by reducing competition for resources.

## Postharvest handling and storage

Even after harvest, management decisions continue to impact green seed outcomes. Drying temperature and rate are critical. High-temperature drying (>40°C) can inactivate enzymes responsible for chlorophyll breakdown, while slow drying at moderate temperatures (25 to 30°C) allows degradation to continue. Seeds harvested early and dried slowly may still turn yellow over time, suggesting that enzymatic activity persists postharvest.

Storage conditions also influence the retention of greenness. Green seeds tend to have a higher moisture content and softer seed coats, making them more vulnerable to fungal infection and mechanical damage. High humidity and temperature accelerate viability loss, reducing the shelf life of seed lots. Proper drying and storage protocols are crucial for preserving seed quality and minimising losses.

## Impacts on processing and end use

Green seeds affect more than just appearance; they compromise the biochemical integrity of soya bean products. Oil extracted from green seeds has higher free fatty acid levels, which reduces its oxidative stability and shelf life. The greenish hue is aesthetically undesirable and requires additional bleaching, increasing processing costs.

Protein content and amino acid profiles are also affected. Green seeds typically have lower protein concentrations and reduced levels of essential amino acids, such as lysine and methionine. This diminishes the nutritional value of soya bean meal and increases feed formulation costs for livestock producers.

Sensory properties are compromised due to elevated lipoxygenase activity, which produces off-flavours in food-grade products such as soya milk and tofu. Additionally, green seeds may exhibit altered carbohydrate profiles, which can affect fermentation and digestibility.

## Conclusion

Green soya bean seeds represent a complex challenge that intersects plant physiology, genetics, climate, and farm management. In South Africa, where soya bean production is expanding into diverse agroecological zones, understanding and managing this issue is critical to sustaining quality and profitability.

By integrating stress-resilient genetics, optimising agronomic practices, preserving soil moisture, and careful handling postharvest, stakeholders can reduce green seed incidence and enhance the value of South African soya beans in both domestic and international markets. For South African producers, the challenge of green soya bean seeds is compounded by climatic variability, which can be very sporadic and irregular.

While this article has introduced key concepts and challenges, a more detailed exploration is forthcoming. In the next issue of *Oilseeds Focus*, we will present a growth stage-based agronomic framework that outlines targeted themes, practices, and physiological insights to address green seed risk across reproductive growth stages, especially under environmental stress conditions. This will provide producers with actionable strategies for resilient soya bean production systems that prevent soya bean greening and inform post-harvest handling.

Send an email to Prof Pieter Swanepoel at pieterswanepoel@sun.ac.za for more information.

# Seed rights overhaul

*By Susan Marais, Plaas Media*

The new *Plant Breeders' Rights Act, 2018 (Act 12 of 2018)* marks a significant shift in how intellectual property is managed in South African agriculture. While it brings the country in line with international conventions and promises to drive innovation, its impact on commercial farming practices – especially around seed saving – will likely spark further debate. Ensuring that small-scale producers remain protected while also encouraging private sector breeding will be key to the *Act's* long-term success.

## Years in the making

After several years of deliberation, the National Department of Agriculture (NDA) announced in June that the new *Act* had officially commenced. President Cyril Ramaphosa signed the proclamation following the approval of the regulations by John Steenhuisen, minister of agriculture. The *Act* replaces the *Plant Breeders' Rights Act, 1976 (Act 15 of 1976)*.

Revisions in the new *Act* include:

- Streamlined administrative processes.
- Scope of plants eligible for protection extended to all genera and species.
- Periods of protection revised to up to 30 years in the case of fruit trees, vines, sugar cane, and potatoes, and 25 years for all other crops.
- Categories of producers, crops, and quantities in relation to farm-saved seed defined.
- The establishment of an advisory committee, including representation from a wide range of stakeholders such as breeders, producers, and intellectual property law specialists.

## Rights for innovation

The NDA added that this *Act* would contribute to the South African government's objectives and priorities by promoting innovation in plant breeding and agriculture. Through the protection of new plant varieties, the *Act* plays a vital role in enhancing food security, increasing agricultural productivity, and supporting rural development growth. Additionally, the new *Act* will encourage investment in plant breeding, foster job creation, and support economic development.

The publication of the *Act* was welcomed by the country's seed breeders. Dr Mieke Human, science and policy manager at the South African National Seed Organisation (Sansor) said: "South Africa has a long history of variety protection. This has resulted in producers having excellent choices when deciding which crops and cultivars to plant.

"The new *Act* positions South Africa very well internationally and continues to support innovation. The seed industry in South Africa has been able to grow because of the variety protection put in place by the NDA."

## Balancing act: Small scale vs commercial

Dave Cochrane, a partner at Spoor & Fisher, said the updated legislation strengthens protection for plant breeders and encourages agricultural innovation, while also balancing the rights of subsistence, vulnerable, and small-scale producers. "This law supports South Africa's producers and plant breeders by protecting investment in new and improved plant varieties. It also ensures that South Africa complies with the international UPOV 1991 Convention, promoting innovation and trade in the agricultural sector."

The following are a few changes introduced by the new *Act* that users must take note of:

- **Stronger protection for plant breeders:** The term of protection for registered plant varieties has been extended to 30 years for certain crops such as fruit trees, vines, sugarcane, and potatoes, and 25 years for all other crops.
- **Limits on commercial use of protected seeds:** The 'farmer's privilege' – which allows producers to save and use seeds from protected plants – now only applies to smallholder, subsistence, and vulnerable household farmers. Larger commercial producers must now obtain permission and pay royalties to breeders when saving seed from protected varieties.
- **Criminal penalties for infringement:** Unlawfully using protected plant varieties is now a criminal offence, with penalties including fines, imprisonment for up to ten years, or both.
- **Sole rights period extended:** The *Act* increases the period during which breeders have exclusive rights to their variety – up to eight years for specific crops such as fruit trees and sugarcane, and five years for others.
- **Provisional protection at filing:** Breeders now receive provisional protection automatically as soon as they file an application.
- **New rules for plant material submissions:** The timeframes for submitting plant material for testing have changed. For most crops, material must be submitted within two years, and for potatoes, trees, and vines, within five years. Extensions are possible under certain conditions.
- **Clearer definitions and rules:** The *Act* provides clarity on what qualifies as a 'sale' (important for determining novelty), confirms that products made from harvested material are protected, and that preparing plant material for sale (called 'conditioning') can be an infringement.

## Saved seed quantities

One of the most controversial aspects of the new regulations relates to the strict limits on saved seed quantities. Cochrane said the regulations also define what quantities of seed may be saved and shared by small-scale and vulnerable farmers. These limits are significantly lower than initially proposed – for example, allowed saved seed for groundnuts has dropped from 2 000 to just 50kg, and maize from 3 000 to 12kg, and fruit crops have dropped from 100 to five per kind.

For more information, contact David Cochrane at d.cochrane@spoor.com or call 012 676 1001.

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# **Sensako:** Sunflower and wheat hero

Sunflowers' ability to adapt to different climate and seasonal conditions is attributed to its tolerance for high and low temperatures alike. Its ability to produce relatively consistent yields under adverse weather conditions makes it an attractive option, especially for producers in dryland areas. This ability to withstand adverse climate conditions proved highly advantageous at the start of the 2024/25 season.

"Access to global germplasm not only benefits the Sensako brand, but also local producers because this advantage is filtering through to new, high-potential products in our pipeline," says Hendrik van Staden, Syngenta Seeds Field Crops business unit head for Africa and the Middle East.

Globally, Syngenta is regarded as the leader in sunflower genetics and producers buying Sensako hybrids have direct access to top sunflower genetics. One such example is Argentinian sunflower hybrids that are suited to South African conditions, offering the dual advantage of high oil content and herbicide tolerance.

## Focus on what matters

According to Charles Basson, sunflower breeder and product placement lead, Syngenta focusses on the following attributes in their Sensako sunflower breeding programme:

- Oil percentage: The idea is to select early in the programme for high oil percentage.
- Agronomic type: Hybrids are evaluated across various environments and planting dates according to plant height, head size and angle, standability, as well as day to flowering and maturity.
- Disease tolerance.
- Herbicide resistance.
- Grain yield.
- Seed production.

Syngenta Seeds, under its Sensako brand, offers a diverse sunflower hybrid package that includes SNK 270 CL, SNK 242 CL, and SNK 441 CL, enhancing the hybrid range available to producers.

"Our pipeline provides producers with high-performing hybrids that combine high oil content with added planting flexibility," says Basson.

SNK 441 CL (70 to 72 days to 50% flowering) and SY 3970 CL (66 to 70 days) are well suited for early planting. SNK 270 CL (64 to 68 days) and SNK 242 CL (62 to 64 days) offer greater flexibility, accommodating both early and late planting windows.

These hybrids are widely adapted and have excellent yield potential and stability under various conditions. Syngenta's hybrids showed their high-performance and high oil content in this season's commercial trials planted in all sunflower production regions in South Africa.

"Producers also shared these experiences. SNK 242 CL performed exceptionally well in all the trials with top grain yields and very high oil content, while SNK 270 CL also showed a stable yield and high oil content throughout the sunflower production area. Additionally, SNK 441 CL's grain yield compared well to that of competitor hybrids currently in the market while also maintaining its high oil content. SY 3970 CL showed high oil content in all trials while also having above average grain yield," Basson says.

SNK 441 CL and SY 3970 CL, both late-maturing hybrids, exhibited above-average performance in a season that suited medium-late maturing hybrids. These high-quality hybrid seed not only ensures better and more productive crops, but also plays a vital role in mitigating risks associated with grain production – such as disease, pests, and climatic diversity – thus enabling producers to grow food using less land, less water, and fewer inputs.

"We strongly recommend planting a hybrid package to strategically manage disease and drought stress. With our new sunflower package, we recommend that producers stagger their planting dates to manage risks, particularly *Sclerotinia*," says Van Staden.

Building strong relationships with producers and earning their trust through consistent performance and on-the-ground support remains a top priority for Syngenta Seeds. This goes hand in hand with continued innovation, with a strong focus on developing new high-yielding, high-oil Sensako hybrids.

Visit *www.syngenta.co.za* or *www.sensako.co.za* for more information.

# Symposium focusses on challenges and solutions

*By Susan Marais, Plaas Media*

Soya bean production in South Africa has more than doubled over the past 50 years, but experts warn that the country cannot afford to rest on its technological laurels – or risk losing ground globally. This was the central message at the recent soya bean symposium, held on 29 July at the CSIR Convention Centre in Pretoria and hosted by the Protein Research Foundation (PRF), Oil and Protein Seeds Development Trust (OPDT), and the Oilseeds Advisory Committee (OAC).

Prof Ferdi Meyer, director of the Bureau for Food and Agricultural Policy (BFAP), noted that South Africa's rapid increase in soya bean output reflects an age-old truth: production is not 'pushed', but 'pulled' by demand.

He outlined four key drivers behind the country's soya bean growth success:

- **Poultry expansion:** Rapid growth in the poultry industry created a significant opportunity to replace imported soya bean meal.
- **Technology transfer:** Organisations such as the OAC and Grain SA spearheaded awareness and knowledge-sharing initiatives.
- **Policy support:** The Department of Trade, Industry and Competition provided clear policy direction, encouraging private investment in crushing facilities.
- **Innovation in production:** The introduction of a technology levy, extensive cultivar trials, and improved farming practices played a significant role. Interestingly, nitrogen use has remained largely unchanged since 2001, even as production and phosphate use have increased – an indicator of the soil health benefits and nitrogen fixation of soya bean cultivation.

On a cautionary note, Prof Meyer stressed that South African consumers remain under significant economic strain, while the poultry sector is still recovering from the impact of avian influenza.

## New cultivars and technology

In the 1970s, Dr Antony Jarvie, soya bean research programme manager at Corteva, authored a paper on how producers could potentially boost soya bean yields to over 3t/ha. Decades later, he notes that advances in management practices, technology, and genetics have been so significant that he could now write an article on achieving 6 or even 7t/ha.

Speaking during a panel discussion on the impact of new cultivars and technology on South African soya bean production – led by Dr Lukeshni Chetty, general manager of Sansor – Dr Jarvie highlighted the introduction of drought tolerance in both soya beans and maize. "This," he explained, "has reduced chemical residues in soils, enabling more effective crop rotation, which has been integral to the global success of soya beans."

While technological innovation has propelled the global soya bean industry forward, Dr Jarvie cautioned that South Africa must keep up or risk falling behind.

Adriaan Jordaan, commercial strategy integrator for horticulture and cereals at Bayer, stressed that while new technologies have been highly beneficial, they must be protected. "It takes at least 20 years for a new product to reach the market – and it is even more challenging in a leverage country such as South Africa," he said. A leverage country, he explained, adopts technology developed elsewhere. "We are fortunate to benefit from international research, but we must remain aware of the significant effort required to bring new developments into the country."

Dr Derick van Staden, director of Agri-Seed and Technology (AST), added that while the South African Cultivar and Technology Agency (Sacta) levy is functioning well, they would prefer industry funding to come from seed sales

*During the first session, speakers gave an overview of the macroeconomic picture of Brazilian and South African soya bean production. The speakers were, from the left, Prof Ferdi Meyer, managing director of the Bureau for Food and Agricultural Policy (BFAP), Dr Leandro Eugenio Cardamone Diniz, researcher and head of soya bean international affairs at Embrapa, and Andries Theron, chairperson of the Protein Research Foundation, who facilitated the session.*


*A panel of experts discussed the impact of new cultivars and technology on soya bean production in South Africa, led by Dr Lukeshni Chetty, general manager of Sansor. From the left are Facundo Stella, commercial manager of GDM Seeds in South Africa, Adriaan Jordaan, commercial strategy integrator for horticulture and cereals at Bayer, Dr Derick van Staden, director of Agri-Seed and Technology, and Dr Antony Jarvie, soya bean research programme manager at Corteva.*

*Dr Lisa Rothmann, plant disease epidemiologist from the University of the Free State, spoke about Sclerotinia management and control in South Africa.*

rather than levies. "It would be far better to receive dividends than levies," he noted.

Although the implementation of the new *Plant Breeders' Rights Act, 2018 (Act 12 of 2018)* strengthens the industry, Dr Van Staden believes South Africa can still learn valuable lessons from Brazil's approach.

## Lessons from Brazil

Dr Leandro Eugenio Cardamone Diniz, a researcher and head of soya bean international affairs at Embrapa, shared an overview of soya bean production in Brazil, highlighting how technology is driving major advancements. In the 2024/25 season, Brazil harvested approximately 168,3 million tonnes of soya beans from 47,5 million ha, achieving a productivity rate of 3 541kg/ha. Looking ahead, the country anticipates harvests reaching 330 million tonnes in future.

While improved genetics have been a major factor in Brazil's progress, Dr Diniz emphasised that better management practices have played an equally important role in boosting production. This success is not simply the result of individual production units leveraging economies of scale – in fact, most producers in the southeastern region of Brazil farm less than 50ha. In contrast, farms in central Brazil average around 450ha, with only a few producers in the Matopiba region working on between 500 and 1 000ha.

According to Dr Diniz, small producers thrive because they are well organised into cooperatives. "This gives them excellent bargaining power when purchasing seed. They also pool resources to buy farming equipment that they all share and gain access to the best technology on the market," he explained.

Many seed dealers – around 41% – are members of cooperatives. The structure even allows producers to earn royalties when seed is purchased from such dealers.

Another key difference between Brazil and South Africa is the way cultivars are developed and used. Brazil is divided into seven regions, each having new cultivars annually that are adapted to the conditions prevalent in each of those regions. In South Africa, on the other hand, a cultivar could possibly be planted anywhere in the country's soya bean production regions.

Soya beans in Brazil are also sold differently – not by weight but by number. A producer might, for example, buy 200 000 seeds, with the price determined by the technologies included in the seed. Despite these advancements, Brazil faces similar logistical challenges than South Africa. "Our roads aren't exactly a dream to travel on," Dr Diniz remarked, adding that producers must factor transport costs into their profitability calculations.

He referred to a 2003 study which revealed that every single centimetre of soil lost due to erosion reduces soya bean yields by 150kg/ha. Therefore, applying no-till practices correctly is critical for soya bean producers in that country.

Proper integrated disease management programmes are also crucial as they focus on using resistant cultivars, no-till cropping systems, balanced plant nutrition, and proper soil management for better root growth. Crop rotation programmes are worked out very carefully and ensure that seed is used correctly. Good seed quality cannot be compromised, Dr Diniz stressed.

## Managing challenges

Dr Lisa Rothmann, plant disease epidemiologist from the University of the Free State, discussed *Sclerotinia* management in South Africa. "This story began in 2018 when the *Sclerotinia* Research Network was formed," she said. "I'm excited to say we've made significant progress in controlling the disease. However, producers must remember there is no silver bullet. Effective control requires an integrated pest management system."

Nadine Loubser, head of microbiology at Microbial Biological Fertilizers International (MBFI), spoke about how microbial innovations could enhance soya bean productivity and connect science with practical applications. "Microbial inoculants assist with biological nitrogen excision. This is a lot more beneficial to the environment and means less conventional nitrogen can be applied to a crop."

For more information regarding the symposium, send an email to Yvette Papadimitropoulos at admin@proteinresearch.net

# Canola in Australia:
## 21st century progress: Breeding (Part 2)

*By Dr Harsh Raman, Kate Light, and Justin Kudnig*

Since double-low (low erucic acid and low glucosinolate) varieties were first discovered and developed in Canada, Australian breeders have used those donor sources to develop canola quality rapeseed (*B. napus*), *B. rapa* and *B. juncea* varieties.

Several different specialty *Brassica* varieties for specific end uses have also been developed in the past. AgSeed Research and Agriculture Victoria developed higher erucic acid rapeseed (HEAR) types (*B. napus*), and biofumigant mustards (*B. juncea*). This joint programme and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) also developed condiment mustards (*B. juncea*). Due to limited market uptake, breeding of these specialty lines ceased in 2008.

The most successful specialty canola type developed in Australia is the high oleic low linolenic (HOLL) canola. AgSeed Research began developing HOLL varieties in the early 1990s with a fatty acid profile approximating 67% oleic and 4% linolenic. This programme is now part of NuSeed Pty Ltd and forms their Monola line of HOLL varieties. Cargill Seeds markets several HOLL hybrids, and Corteva AgriScience (formerly the Dow AgroSciences programme) are now pursuing the HOLL market in Australia. Current Cargill and NuSeed HOLL specialty products in Australia have all been selected for blackleg resistance, maturity, adaptation, and herbicide tolerance. The Australian HOLL area is upwards of 60 000 ha annually.

### Herbicide tolerance systems

***Conventional canola*:** Conventional canola open pollinated (OP) varieties were developed and released in Australia until 2011. These varieties had tolerance to grass-selective herbicides. The last conventional hybrid was released in 2017.

The area sown to conventional canola in Australia has dramatically decreased since the 1990s when five herbicide tolerance systems became available, namely triazine tolerant (TT), imidazolinone tolerant (IMI, Clearfield®), glyphosate resistant (Roundup Ready® and TruFlex®), and glufosinate resistant (Liberty Link®). Herbicide tolerant varieties gave canola growers and agronomists more options for efficient and effective integrated weed management (IWM).

***Triazine tolerant*:** Triazine tolerant (TT) canola varieties comprise over 40% of the annual Australian canola area. Despite recognition of the inherent yield penalty related to the triazine tolerance mutation, TT canola fulfils a key role in many IWM systems. The area sown to TT canola is split evenly between OP varieties and hybrids.

The first TT hybrids were the Ogura cytoplasmic male sterility (CMS) system (Pacific Seeds) and the NPZ Lembke MSL system (NPZA), released in 2009. Within a few seasons it was clear that while TT hybrids had significantly improved yield compared with OP varieties (+10 to 15%), they still lagged behind the yield of hybrids with other herbicide tolerance systems.

TT Ogura CMS paved the way for the stacking of herbicide tolerances. However, TT stacks inherit the yield penalty associated with the TT mutation. Some recently released TT hybrids show significant genetic yield gain and in-cross technology analysis shows equivalent yields to technologies such as Roundup Ready® or Clearfield®.

***Imidazolinone tolerant*:** Imidazolinone (IMI) tolerant OP canola was first released in Australia in 2000 by Pioneer Hi-Bred Australia Pty Ltd, offering an alternate herbicide system for Australian canola growers. When the first hybrids were developed and released in 2005 by Pioneer the yield benefit over TT and flexibility offered by the system was realised.

Since 2010 all IMI tolerant varieties have been hybrids. Cereal grain crops in Australia are now also available with IMI tolerance. As the summer months are often very dry, crops following IMI tolerant cereals, such as canola, need to have a tolerance to any potential IMI residue. This led to the stacking of IMI tolerance with other herbicide tolerance systems.

The Clearfield® hybrid system enables herbicide tolerant stacks to be created. Growers have the flexibility to sow a glyphosate/IMI tolerant hybrid stack to avoid soil residue issues from previous IMI use and/or manage resistant weed populations.

***Glyphosate resistance*:** It was anticipated that glyphosate resistant canola in Australia (Monsanto's Roundup Ready®) would be commercially released by 2002. However, due to state moratoria and the extended regulatory approval process, this was delayed until 2008. Nuseed Pty Ltd, Advanta Seeds Pty Ltd and Pioneer Hi-Bred Australia Pty Ltd all released Roundup Ready® varieties that year. Glyphosate resistant hybrids are now estimated to comprise 35 to 40% of the entire Australian canola crop acreage.

TruFlex® canola was first released in 2018, both globally and in Australia by Advanta Seeds Pty Ltd. Corteva AgriScience's Optimum GLY® trait was granted regulatory approval in 2023, with commercial release of a Pioneer Optimum GLY® canola hybrid planned for 2024.

***Glufosinate resistance*:** The first hybrid stacked with glufosinate resistance and TT was released in 2021 by BASF. A stacked hybrid with both glufosinate and glyphosate resistance was due to be released commercially in Australia in 2024.

### Dual-purpose canola

In the past decade, a market has developed in the medium- to high-rainfall cropping regions for dual-purpose (graze/grain) varieties. These varieties are not bred in Australia – they are winter oilseed rape (WOSR) varieties licenced from mainly European breeding programmes. They account for approximately 200 000ha in Australia, fulfilling graze and grain, grazing only,

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or grain only purposes, depending on specific agronomic and feed gap requirements in mixed farming businesses.

## Other *Brassica* species

***Brassica juncea*:** Breeding for Indian mustard commenced in the 1970s in Australia. The aim was to develop varieties for hotter, drier, low rainfall areas. The research organisations involved at the time included CSIRO, Agriculture Western Australia (AgWA) and Agriculture Victoria. The CSIRO and AgWA programmes ceased by the turn of the century, and the breeding material was incorporated into the Agriculture Victoria breeding programme.

This programme became part of the NBGIP and began to focus on developing canola-quality *juncea*. The first of these varieties was released in 2007 (Dune), and two IMI tolerant canola quality *B. juncea* varieties followed in 2009. Viterra (now Nutrien Ag Solutions) continued the breeding programme from 2011 to 2014 with support from the GRDC. The first hybrid *juncea* varieties were developed but were not commercialised in the Australian market.

***Brassica carinata*:** Australian breeding programmes and pre-breeders have evaluated Ethiopian mustard accessions for blackleg and pod shatter resistance, flowering time, grain yield, and other agronomic traits. Research has identified considerable genetic variation for these traits. Research continues in Australia at a pre-breeding level to explore the possibility of exploiting these traits in Australia, whereas they have been commercialised in other locations worldwide.

## Significant research developments

Significant investment in research and development has resulted in continuous innovation and technological improvements in Australian canola breeding across several areas.

***Gene characterisation*:** Characterising genetic variation for priority traits and trait marker discovery in partnership with the GRDC and other organisations, for blackleg resistance (MGP, NSW DPI and CSIRO); heat tolerance (UWA and NSW DPI); tolerance to acid soils due to aluminium, manganese, and proton toxicities (NSW DPI and DPIRD); phenology (CSIRO and NSW DPI); pod shatter resistance (NSW DPI); drought tolerance (NSW DPI); and oil quality (NSW DPI and CSIRO).

***Genetic marker technologies*:** Different marker technologies such as single sequence repeat (SSR), single nucleotide polymorphism (SNP), genotyping-by-sequencing (GBS), and skim sequencing were used to characterise canola germplasm and construct linkage maps for genetic analysis using interval mapping, genome-wide association analysis, and haplotype analysis, and high-resolution mapping in Australian canola pre-breeding germplasm.

More recently, a DNA resequencing-based approach has been used for genome-wide association studies (GWAS) analyses in Australian germplasm.

***Reference and pan-genomes*:** Australian researchers collaborated internationally and contributed to developing *B. rapa*, *B. oleracea*, *B. napus* and *B. carinata* reference and pan-genome assemblies. These resources are crucial for pinpointing genes and understanding the genetic architecture of important agronomic traits and for trait enhancement.

***AI and data mining*:** Artificial intelligence (AI) is being exploited to select traits and make 'ideal' crosses in breeding programmes. Breeding programmes use drone sensor technologies to assess trials. This technology played a significant role during the Covid pandemic (2020 to 2022) when travel restrictions and state border bans existed in Australia.

***Gene engineering and editing*:** Extensive progress has been made in genetic engineering and gene editing technologies in Australia and overseas. For example, CSIRO and NuSeed Pty Ltd have developed transgenic canola with an omega fatty acid biosynthesis gene.

The Australian Research Council (ARC) supported the Australian Training Centre on Future Crops (led by the Australian National University and supported by NSW DPI, CSIRO, the University of Adelaide [UA], and Australian and international industry research partners) is focussing on genetic engineering and gene editing approaches to develop canola with improved resistance to blackleg, pod shatter and photosynthesis efficiency. This research is being done in collaboration with Australian canola breeding companies, NSW DPI and CSIRO.

***Agronomic interventions*:** Research on agronomic interventions with spray-on technologies has shown promising results in switching genes on and off 'at will' in crop plants. This technology has potential in managing diseases such as blackleg and *Sclerotinia*, and optimising plant development/physiological processes that negatively affect canola yield and quality.

## Future directions

High-yielding, blackleg-resistant, herbicide tolerant varieties or hybrids with improved adaptation have built the Australian canola industry to what it is today. The Australian industry is relatively small compared to Canada, China and India, and is largely dependent on international export demand, especially in Europe, for the biodiesel market.

Australian canola breeding programmes must continue to embrace new technologies and seek partnerships that foster new scientific discoveries such as phenomics, genomics and AI technologies. Incorporating these new endeavours into breeding programmes will inform and improve efficiencies and continue to drive improvement.

Further research and development are needed to develop super-high-yielding hybrids by consolidating new heterotic patterns. Phenotypic and genomic tools need to be developed to accelerate genetic gains in canola for high productivity and physiological efficiency (such as photosynthesis, water usage).

Genetic technologies such as plant transformation and gene editing protocols that are agnostic to varieties are being developed in Australia. These technologies, together with breeding programmes, will play an important role in developing next-generation canola varieties that meet future industry needs such as resilience to environmental and biotic stresses, and the ability to meet growing demands for food, feed, and industrial applications.

This article is an extract from *Canola in Australia: 21st century progress* (2023) by the Department of Regional NSW.
To access the full digital version, visit *www.australianoilseeds.com*

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# Optimising herbicide use in canola:
## The threat of herbicide resistance in serious weeds

*By Dr Charlie Reinhardt*

There are currently 534 unique cases (species x mechanism of action) of herbicide-resistant weeds globally, involving 273 species (156 dicots and 117 monocots). Weeds have evolved resistance to 21 of 26 economically important herbicide mechanisms of action and to 168 different herbicides. Resistance has been reported in 102 crops in 75 countries.

### Resistance is multi-faceted

*Table 1* lists the 13 herbicides registered for use in canola in South Africa. This number might seem impressive but given that five share the same mechanism of action, which is inhibition of the enzyme acetyl coenzyme-A carboxylase (Herbicide Resistance Action Committee [HRAC] Group 1), 'cross-resistance' would mean a particular weed species could have resistance to all four of the other herbicides in this group. Cross-resistance typically also threatens the efficacy of HRAC Group 2 herbicides, which inhibit the enzyme acetolactate synthase (ALS); two herbicides in *Table 1* belong to this group.

Another challenge in resistance management is 'multiple resistance', which is particularly common with herbicides in Groups 1 and 2. This means that a weed species showing resistance to herbicides in one group will also be resistant to those in the other group; *Lolium* (ryegrass) weed species are prime examples, as they can be resistant to multiple herbicides belonging to Groups 1 and 2.

**Table 1: Herbicides registered in South Africa for use in canola. (Sources: Grain SA and Kathy van Zyl, 2021)**

| Herbicide (active ingredient of products) | HRAC classification code and mechanism of action | Weeds controlled | Application timing |
|---|---|---|---|
| **Atrazine** | Group 5: Inhibits photosynthesis (PS2) | Broadleaf and grass | *Pre-em/ Early post-em |
| **Clethodim** | Group 1: Inhibits acetyl CoA carboxylase (ACCase) | Grass | Post-em |
| **Clopyralid** | Group 4: Similar action to auxin-type herbicides | Broadleaf | Post-em |
| **Ethametsulfuron-methyl** | Group 2: Inhibits acetolactate synthase (ALS) | Broadleaf and grass | Post-em |
| **Haloxyfop-R methyl ester** | Group 1: Inhibits acetyl CoA carboxylase (ACCase) | Grass | Post-em |
| **Imazamox** | Group 2: Inhibits acetolactate synthase (ALS) | Broadleaf and grass | Post-em |
| **Metazachlor** | Group 15: Inhibits long-chain fatty acid synthesis | Broadleaf and grass | Pre-em |
| **Propaquizafop** | Group 1: Inhibits acetyl CoA carboxylase (ACCase) | Grass | Post-em |
| **Propyzamide** | Group 3: Inhibits cell division and elongation | Grass | Post-em |
| **Quizalofop p-ethyl** | Group 1: Inhibits acetyl CoA carboxylase (ACCase) | Grass | Post-em |
| **Quizalofop p-tefuryl** | Group 1: Inhibits acetyl CoA carboxylase (ACCase) | Grass | Post-em |
| **Simazine + Terbuthylazine** | Group 5: Inhibits photosynthesis (PS2) | Broadleaf and grass | Pre-em |
| **Trifluralin** | Group 3: Inhibits cell division and elongation | Grass | Pre-plant |

**Pre-em = pre-emergence; post-em = post-emergence.*

### Resistance recording and research

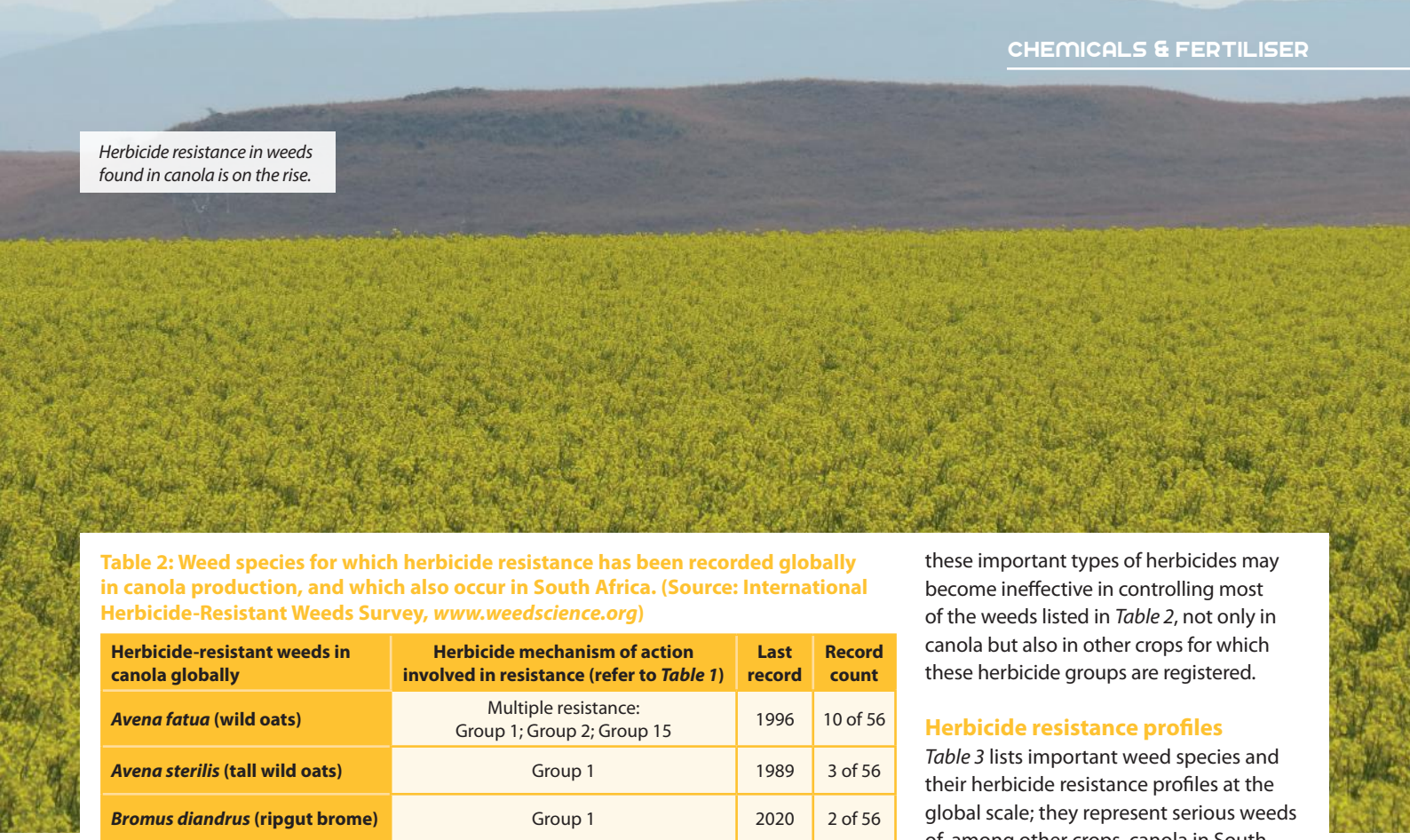
*Table 2* shows the global resistance records for weeds, which are also found in South Africa, in canola production. It is essential to note that not all cases of herbicide resistance are reported on the international database at *www.weedscience.org*. This could be due to ignorance or neglect in reporting cases of progressively poorer control of species. Another reason could be a lack of interest in reporting confirmed resistance cases.

In Australia, where rigorous research and advocacy on herbicide resistance are prevalent, there are at least three diagnostic laboratories that conduct routine screening for resistance. In South Africa, no such service currently exists. However, significant local research on herbicide resistance is being done at the University of Pretoria through the South African Herbicide Resistance Initiative (SAHRI), initiated in 2012.

In cases where weed species show resistance to a herbicide(s) in other parts of the world, but no such problems have yet been reported locally, it means that special precautions should be taken because the genetic makeup of such globe-trotting weeds would make them prone to resistance development, irrespective of where they are located. The type of cropping system and herbicide use are the primary drivers of resistance development in such cases.

The two multiple resistance cases in *Table 2* suggest that there is a risk that neither ACCase (Group 1) nor ALS herbicides (Group 2), including metazachlor (Group 15), may hypothetically give inadequate control of wild oats (*Avena fatua*) and Italian ryegrass (*Lolium perenne* ssp *multiflorum*) in canola production in South Africa.

Because cross-resistance is most often reported for ACCase and ALS herbicides,



*Herbicide resistance in weeds found in canola is on the rise.*

**Table 2: Weed species for which herbicide resistance has been recorded globally in canola production, and which also occur in South Africa. (Source: International Herbicide-Resistant Weeds Survey, *www.weedscience.org*)**

| Herbicide-resistant weeds in canola globally | Herbicide mechanism of action involved in resistance (refer to *Table 1*) | Last record | Record count |
|---|---|---|---|
| ***Avena fatua* (wild oats)** | Multiple resistance: Group 1; Group 2; Group 15 | 1996 | 10 of 56 |
| ***Avena sterilis* (tall wild oats)** | Group 1 | 1989 | 3 of 56 |
| ***Bromus diandrus* (ripgut brome)** | Group 1 | 2020 | 2 of 56 |
| ***Hordeum murinum* (wild barley)** | Group 1 | 2001 | 2 of 56 |
| ***Lactuca serriola* (wild lettuce)** | Group 1 | 1994 | 2 of 56 |
| ***Lolium perenne* ssp *multiflorum* (Italian ryegrass)** | Multiple resistance: Group 1; Group 2; Group 15 | 2005 | 6 of 56 |
| ***Lolium rigidum* (annual ryegrass)** | Group 1 | 1997 | 4 of 56 |
| ***Sisymbrium orientale* (Indian hedge mustard)** | Group 5 | 2011 | 1 of 56 |

**Table 3: Resistance records globally for important weeds of South African canola. (Source: International Herbicide-Resistant Weeds Survey, *www.weedscience.org*)**

| Herbicide-resistant weeds globally that are serious problems in South African canola | Herbicide mechanism of action involved in resistance | Record count |
|---|---|---|
| ***Conyza bonariensis* (flax-leaf fleabane)** | Group 9 (glyphosate): Inhibits EPSP synthase<br>Group 22: Photosynthesis inhibitor, paraquat<br>Group 5: Photosynthesis inhibitors, atrazine and simazine | 16 of 24<br>4 of 24<br>1 of 24 |
| ***Conyza canadensis* (Canadian fleabane)** | Group 9: EPSP synthase inhibitor, glyphosate<br>Group 5: Photosynthesis inhibitors, atrazine and simazine<br>Group 22: Photosynthesis inhibitor, paraquat<br>Group 2: Inhibits acetolactate synthase (ALS) | 42 of 70<br>10 of 70<br>7 of 70<br>8 of 70 |
| ***Lolium rigidum* (annual ryegrass)** | Group 9 (glyphosate): Inhibits EPSP synthase<br>Group 5: Photosynthesis inhibitors, atrazine and simazine<br>Group 3: Inhibits cell division and elongation<br>Group 1: Inhibits acetyl CoA carboxylase (ACCase)<br>Group 2: Inhibits acetolactate synthase (ALS)<br>Group 22: Photosynthesis inhibitor, paraquat<br>Group 3: Inhibits cell division and elongation | 15 of 57<br>3 of 57<br>6 of 57<br>18 of 57<br>14 of 57<br>3 of 57<br>6 of 57 |
| ***Raphanus raphanistrum* (wild radish)** | Group 2: Inhibits acetolactate synthase (ALS)<br>Group 5: Photosynthesis inhibitors, atrazine and simazine | 12 of 15<br>2 of 15 |

these important types of herbicides may become ineffective in controlling most of the weeds listed in *Table 2*, not only in canola but also in other crops for which these herbicide groups are registered.

## Herbicide resistance profiles

*Table 3* lists important weed species and their herbicide resistance profiles at the global scale; they represent serious weeds of, among other crops, canola in South Africa. Notably, a significant number of resistance cases are linked to glyphosate herbicide across all the listed weeds. Although glyphosate cannot be used selectively in canola, it remains a valuable tool for pre-plant and post-harvest weed control in any annual cropping system.

The cases of resistance to Group 5 herbicides (such as atrazine, simazine, terbuthylazine) are alarming because Triazine-Tolerant® technology in canola production is a relatively new development in South Africa, aiming to provide an alternative to existing resistance towards ACCase and ALS herbicides. Clearfield® technology allows the selective (safe) use of imazamox herbicide (ALS, Group 2) in canola; cross-resistance in the case of this imidazolinone herbicide and the sulfonylurea herbicides, which are all ALS-inhibitors (Group 2), would be a major setback for effective weed management in canola production.

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 references or more information, contact him at 083 442 3427 or dr.charlie.reinhardt@gmail.com

# Protect Your Groundnuts

## With Corteva Crop Protection

# Strongarm® 840 WG

## HERBICIDE


**Strongarm® 840 WG (Reg. No. L8663)** is a water dispersible granule herbicide for use in tank mixtures (as recommended by the label) and for the pre-emergence control of annual grasses, broadleaf weeds and under certain conditions, also yellow nutsedge in crops.

Very effective and selective pre-emergence herbicide for use in groundnuts and soybeans. Controls a variety of grass and broadleaf weeds. Good tool to control problematic weeds such as dubbeltjie in groundnuts and morning glory in soybeans amongst other weeds. Can be soil-applied (surface, pre-plant, or pre-emergence) to meet the needs of the no-till, minimum-till, and conventional tillage farmer. Highly effective with long residual action.

**Scan This Code To View This Product Webpage**

**FOR MORE INFORMATION CONTACT THE REGISTRATION HOLDER:** Corteva Agriscience RSA (Pty) Ltd · Reg. No. 1997/003030/07 • **Paarl** +27 (0) 21 003 8259 • **Centurion** +27 (0) 12 683 5700 • 2nd Floor, Building A, Lakefield Office Park, 272 West Avenue, Centurion, 0157, Gauteng, Republic of South Africa.

**ALWAYS USE ACCORDING TO LABEL RECOMMENDATIONS:** Strongarm® 840 WG contains diclosulam (840 g/kg) | Reg. No. L8663 | Act No. 36 of 1947 • HAZARD STATEMENT(S) Causes mild skin irritation. Very toxic to aquatic life with long lasting effects. 

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# Effective weed control with Strongarm® 840 WG

CORTEVA™ agriscience

South African groundnut farmers know better than anyone how critical early weed control is to achieve a healthy, high-yielding crop. Weeds are among the biggest threats to groundnut productivity, competing fiercely with young plants for sunlight, water, and nutrients during those vital early weeks after planting. If left unmanaged, these weeds can significantly reduce yield and impact profitability.

At Corteva Crop Protection, we understand that every farm is unique, with its own set of challenges influenced by soil type, climate, tillage practices, and the varieties of groundnuts grown. That's why we put South African groundnut farmers first by offering tailored solutions that address these challenges head-on, helping farmers protect their crops and maximise returns. One of the most trusted products in our arsenal for groundnut weed control is Strongarm® 840 WG.

## Understanding weed pressure

Groundnut fields in South Africa face a broad spectrum of weed species. The major broadleaf weeds include pigweed (*Amaranthus* spp.), blackjack (*Bidens pilosa*), purslane (*Portulaca oleracea*), cocklebur (*Xanthium strumarium*), and fleabane (*Conyza* spp.). These broadleaf weeds can quickly spread, growing aggressively and outcompeting groundnuts for vital resources.

Equally challenging are grassy weeds such as couch grass (*Cynodon dactylon*), barnyard grass (*Echinochloa crus-galli*), and crabgrass (*Digitaria* spp.), which thrive in many South African soil types. One of the most troublesome weeds in groundnuts is yellow nutsedge (*Cyperus esculentus*), a perennial weed known for its fast growth and resilience, often leading to significant crop losses if not controlled early.

These weeds' differing growth cycles and persistence mean that a broad-spectrum, long-lasting herbicide is crucial for effective weed management.

## Pre-emergence herbicide of choice

Strongarm® 840 WG (Reg. No. L8663) is a water dispersible granule herbicide formulated to provide selective, pre-emergence control of a wide range of annual grasses, broadleaf weeds, and yellow nutsedge in groundnuts.

Applied either pre-plant or to the soil surface before crop emergence, Strongarm® 840 WG creates a protective barrier in the soil that targets weed seedlings as they germinate, preventing them from establishing and competing with your groundnut plants. Its selectivity ensures that your groundnuts are unharmed, allowing them to grow strong and healthy without the stress of early-season weed competition.

## Versatility across farming practices

South African groundnut farmers use a variety of tillage systems, from no-till and minimum-till to conventional ploughing. Strongarm® 840 WG is designed to work effectively within all these systems, providing flexible application options to suit individual farm operations.

Whether applied directly after planting or as a pre-plant soil surface treatment, its residual activity means it continues to suppress weeds through the critical early growth stages of your groundnuts, reducing the need for additional herbicide applications, and saving you time and money.

## Why Strongarm® 840 WG?

- **Broad-spectrum control:** Effectively manages annual grasses, broadleaf weeds, and yellow nutsedge, including problematic species such as *dubbeltjie*.
- **Extended residual action:** Offers protection over an extended period, crucial for the slow initial growth phase of groundnuts.
- **No harvest residue:** Leaves no harmful residues on the crop, ensuring quality and market acceptance.
- **Supports crop rotation:** Compatible with key rotation crops such as maize, wheat, soya beans, and sunflower – essential for maintaining soil health and productivity.
- **Cost-effective:** Low application rates reduce input costs without compromising weed control efficacy.
- **Tank mix flexibility:** Can be combined with other herbicides (per label recommendations) to tailor weed management strategies.

## Meeting diverse needs

South African groundnut farmers cultivate several varieties, including Spanish, Virginia, and Runner types, each with distinct growth characteristics and market demands.

Spanish varieties, often planted in warmer areas, mature quickly but require vigilant early weed control to maximise yields. Virginia and Runner types, more commonly grown in the Highveld and cooler regions, benefit significantly from Strongarm® 840 WG's residual weed suppression, as their slower growth makes them more vulnerable to weed pressure.

Additionally, South Africa's diverse soils – from sandy soils in Limpopo and the Free State to heavier clay soils in Mpumalanga and KwaZulu-Natal – require a herbicide that performs consistently under variable conditions. Strongarm® 840 WG has proven its reliability across these soil types and climatic zones, offering farmers confidence regardless of location.

## Farming practice versatility

Our agronomy experts are available to help identify weed species, recommend integrated management plans, and optimise herbicide timing and application methods. We encourage farmers to combine chemical controls such as Strongarm® 840 WG with good agricultural practices such as crop rotation, mechanical weed control, and timely planting to build sustainable, long-term weed management programmes.

To learn more about our crop protection products and solutions, visit *www.corteva.co.za/products-and-solutions/crop-protection/strongarm-840-wg.html* or follow us on Facebook, LinkedIn, Instagram, and YouTube or download the Corteva FarmFundi App.

NPP Natural Plant Protection

# PRECEDE PLUS

Liquid Nutrient Seed Treatment

**PRECEDE PLUS IS A LIQUID NUTRIENT PRODUCT THAT CONTAINS SEAWEED AND IS INTENDED FOR APPLICATION DIRECTLY ONTO SEED FOR SPECIFIC CROPS AS INDICATED. WHEN USED CORRECTLY, IT SUPPORTS HEALTHY CROP DEVELOPMENT THROUGH ENHANCED NUTRIENT AVAILABILITY AT THE EARLY STAGES OF GROWTH.**

## STORAGE OF DRESSED SEED

Seed that has been treated with **PRECEDE PLUS** should be planted within a reasonable time period. Although **PRECEDE PLUS** is not expected to negatively affect the storage life of treated seed, its germination and overall performance may be influenced by the physical storage conditions. For this reason, the registration holder cannot accept liability for the performance of seed that has been treated and stored for extended periods.

## METHOD OF APPLICATION

Before using **PRECEDE PLUS**, the container should be shaken thoroughly to ensure the contents are well mixed. It is important that application equipment is correctly calibrated to achieve an even distribution of the product at the correct application rate. Care should be taken to avoid over-wetting the seed during application. After the product has been applied, the seed should be mixed thoroughly and allowed to dry before being packaged.

## BEST PRACTICES BEFORE USE

**PRECEDE PLUS** should be used strictly according to the directions provided on the product label. All equipment used during the application process must be cleaned both before and after use to prevent contamination or blockage. It is also essential to clean all seed flow areas on the planter to avoid clogging during planting. For personal safety, appropriate protective gear such as gloves and a face shield should be worn when handling this product.

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PRECEDE PLUS | Reg. No.: M222 Act Nr. 36 of 1947 | FERTILIZER GROUP: 3 | ACTIVE INGREDIENTS: Phosphorous (P) 50 g/kg, Zinc (Zn) 160 g/kg, Molybdenum (Mo) 13 g/kg, Contains seaweed | SIGNALWORD: WARNING | Hazard statements: May cause damage to kidneys via prolonged and repeated oral exposure. Very toxic to aquatic life with long lasting effects. | Registration holder: UPL South Africa (Pty) Ltd Co. Reg. No.: 2009/019713/07, 7 Sunbury Office Park, Off Douglas Saunders Drive, La Lucia Ridge, South Africa. 4019, Tel: 031 514 5600

UPL

# Global fertiliser trends: Implications for South Africa's oilseeds industry

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

South Africa is a net importer of fertiliser, exposing the country to price volatility and supply chain disruptions as evidenced by recent global challenges such as geopolitical tensions and the Covid-19 pandemic. The country's fertiliser import landscape is shaped by a mix of dominant suppliers, emerging players, and declining contributors.

Local agriculture requires adaptable strategies to mitigate the consequent high and fluctuating crop production costs largely driven by fertiliser prices. Therefore, understanding the global fertiliser environment is essential for the future and sustainability of South Africa's agricultural and oilseed sectors.

A team of researchers from the Bureau for Food and Agricultural Policy (BFAP) and Stellenbosch University unpacked the global fertiliser trade and trends, as well as South Africa's fertiliser trade. Their work titled "Trends and drivers of fertiliser consumption in the South African agricultural industry" (Otterman *et al*., 2025) was recently published in the journal, *Agrekon*.

## Global fertiliser trends

Globally imported fertiliser products containing nitrogen (N), phosphorus (P), potassium (K), NPK mixtures, and organic fertilisers from 2001 to 2023 (converted from products into nutrient equivalence) are presented in *Figure 1*. Over the last decades, total global fertiliser import values have increased at a higher rate than volumes, reflecting significant fertiliser price surges.

For example, the import value of N fertilisers rose from US$6,46 billion in 2001 to US$38,45 billion in 2023. The volume of N fertiliser imports peaked in 2021. However, the value peaked in 2022 and increased by around 65% from 2021, while the volume shrunk by 5% from 2021 to 2022. This disparity underscores the impact of global demand during periods of supply chain disruptions such as the Russia-Ukraine war, rising energy costs impacting fertiliser production, and inflationary pressures globally.

Nitrogen fertilisers remain the largest component by value (40% average between 2019 and 2023) and volume (42%) of global fertiliser trade, highlighting its critical role in modern agriculture. Based on trade value and volume, K and P were the second and third-largest fertilisers traded globally between 2019 and 2023, accounting for 23 and 19% by value and 25 and 17% by volume, respectively (*Figure 2*).

Significant price increases were evident for N, P and K. Over the last five years, the annual growth rate in value of N fertilisers was 18%, while the volume only increased by 1%. Similarly, despite low five-year annual volume growth rates of -2 and 1% for P and K, the value growth rates were 16 and 15% over the same period, respectively.

The demand for NPK mixtures followed a steady trend with 13,33 million tonnes in 2001 to 28,64 million tonnes in 2023, but reflected an annual growth rate of -2% over the last five years. Between 2019 and 2023, the five-year average contribution towards the total fertiliser trade value and volumes by NPK mixtures were 16 and 14%, respectively.

Although organic imports have increased steadily since 2001, they represented only a small share of crop production requirements, accounting for just 2% of imported value and volume between 2019 and 2023.

## Global fertiliser trade

### *Key fertiliser importers*

The global fertiliser trade has undergone significant shifts, largely due to rising agricultural demands and recent market changes. Global fertiliser availability for trade is influenced by various factors, including climate conditions, geological characteristics, and exploration capacity. These factors result in significant variations in availability between countries.

Brazil, India, and the United States (US) are the largest importers of fertilisers, collectively accounting for approximately US$34 billion in imported fertiliser over a five-year period (2019 to 2023). Brazil, which recorded an 11% annual increase over the last ten years, has seen its growth surge to 21% in the last five years. This highlights Brazil's emergence as a dominant

**Figure 1: Intrinsic fertiliser value of globally imported products containing nitrogen (N), phosphorus (P), potassium (K), NPK mixtures, and organics from 2001 to 2023 (distinct from nutrient equivalence). (Data: TradeMap, 2024)**

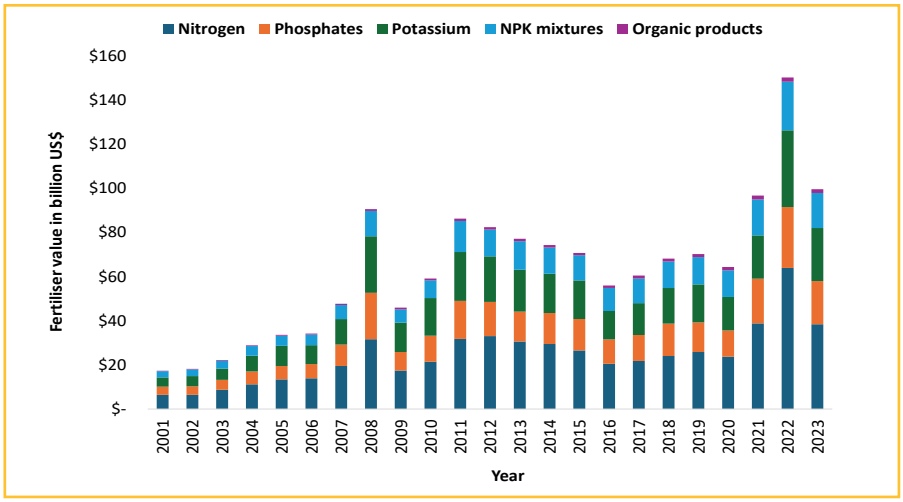
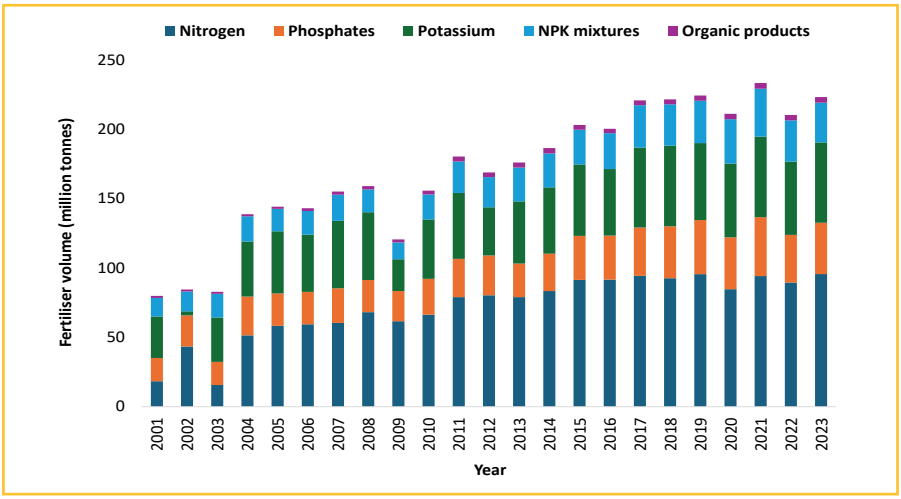


**Figure 2: Global import volume of products containing N, P, K, NPK mixtures, and organic products from 2001 to 2023. (Data: TradeMap, 2024)**




player in fertiliser imports, surpassing even Argentina's decade-long annual growth rate of 13% (driven by its expanding agricultural sector and supported by improved yields, increased cultivation, and recent tax cuts on imported fertiliser).

Brazil's strategic sourcing from major suppliers including Russia (23% of imports) and its responses to global supply chain disruptions have further strengthened its position as a leading importer, ensuring agricultural productivity amid rising demand.

***Key fertiliser exporters***

Russia was the leading global exporter of fertiliser products between 2019 and 2023, exporting roughly 36% more than China, the second-largest exporter. Despite its significant export capacity (US$9 billion), China also imported approximately US$4 billion worth of fertiliser during this period, highlighting its complex role in the global fertiliser market.

Fertiliser exports from the Middle East and North Africa have experienced remarkable growth over the last decade, with Saudi Arabia, Oman and Egypt increasing their exports by 20, 16, and 19% over the last decade, respectively.

## South African fertiliser trade

***Imports***

South Africa is ranked 29th among global importers, accounting for 0,9% of the global fertiliser imports by value (2019 to 2023 average), indicating a relatively modest role in the international market. In 2023, the value of South African fertiliser imports was US$824 million, following a 20-year peak in 2022 that exceeded US$1,5 billion. South Africa primarily imports fertilisers from Saudi Arabia (urea and monoammonium phosphate [MAP]), Russia (MAP, urea and potassium chloride), Qatar, China, Germany and Oman.

Saudi Arabia accounts for 19% of the total value imported (US$891 194) by South Africa over the five-year average (2019 to 2023). Annual growth rates of 15% (five-year average) and 12% (ten-year average) suggest a consistent and expanding trade relationship between South Africa and Saudi Arabia. This dominance can be attributed to Saudi Arabia's significant production capacity, particularly in N-based fertilisers like urea and MAP, the two main products imported from Saudi Arabia.

In recent years, there has been a greater emphasis on urea supply from Qatar with a significant increase (11%) in the annual growth rate of total value imported between 2019 and 2023. Despite being one of the largest producers of N and P fertilisers globally, the annual growth in total imports from China was only 13% (five-year average) and 6% (ten-year average). Chinese export restrictions during periods of local shortages in recent years have resulted in reduced import fertiliser volumes (Vos *et al*., 2025).

The rapid growth from Qatar and Oman suggests opportunities for strengthening ties with emerging markets, while stable relationships with Saudi Arabia and Germany provide consistency. However, geopolitical challenges (war and sanctions) and price volatility necessitate strategies to ensure a sustainable and secure fertiliser supply for South Africa's agricultural sector, especially for N-based fertilisers.

*Table 1* illustrates the average share of fertiliser imports and exports by value and volume from 2019 to 2023, along with their growth rates. During this period, N fertiliser products dominated imports, making up 56% of total import value and 64% of import volume, followed by K and P. NPK mixtures and organic fertilisers only account for a small share of South Africa's imports. The total value of imports increased at an average annual rate of 18% between 2019 and 2023, while total import volumes grew modestly by 2% per year.

***Exports***

Between 2001 and 2023 South Africa's fertiliser export values were highly volatile, peaking at US$662 million in 2022, while the highest export volumes were recorded in 2015. These fluctuations largely mirrored global commodity price trends, which spiked during key events such as the 2008 biofuel mandates, the 2013 US drought, and the 2022 Russia-Ukraine war.

South Africa has sustained steady fertiliser export relations with other neighbouring countries, with Zambia, Zimbabwe, Namibia, Botswana and Eswatini making up 78% of all fertiliser exports in terms of values. The annual

**Table 1: 2019 to 2023 trade share and annual growth rates for different fertiliser types.**

| Fertiliser type | Import share | | Annual import growth rate | | Export share | | Annual export growth rate | |
|---|---|---|---|---|---|---|---|---|
| | Value | Volume | Value | Volume | Value | Volume | Value | Volume |
| **Nitrogen** | 56% | 64% | 20% | 5% | 67% | 71% | 22% | 9% |
| **Phosphates** | 18% | 13% | 16% | 1% | 5% | 4% | 24% | 11% |
| **Potassium** | 21% | 20% | 16% | -3% | 7% | 8% | 3% | -15% |
| **NPK mixtures** | 5% | 2% | 18% | -11% | 18% | 15% | 22% | 9% |
| **Organic products** | 1% | 0% | -27% | -18% | 3% | 2% | 1% | 6% |
| **Total** | **100%** | **100%** | **18%** | **2%** | **100%** | **100%** | **20%** | **7%** |

growth rates for fertiliser exports from South Africa to Zimbabwe, Namibia and Botswana were 17, 18 and 22%, respectively, between 2019 and 2023. However, a closer examination of the longer-term trends reveals stagnant growth rates of 2, 2, and 0% for Zimbabwe, Namibia and Botswana, respectively, from 2014 to 2023. This stagnation suggests a static demand for fertilisers from South Africa as a supplier coupled with limited agricultural expansion in these regions.

Looking at the share of fertiliser exports by value and volume from 2019 to 2023 (*Table 1*), N-based fertilisers accounted for the largest share of exports by volume (71%). Significantly more NPK blends were exported over the same period, accounting for 15% of import volumes, followed by K (8%), P (4%), and lastly organic products (2%). Phosphorus exports recorded the fastest growth rate, with an average annual increase of 24% in value and 11% in volume. In contrast, K export volumes declined slightly despite a modest increase in value. Both N and NPK mixtures indicated annual growth rates of 22% in value and 9% in volume.

## Key take home message

Global fertiliser markets have become increasingly volatile with rising prices driven by geopolitical tensions, supply chain disruptions, and input cost pressures. South Africa, as a net importer of fertiliser – particularly N-based products – faces growing risks to input cost stability and long-term agricultural sustainability.

For the oilseeds industry, which relies heavily on consistent fertiliser access, understanding and anticipating global trade trends is critical. Strengthening ties with reliable suppliers, diversifying import sources, and developing national fertiliser strategies are essential to buffer South Africa's agriculture – especially the oilseeds sector – against future shocks in the global fertiliser market.

A series of follow-up articles will appear in an upcoming issue of *Oilseeds Focus*, exploring local fertiliser consumption, key trends and drivers, and a benchmarking of fertiliser use in South Africa's oilseed production – sunflower, soya bean, and canola – against leading global producers. The analysis highlights opportunities to enhance nutrient-use efficiency and reduce input costs while maintaining productivity under local conditions. The full scientific report will be published online.

**Acknowledgements**

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For more information and references, send an email to Pieter Swanepoel at pieterswanepoel@sun.ac.za or visit *www.bfap.co.za*

# Percolite®

## PERLITE FILTER AID

Make it perfectly clear.

### What is Percolite®?

The fundamental problem of filtration is to maximise two desirable yet conflicting parameters: Clarity and Flowrate. Percolite® achieves just that. Percolite® filter aid is manufactured from a unique naturally occurring vitreous volcanic lava known as Perlite. First the crushed Perlite is expanded in a furnace into millions of tiny hollow bubbles. Using specialised production methods, these bubbles are then carefully milled and accurately classified to produce the various Percolite® grades.

Percolites' unique interlocking structure forms a myriad of microscopic interparticle channels. Percolation takes place within these channels and efficiently removes particulate material from the filtrate. Consequently a high flow rate together with exceptional clarity is achieved.

Percolite® filter aid is completely inert and it is sterile (due to 950°C furnacing). Also, it does not impart any colour, taste or odor to the filtrate.


- A superior quality filter aid
- Inert and sterile. Does not impart any colour, taste or odour to the filtrate
- High flow rate to clarity ratio
- Various grades to suit the application
- Sterile production and packaging
- Countrywide distribution and support
- Can be used in most industries such as: Food, oil, wine, beverage, pharmaceutical, chemical, industrial, coatings & paint and environmental

### Available Grades

Percolite® is available in several grades to meet almost any flow and clarity requirement. Since research and development is core to our business, grades can be manufactured and tested to meet customer requirements.


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PRATLEY Percolite® PERLITE FILTER AID

# High-performing filter aid is the new benchmark for filtration

Filtration entails the separation of solids from liquids by forcing the liquid to flow through a filter aid. The fundamental problem posed by filtration is how to maximise clarity and flow rate, which are two desirable yet conflicting parameters. Percolite® filter aid from Pratley achieves just that, highlights Pratley marketing director Eldon Kruger.

"The accurate size classification and the unique structure of Percolite® filter aid leads to one of the highest flow-rate-to-clarity ratios possible."

## Percolite® for high performance

Percolite® is a natural product, which means no taste, colours, or odours are transferred to the filtered product. Due to its low density, Percolite® has a high flow rate combined with exceptional clarity. Percolite® can be used in oils, wine, fruit juices, pharmaceuticals, chemicals, and industrial filtration applications.

"From experience, current filtration mediums can easily be switched to Percolite® without any impact on the performance of the process," says Kruger. This is particularly true for customers converting from diatomaceous earth filter aids to Percolite®.

Apart from the health hazards and high prices associated with diatomaceous earth, customers who have converted to Percolite® observe lower pressure differentials across their filter cake, ultimately translating to higher production outputs. Percolite® densities are also in the region of 50% less than diatomaceous earth. The cost-saving when converting to Percolite® is therefore significant.

Pratley has a state-of-the-art filter aid production facility that represents the most advanced plant on the continent. Here, proprietary technology processes perlite raw material to produce the high-quality filter aid. The manufacturing process is ISO 9001-2015 certified. Percolite® meets the standards listed in the food chemicals codex published by the United States National Academy of Sciences and is a Halaal-certified product. Pratley is also a member of the International Perlite Institute.

## Maintaining quality control

An advanced research and development laboratory supervises the quality control of the final product. Sophisticated test equipment includes a laser particle size analyser, turbidity meters, X-ray diffractometer, scanning electron microscopes, viscometers, an atomic absorption spectrometer, Fourier transform infrared spectrometer, and filtration flow rigs.

It ensures stringent quality control and allows Pratley to thoroughly analyse customer liquids to recommend the most suitable Percolite® grade for the job. Grades can be manufactured and tested to meet customer requirements.

Percolite® applies to almost any industry requiring fine liquid/solid separation:

- **Food and beverage:** Wine, oil, starch, beer, glucose, fruit juice, syrup.
- **Pharmaceutical:** Antibiotics, enzymes, Epsom salt.
- **Chemicals:** Acids, resins, polymers, adhesives, hydrolysed vegetable protein.
- **Industrial:** Water treatment, oil and solvent recovery, industrial fillers, heavy metal solutions, industrial chemicals, platinum-bearing solutions, copper-cobalt-nickel solutions, titanium solutions, electroplating solutions, dry cleaning.
- **Coatings and paint:** Varnish, waxes, gums, textured paints, oils, polishes.
- **Environmental:** Oil and petrochemical clean-up, water filtration.

Pratley has supply depots in Gauteng, Cape Town, Durban, and Gqeberha offering countrywide sales and support. The product is professionally packed and supplied in food-safe packaging.

For more information, send an email to sales@pratley.co.za, or visit *www.pratleyminerals.com*

# A decade of growth:
## Tracking the evolution of oilseed production

*By Marguerite Pienaar, economist, Grain SA*

Over the last decade, oilseed production has undergone a remarkable transformation, reflecting shifts in global demand, climate conditions, farming practices, and market dynamics. In South Africa and beyond, crops such as sunflower, soya beans, groundnuts, and canola have each followed unique growth trajectories shaped by technological advancements and an ever-evolving agricultural environment.

The latest Crop Estimates Committee (CEC) estimates indicate production of 708 300t of sunflowers, 2,7 million tonnes of soya beans, 61 389t of groundnuts, and 164 900t of canola in the current season. This article explores how these key oilseeds have progressed over the last ten years, highlighting trends in production volumes, regional expansion, and their growing role in the oilseed complex.

### Soya beans

Soya bean production surpassed a million tonnes for the first time during the 2014/15 production season, and the figure doubled less than ten years later, reaching 2,7 million tonnes. Through the breeding and technology statutory levy, the average yield has also increased significantly with the ten-year average yield amounting to 1,96t/ha, the five-year average yield 2,09t/ha, and the three-year average yield 2,37t/ha. However, the 2024/25 season drought caused a huge production and yield loss. Despite this setback, the industry has shown great resilience as production is expected to increase in the 2025/26 season.

The total area planted has also increased to 1,2 million tonnes, indicating that producers are confident in the long-term viability of the soya bean crop. The yield has been volatile due to the nature of the crop in the South African context. Soya beans thrive in cooler and wetter climates and are mostly produced under rainfed agriculture; unfortunately, conditions are not always favourable.

The major soya bean-producing regions in South Africa are Mpumalanga and the Free State, with rapidly expanding production in North West. The country currently has an estimated soya bean crushing capacity of approximately 2,9 million tonnes, of which roughly 80% is used to produce soya bean meal for the animal feed industry and the remainder for soya bean oil. This capacity is projected to grow further in the coming years.

Most of South Africa's soya bean output is consumed domestically, with approximately 1,9 million tonnes used locally and around 490 000 tonnes exported to neighbouring and Asian markets. The steady increase in production has reduced the country's reliance on imports and positioned South Africa to become a net exporter. However, imports spiked between the 2021/22 and 2023/24 marketing seasons, peaking due to drought-related production losses (*Figure 2*). Since then, import volumes have dropped sharply and are expected to decline further, from 154 288t in the previous season to just 12 800t in the current season.

### Sunflowers

Sunflower is the second-largest oilseed crop in the country. Total sunflower production has fluctuated rather than followed a consistent growth trend, rising sharply in the late 1990s, declining in the early 2000s, and stabilising in recent years at around 600 000 to 850 000t. In the current season, the area planted to sunflower increased by 4,92% compared with the previous season. This expansion was driven mainly by drought conditions that favoured sunflower production, supported further by attractive global oilseed prices. Yields have generally

**Figure 1: Soya beans: Area planted, production and yield. (Source: Grain SA)**

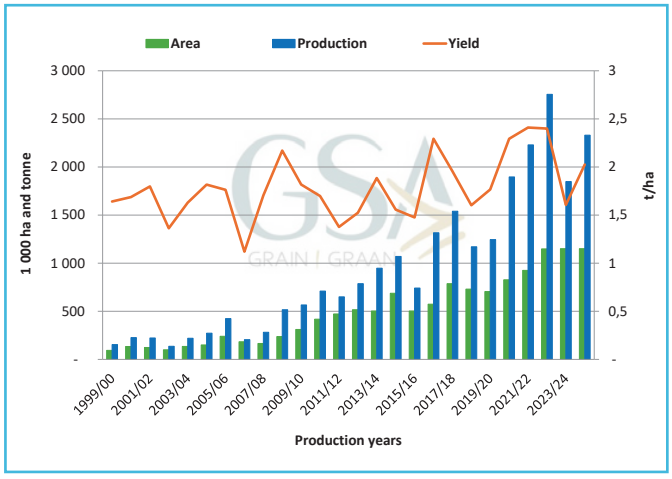



**Figure 2: Soya bean imports and exports over ten marketing seasons. (Source: Sagis)**

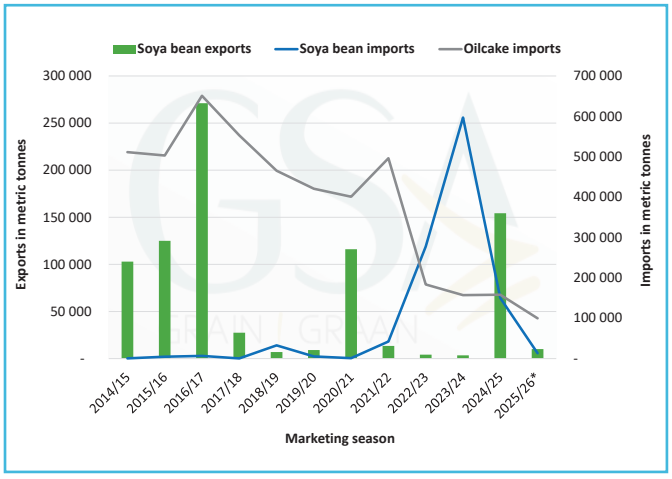
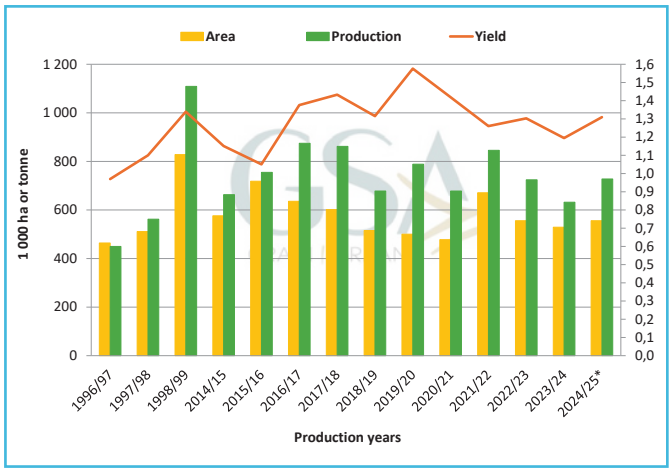


**Figure 3: Sunflower seed production and yield. (Source: Grain SA)**




improved over time, reaching their highest levels during the 2019/20 production season.

The Free State remains South Africa's leading sunflower-producing region, followed by North West and Limpopo. Production for the current season is estimated at 708 300t, with the bulk of the crop processed locally for cooking oil. Local crushing is expected to account for approximately 700 000t, while exports are projected at around 6 000t.

*Sclerotinia* has been present in South Africa for many years, but its prevalence has increased significantly, especially in sunflower after the expansion of cultivated areas. Favourable conditions during the flowering stage when crops are most vulnerable can result in yield losses of up to 80%.

The disease has spread across the country, with the most severe cases reported in North West, the Free State, and Mpumalanga. Total yield losses have not been quantified nationally, but the impact is reflected in commercial producer deliveries, and by the 21st week of the marketing season, 1 599t/week were required, compared to only 929t per week during the same period the previous year.

## Groundnuts

The groundnut industry is the smallest and reflects an interesting story. Both the area planted and production decreased significantly since the early 2000s. Regardless of this decline, it is important to highlight the increase in the area planted from the 2022/23 production season. Although the area planted has seen the most significant decrease, this is primarily due to the production costs associated with producing groundnuts, particularly the cost of machinery. Groundnuts are a lucrative crop; however, the associated cost of production is very high. Groundnuts are predominantly produced in North West, followed by the Free State and Northern Cape.

Total consumption of groundnuts is in the direct market, while a high portion of the production is used to make peanut butter. Approximately 345 of the total commercial supply is imported from India and Argentina. Groundnut contribution to crushed oil and oilcake is negligible, with only 600t estimated to be crushed this season. Only 1 500t are projected to be exported.

During the 2020/21 period, the International Trade Administration Commission (ITAC) considered an application from RCL Foods to increase the customs duty on peanut butter (tariff subheading 2008.11.1) from 0,99c/kg to 25% *ad valorem*. An investigation was initiated on 15 January 2021 via *Government Gazette Notice 44075 (Notice 08 of 2021)*, inviting public comment.

The commission made a recommendation to the then minister of trade, industry and competition, Ebrahim Patel, who referred the matter back for further investigation, requesting ITAC to assess the price-raising effects, industrial capacity, market competition, and the broader value chain, particularly due to concerns around the impact on low-income households. In response, ITAC requested updated market, trade, and financial data from RCL, which was subsequently submitted. The updated application reiterated key concerns, including importers circumventing the 10% duty on groundnuts by importing peanut butter, lower import prices compared to local production costs, and the risk of local manufacturers exiting the market.

Stakeholders were engaged in April this year through a questionnaire, and the new application was published in the *Government Gazette* on 25 July, with a four-week window for public submissions. This is an urgent attempt to protect the local groundnut industry.

## Canola

Canola has become one of the most important rotation crops in the winter rainfall production area and is a well-suited alternative crop compared to planting wheat. Canola production in South Africa saw a significant increase between 2023 and 2024, particularly in the northern regions of the country due to the lower profitability of producing wheat.

In 2023, canola was cultivated in only four provinces, but by 2024 this number had doubled to eight. While this expansion has boosted overall supply, it has not necessarily been matched by increased demand. Notably, production also rose sharply in provinces that were already cultivating canola. For instance, output in the Northern Cape grew by 373% (an additional 1 380t), while the Free State saw a 525% increase (an additional 1 890t).

For the 2025 season, the planted area has expanded by approximately 3 500 to 5 000ha, with roughly 40% of this growth occurring in the Northern Cape, 20% in the Eastern Cape, and 40% in Mpumalanga and Limpopo combined. Canola is primarily processed through crushing to produce oil for human consumption and oilcake for use in animal feed, both of which move further along the value chain. Intentions to plant for the Western Cape is estimated at 166 500ha.

## A final thought

The expansion in volumes, diversification across regions, and integration into value chains demonstrate both the adaptability of producers and the strategic importance of oilseeds in meeting local and global demand. Looking ahead, continued innovation, supportive policy, and investment in research will be critical to sustaining this momentum.

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

# Outlook for the SA poultry industry

*By Dr Tracy Davids, Bureau for Food and Agricultural Policy*

South Africa's agricultural sector is resilient; its historic performance bears testament to this. Despite sensitivity to several exogenous factors that result in immense and intensifying volatility, the sector has grown faster on average over the last 20 years than South Africa's economy.

Despite multiple local and international disruptions which led to spiralling inflation globally, surging freight rates, and multiple supply chain disruptions, the sector shone. However, this performance, which was largely underpinned by high field crop prices and favourable weather, now seems in the distant past with growing headwinds again testing the sector's resolve.

Many challenges contributed to the consecutive contractions in agricultural GDP in 2023 and 2024, such as declining international crop prices, poor consumer spending power in the country, widespread animal disease impacts, port congestion, and the drought conditions experienced across South Africa's summer crop production regions in 2024.

Many of these factors impacted directly on the performance of the poultry industry, which remains the largest (in terms of turnover) within agriculture. However, with agricultural GDP returning to positive growth in the first quarter of 2025, the impacts of the 2023 outbreak of highly pathogenic avian influenza (HPAI) now behind us, and more favourable prospects for the 2025 summer crop, our attention turns to a critical question: What are the growth prospects for the poultry industry and indeed the larger agricultural sector?

## Local and global outlook

The Bureau for Food and Agricultural Policy (BFAP) released its latest baseline outlook for the agricultural sector on 13 August 2025, and it details many factors that will influence agriculture's performance over the short- and medium term. Chief among these is a turbulent and uncertain global economy and international trade environment.

Having successfully navigated the confluence of disruptions that drove persistent inflationary pressure in recent years and avoiding a deep recession, the global economy was poised for more robust growth in 2025 and 2026, with the International Monetary Fund projecting 3,3% in its January release of the World Economic Outlook. Instead, following the announcement of widespread tariffs by the new United States (US) administration, these forecasts were revised downwards to 2,8% in April this year. Policy uncertainty has reached levels last seen at the height of the pandemic and remains a core downside risk, along with escalating tensions in the Middle East and the ongoing war in the Black Sea region.

Domestically, these global risks are compounded by several unique challenges. Economic growth has been persistently low for almost a decade, constrained by structural challenges such as inconsistent electricity supply, deteriorating municipal infrastructure, and logistical bottlenecks. Despite optimism around the formation of the government of national unity, and its perceived potential to drive reforms, its growing fragility has become increasingly evident.

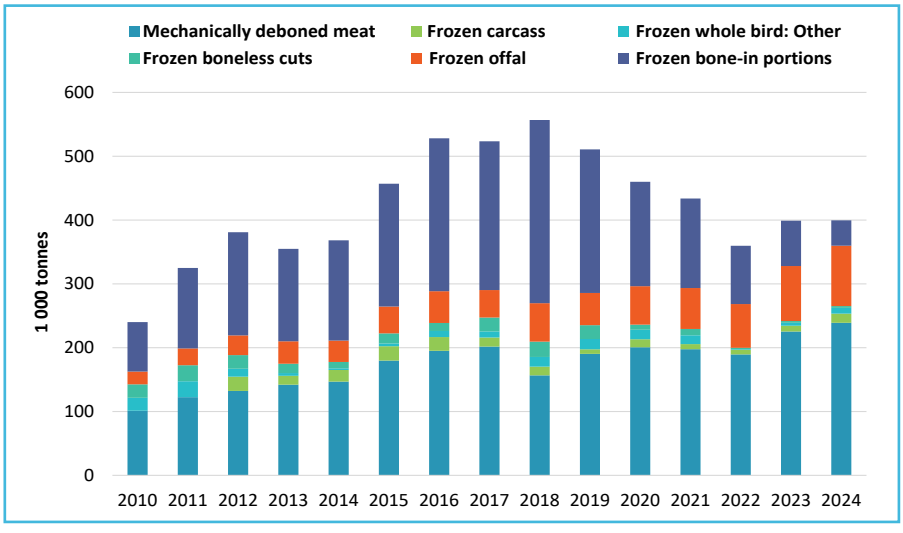
Consequently, while optimism around South Africa's economic prospects was widespread in 2024, most forecasts have been downgraded since as improved sentiment is yet to translate into meaningful increases in private sector investment and consumer spending – both critical drivers for accelerating economic growth.

## Import and export interplay

Consumer spending power has stagnated, with less than 1% of real (inflation adjusted) income growth over the ten-year period from 2014 to 2024. Such limitations in consumer spending power impact livestock sectors strongly, due to the higher cost of products compared to basic staples. This challenge was compounded by a cycle of high feed costs, initially driven by international market dynamics but prolonged by last year's drought impact on South Africa's summer crop production, leaving consumers unable to absorb necessary price increases to offset rising costs.

While feed prices increased by an average of 9,3% per annum from 2019 to 2024, chicken prices only grew by 7,6% per annum, putting prolonged pressure on producer profitability. Nevertheless, continued productivity gains were a key enabler of production growth, which continued to outpace consumption gains, enabling substantial import replacement.

**Figure 1: Poultry product imports, 2010 to 2024. (Source: ITC Trademap, 2025)**



As one looks to the future, it is worth considering to what extent the factors that influenced performance in recent years are likely to change. Considering the economic environment, consumer spending power will likely remain under pressure, at least in the short term. This suggests that growth strategies will continue to be built on a combination of import replacement and export led expansion. Within the poultry industry, the success achieved in reducing bone-in-portion imports from almost 240Kt in 2018 to less than 40Kt in 2024 (*Figure 1*) suggests that opportunities for further import replacement are starting to diminish.

From merely 28% in 2018, mechanically deboned meat, which is not manufactured at large scale in South Africa, constituted almost 60% of total imports in 2024. Conversely, the share of bone-in-portions declined form 51% in 2018 to less than 10% in 2024. While limited import replacement opportunities remain, it is becoming increasingly clear that export expansion will need to form a core part of future growth strategies. Export growth was already identified as a pillar in the *Poultry Masterplan*, with an initial focus on the Middle East as a priority market.

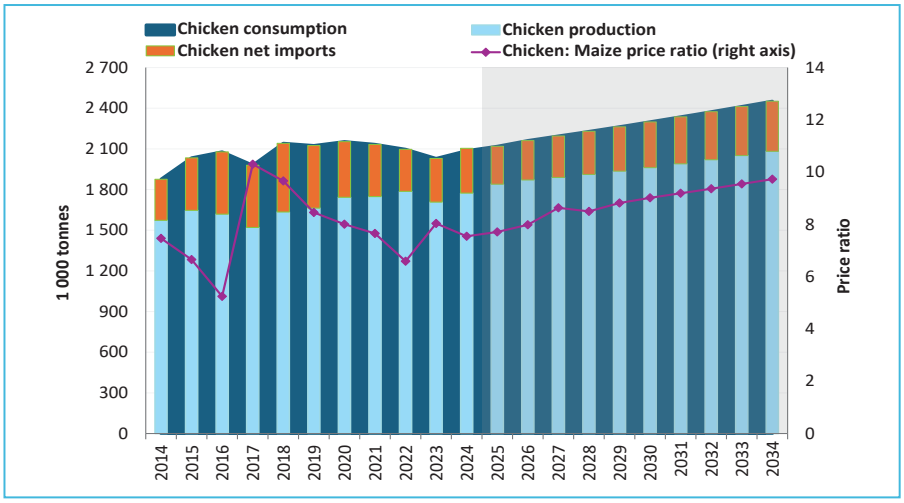
## Global competitiveness

In the medium term, successful export-led growth will have to be achieved in an increasingly complex global trade environment and amid rising compliance costs, which will require an industry that is globally competitive, and an animal health and biosecurity system that inspires confidence among potential trade partners.

While another evaluation of the poultry industry's competitiveness in the global context will be conducted in the coming months, past evaluations by BFAP have shown that the country's production costs remain higher than Brazil – the leading exporter globally. Nevertheless, South Africa's position relative to such core competitors has improved consistently over the last decade, with production costs not far off that of the US in 2021.

As the biggest contributor to primary production costs, the animal feed sector is a core enabler of competitiveness. The developments within this sector are also among the major factors underpinning the expectation that chicken production growth could accelerate to 1,5% per annum over the coming decade, from 1,3% per annum over the last ten years. This reflects improvements in profitability as the improved summer crop enables lower prices for core feed crops.

**Figure 2: Chicken production, consumption, trade and profitability, 2014 to 2034. (Source: BFAP, 2025)**




While the need to rebuild stocks following the 2024 drought implies that a full decline to export parity levels will take multiple years, *Figure 2* illustrates that the chicken to maize price ratio is expected to improve consistently in the medium term to support production growth. Further to increased maize production, the growing maturity of South Africa's soya bean value chain will also support the competitiveness of poultry production.

## Soya bean production

Over the last decade, soya bean production in South Africa has expanded by an annual average of more than 10%. This has enabled utilisation rates among major processing facilities to reach sustainable levels, stabilising both profitability and the quality of outputs, as well as enabling further expansion in capacity over the past two years. This resulted in substantial replacement of imported soya bean meal with domestically produced product. Soya bean meal imports have declined from 432Kt in 2015 to 158Kt in 2024 despite the drought-affected reduction in soya bean production.

In 2025, and indeed in the medium term, South Africa is expected to remain a net exporter of soya bean meal. While some meal may be imported into the Western Cape, due to the high transport differential relative to major soya bean production regions, domestically produced soya bean meal should be able to penetrate other coastal regions as ample exports into neighbouring countries yields a net surplus position. This suggests that domestically produced soya meal will, with the potential exception of drought years, be offered at a discount to imported products, reducing the cost of feed and bolstering the competitiveness of feed intensive industries such as poultry.

## Conclusion

While the outlook for the poultry industry is positive relative to the challenges of the recent past, several downside risks remain. Core among these is poultry disease, as the frequency and intensity of outbreaks across South Africa have increased in recent years. The new cases of HPAI recorded in July again placed the poultry sector on high alert, and while breeder flock vaccinations have commenced, progress in simplifying vaccination protocols will be a critical enabler of widespread adoption.

If the industry is to unlock its full potential to support growth and employment, also in the broader agrifood system, animal health challenges, along with issues such as the breakdown in critical infrastructure and support services, will have to be addressed. Several actions and interventions have been identified under the *Agriculture and Agro Processing Master Plan*, but decisive action is now needed to ensure implementation and a sustainable future.

For more information, send an email to tracy@bfap.co.za

# A season of abundance lies ahead

*By Wandile Sihlobo, chief economist, Agbiz*

We continue to see an encouraging outlook for global grains and oilseeds production in the 2025/26 season. The International Grains Council (IGC) is the latest organisation to release an upbeat forecast by predicting a global harvest of 2,38 billion tonnes in the 2025/26 season – a 3% increase from the previous one. However, it is still early in the season, as producers in the Southern Hemisphere regions will only start preparing their land in two months, while producers in the Northern Hemisphere have already planted their crops.

This positive expectation is partly based on a favourable weather outlook and prospects that producers will be planting crops in the typical areas or that they will plant slightly more in all the key production areas. Encouragingly, these forecasts suggest that the recent heatwaves in Europe likely did not cause significant damage to the crops as we had feared.

## Expectations regarding major crops

The data for major crops shows that the 2025/26 global maize harvest is forecast at 1,28 billion tonnes, up 4% from the previous season. Significant crop improvement is expected in the United States (US), Argentina, Ukraine, China, the European Union (EU), South Africa and Russia. This is a result of the expected expansion in area plantings in some countries as well as expected higher yields. The forecast for the 2025/26 global maize stocks is 278 million tonnes, a 1% increase from the previous season.

The 2025/26 global wheat harvest is forecast at 808 million tonnes, a 1% increase from the previous season. The EU, Russia, Canada, Argentina, India, and United Kingdom are among the key countries expected to contribute to the anticipated global uptick in wheat harvests. The annual consumption of wheat for food, feed, and industrial usage is set to increase in the new year. Thus, stocks may be down by 2% from the previous season, estimated at 265 million tonnes.

We may see wheat prices trading sideways with possible mild upticks due to tight supplies. It is worth mentioning that, since the start of 2025, global wheat prices have traded sideways under pressure in specific periods. We remain optimistic about a possible sideways movement rather than sharp increases.

## Soya bean, sunflower on the up

Like other crops, the 2025/26 global soya bean harvest is expected to increase by 1% to 428 million tonnes. Brazil, Argentina, China, Paraguay and Ukraine are among the key countries expected to drive this improvement. It is worth emphasising that the major producers of soya bean, namely Brazil, Argentina and Paraguay, are still in the 2024/25 production season with their 2025/26 season only starting in October.

These forecasts assume favourable weather conditions and widespread planting in the general area. Better insights regarding the outlook will be available once the new season commences in the Southern Hemisphere.

With crush, food, and feed set to increase, stocks will likely come under pressure. The IGC forecasts global soya bean stocks for 2025/26 at 83 million tonnes, a 1% decrease from the previous season. It is doubtful that this will lead to a significant price increase as a sideways movement in prices is anticipated in the coming months.

The IGC forecasts the 2025/26 global sunflower seed crop at 57 million tonnes, up by 9% from the previous season. This is based on an anticipated big harvest in Russia, Ukraine, the EU, Moldova, China, Turkey, South Africa and the US, among others. This is likely to keep sunflower seed prices under pressure.

## Moderate global food prices

Although we are still early in the 2025/26 season with certain countries waiting to plant, the production prospects paint an encouraging picture for the path ahead. Ample harvests are expected and should keep global food price conditions at moderate levels for some time.

For more information, send an email to the author at wandile@agbiz.co.za

# SA nears animal feed protein self-sufficiency

*By Drs Dirk Strydom, Grain SA, and Erhard Briedenhann, Protein Research Foundation*

South Africa is rapidly closing the gap on its reliance on imported protein sources for animal feed. A recent report commissioned by the Protein Research Foundation (PRF) revealed that local production accounted for more than 90% of the country's oilcake demand in 2024 – an essential input in feed for poultry, cattle, pigs, and other livestock. This achievement marked a significant milestone in the PRF's long-term strategy to bolster local agricultural sustainability.

The PRF's approach in recent years has centred on promoting local production of soya beans and canola – two crops that underpin high-protein oilcake feed. Using the animal product requirement (APR) model developed in collaboration with the Bureau for Food and Agricultural Policy (BFAP), the PRF projected national feed needs based on key variables such as population growth, per capita consumption of meat, milk, and eggs, and livestock productivity gains.

According to the model, total national animal feed consumption in 2024 reached 12,45 million tonnes, with broilers, beef cattle, and dairy cattle comprising the bulk of demand.

Oilcake remains the principal source of protein in South African animal feed. Among the various types, soya bean oilcake dominated the sector. In 2024, local production contributed 88% of total soya oilcake requirements, up from just 12% in 2005. This trend reflected a remarkable turnaround in domestic capacity and investment in crushing facilities.

**Figure 1: Growth in soya oilcake self-sufficiency.**

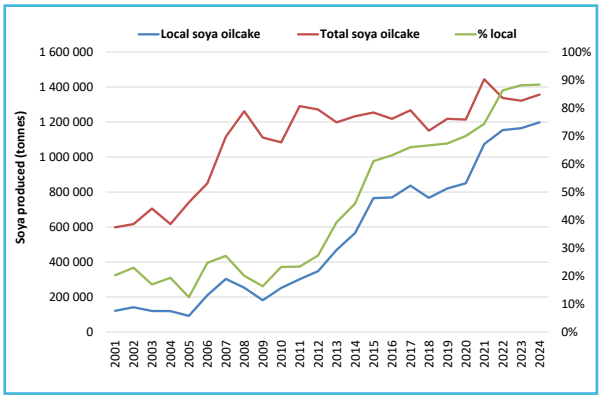



**Table 1: Total oilcake consumption and local share.**

| Year | Local oilcake (tonnes) | Total oilcake (tonnes) | Local % |
|---|---|---|---|
| **2005** | 416 736 | 1 212 593 | 34 |
| **2010** | 701 030 | 1 743 137 | 49 |
| **2015** | 1 197 604 | 1 914 330 | 63 |
| **2020** | 1 485 183 | 1 885 663 | 79 |
| **2023** | 1 828 558 | 1 988 970 | 92 |
| **2024** | 1 836 381 | 2 000 599 | 92 |

**Table 2: Projections of feed and oilcake requirements (tonne).**

| Year | Feed | Oilcake | Soya oilcake |
|---|---|---|---|
| **2024** | 12 450 374 | 2 000 599 | 1 414 155 |
| **2027** | 12 853 437 | 2 071 555 | 1 455 622 |
| **2033** | 14 122 660 | 2 241 497 | 1 564 532 |

## Projections

The model forecasted steady increases in feed and oilcake demand. From 2024 to 2033, total animal feed needs are projected to grow by over 13%, driven by expanding domestic consumption and export opportunities for meat products.

The APR model projected that by 2033, South Africa will be 93% self-sufficient in total oilcake usage if the momentum continues. This achievement is expected to be underpinned by growth in soya bean production and favourable crushing margins, especially in inland regions where most oilcake is produced.

This growth implies a corresponding need for soya bean seed. In 2024, an estimated 1,88 million tonnes of soya beans were required (excluding full-fat soya and soya used for human consumption) to produce the soya bean oilcake needed. By 2033, that number is expected to rise to nearly two million tonnes.

This growth trajectory in self-sufficiency reflected years of investment in research, on-farm trials, and infrastructure. It also demonstrated the growing maturity of South Africa's oilseed value chain – from seed to crushing to delivery.

**Table 3: Local vs imported soya oilcake production (tonnes).**

| Year | Local soya oilcake (from local soya beans) | Local soya beans production (required) | Total soya oilcake requirements | Local soya production (required) for self-sufficiency | % local |
|---|---|---|---|---|---|
| **2024** | 1 255 937 | 1 674 582 | 1 414 155 | 1 885 540 | 88 |
| **2027** | 1 351 362 | 1 801 816 | 1 455 622 | 1 940 829 | 93 |
| **2033** | 1 444 532 | 1 926 042 | 1 564 532 | 1 940 829 | 93 |

## Logistics and market access

Despite positive trends, local producers still face logistical and pricing challenges – especially transporting inland-produced oilcake to coastal regions where imported products may be more competitive. For sustained growth, domestic prices must remain aligned with export parity, and logistics systems must be efficient and cost-effective.

In addition, the sector's expansion depends heavily on the performance of South Africa's poultry and livestock sectors. Avian influenza outbreaks and biosecurity lapses can quickly reduce feed consumption and upend growth projections. Disease management and export competitiveness will be central to unlocking the industry's full potential.

Email Dr Dirk Strydom at dirks@grainsa.co.za or Dr Erhard Briedenhann at erhardb@netactive.co.za for more information.

# World oilseeds market and trade, August 2025: Indonesian soya bean meal imports growth

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

Indonesian imports of soya bean meal are raised 200 000 metric tonnes (Mt) in August, bringing the total to 6,2 million tonnes in marketing year 2024/25 (October to September), a 1,1 million tonne increase from 2023/24. Indonesia's poultry and aquaculture industries use soya bean meal as a major feed input, and as domestic protein demand increases, imports of soya bean meal are forecast to rise concurrently. In 2023/24, imports of soya bean meal hit a low as Indonesia's feed industry grappled with culling mandates and high input costs that lowered demand.

Until 2022/23, Argentina was consistently Indonesia's top supplier of soya bean meal. In that year, Argentina experienced a drought that decreased soya bean meal production and exports by over 20% each. During that same period, Brazil increased soya bean meal production, resulting in increased exports of nearly 30% between 2020/21 and 2022/23. Since 2022/23, Brazil maintained its dominance as Indonesia's largest supplier of soya bean meal, accounting for nearly 80% of imports in 2023/24.

The United States (US) is Indonesia's top supplier of soya beans with nearly 90% market share in 2023/24, but captured only 3% of Indonesia's soya bean meal market in the same year as the third largest supplier after Brazil and Argentina. Indonesia imports whole soya beans for food use in tempeh and tofu production, while soya bean meal imports largely go towards the feed industry, making imports unsuitable substitutes for one another.

## Growing exports, declining prices

Global soya bean meal exports are forecast to rise in 2025/26 as meal consumption continues to grow, incentivised by lower soya bean meal prices relative to other feed ingredients. While growth is expected to slow compared to double-digit rates in 2023/24 and 2024/25, this would mark the third consecutive year of record soya bean meal exports. The USDA currently forecasts world soya bean meal exports in 2025/26 at 82 million tonnes, a 1% increase from 2024/25, but a continuation of a growth trend that has led to exports increasing by nearly a quarter in only three years.

Lower soya bean meal prices were caused by large global soya bean supplies and biofuel policies in Brazil and the US, which increased fat and oil feedstock demand, incentivising crushing expansion and raising exportable supplies of soya bean meal.

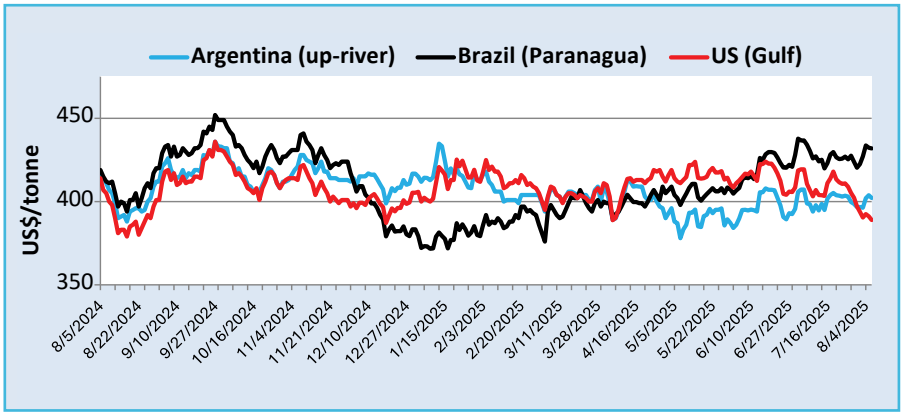
Rising global soya bean meal supplies beginning in 2023/24 have exerted downward pressure on prices. The average free on board (FOB) prices have declined from around US$550/t for major exporters in November 2023 to around US$300/t in July 2025. These favourable prices, as well as strong growth in global feed demand, have led to significant import growth for many countries during the 2023/24 to 2025/26 period, when compared to the previous three-year average.

Global soya bean meal imports are expected to be nearly ten million tonnes higher in this period, driven by import growth in markets including Iran, the European Union (EU), Vietnam, and Mexico.

## Overview 2025/26

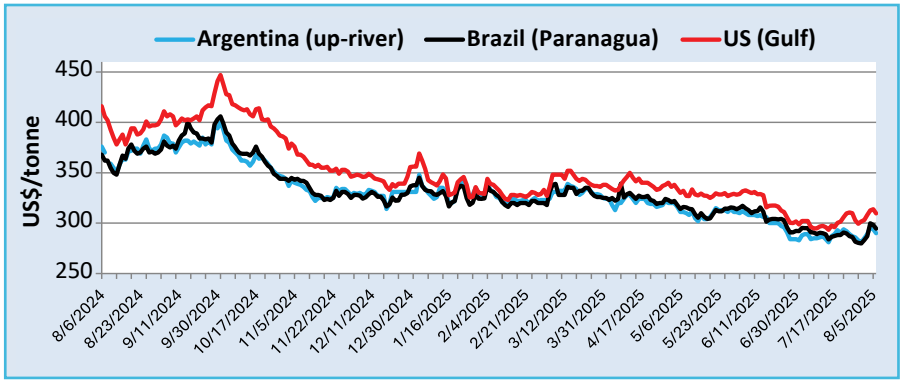
The global oilseeds production forecast is lowered this month on lower US soya bean, Ukraine and EU sunflower seed, and US and Sudan cottonseed. Global oilseeds trade is down slightly as decreased US soya bean and Ukraine rapeseed is not offset by increased Argentina soya beans. Global oilseeds

**Figure 1: Soya bean export prices. (Source: International Grains Council)**




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

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



crush is down on decreased EU and Ukraine sunflower seed and US and Uzbekistan cottonseed crush, largely offsetting increased rapeseed crush from the EU.

Global oilseeds ending stocks are forecast lower on decreased US and Argentina soya bean stocks not offset by raised EU rapeseed. Global oilseed meal trade is unchanged with higher India rapeseed meal offsetting a decline in Ukraine sunflower seed meal exports. Global vegetable oil trade is lowered on decreased Ukraine sunflower seed oil exports.

The projected US season-average farm price for soya beans is unchanged at US$10,10 per bushel.

## Overview 2024/25

Global oilseeds production is raised in August on higher soya bean production in Argentina and Uruguay and peanut production in Sudan, greatly offsetting decreased cottonseed production across Africa. Global oilseeds trade is raised on higher Uruguay and US soya bean exports, offsetting minor decreases in Ukraine rapeseed and sunflower seed. Global oilseeds crush is raised on higher Argentina, Egypt, US, and Turkey soya bean crush.

Global oilseeds ending stocks are raised on increased EU rapeseed and Argentina soya bean stocks, offsetting decreased US soya beans stocks. Global oilseed meal trade is up on higher Brazil, US, and Argentina soya bean meal largely offsetting a decline in EU sunflower seed and Malaysia palm kernel meal. Global vegetable oil trade is unchanged as lower Papua New Guinea palm oil exports offset increased exports of Argentina, China, and Turkey soya bean oil.

The projected US season-average farm price for soya beans is unchanged at US$10,10 per bushel.

## Export prices

Since the last WASDE report, soya bean export prices have remained largely unchanged aside from the US. US soya bean export prices have trended downward away from Argentina and Brazil over the past month as crop condition reports confirmed expectations of a large crop combined with lagging export sales. In contrast, soya bean meal export prices appreciated slightly over the month following a multi-month decline that resulted in record lows during July. US soya bean meal ended the month rising above US$300/t on strong export sales

Soya bean oil export prices from Brazil and Argentina increased over the past month on strong demand from importers. US soya bean oil export prices remain largely unchanged and still hold a substantial premium over alternative origins due to strong domestic demand for biofuels. Ukraine sunflower seed oil strengthened as production outlook declined. EU rapeseed oil export prices declined over the month as harvest continues across Europe, though prices remain elevated amid presently low supplies. Palm oil remains the world's discount oil with some month-to-month appreciation as import demand accelerates.

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

# The missing ingredient:
## Knowledge gaps and perceptions of soya from a low-resource community in South Africa

*By Dr Wilna Oldewage-Theron and Vibhuti Batra*

In South Africa, the effects of poverty and food insecurity are acutely visible. In 2021, 11,6% of households in the country experienced hunger/lack of food, impacting 2,1 million households. Food insecurity often results in insufficient food intake or unbalanced diets. The ongoing nutrition transition in South Africa, as in many low- and medium income countries (LMICs), has resulted in a shift from traditional, unrefined diets to Westernised patterns characterised by high intakes of refined carbohydrates, added sugars, animal-source foods, and fats. This shift is driven by rising consumption of fast, processed, and ultra-processed foods.

Combined with persistent poverty, these dietary changes have led to a complex food and nutrition security crisis known as the double burden of malnutrition (DBM). DBM refers to the simultaneous presence of undernutrition (including stunting, wasting, and micronutrient deficiencies) and overnutrition (overweight, obesity, and related non-communicable diseases [NCDs]) within the same individual, household, or community.

In South Africa, DBM disproportionately affects black African populations and those living in impoverished and urbanised areas. It is often further compounded by the high prevalence of human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), reflecting a broader epidemiological shift where infectious diseases coexist with rising rates of diet-related NCDs.

The causes of these nutritional challenges are multifactorial. One of the causes is poor dietary diversity (DD). Poor DD is influenced not only by economic limitations but also by personal preferences, sociocultural norms, environmental constraints, and cognitive factors, including nutritional knowledge. Studies have shown that improving nutritional knowledge can significantly affect food choices and dietary behaviours. However, in many low-income households, there is a limited understanding of nutrition and insufficient skills to select or prepare affordable, nutritious meals.

The potential of soya as a culturally acceptable, nutritionally rich, and cost-effective food source deserves greater attention. Soya provides a complete protein (36%) alongside carbohydrates (35%), dietary fibre (17%), and beneficial fats, including monounsaturated (23%) and polyunsaturated (58%) fatty acids, as well as essential vitamins and minerals. Its protein quality compares favourably with animal sources, based on the protein digestibility corrected amino acid score (PDCAAS), making it an attractive alternative in protein-deficient diets. In addition, the health benefits of soya consumption are well-documented, including its role in reducing the risk of osteoporosis, breast cancer, cardiovascular disease, and diabetes.

Despite these advantages, soya remains underutilised in South Africa, particularly in low-income communities where its nutritional and economic value could significantly contribute to reducing food insecurity and malnutrition.

Interventions that improve nutritional literacy have shown promise. A soya nutrition education programme implemented in rural South Africa significantly improved respondents' knowledge and perception of soya as a healthy dietary option. Similarly, a one-day training workshop for smallholder producers altered their perception of soya, highlighting its potential for broader public health impact. In addition, a cost-effective vegetable and soya gardening and consumption study showed significant

**Table 1: Socio-demographic characteristics of the respondents.**

| Variable | Total (n=139) n (%) |
|---|---|
| **Marital status** | |
| Single | 81 (58,3) |
| Married | 49 (35,3) |
| Divorced | 3 (2,2) |
| Widowed | 4 (2,9) |
| Missing data | 2 (1,3) |
| **Education level** | |
| None | 2 (1,4) |
| Grade 1 to 7 (Primary) | 8 (5,8) |
| Grade 8 to 12 (Secondary) | 102 (73,4) |
| Post-school certificate/ degree | 27 (19,4) |
| Employed | 57 (41,0) |
| **Social media use** | |
| None | 31 (22,3) |
| Email | 4 (2,9) |
| WhatsApp | 93 (66,9) |
| Twitter | 8 (5,8) |
| Facebook | 67 (48,2) |
| Instagram | 11 (7,9) |

**Table 2: General soya nutritional and health benefits knowledge.**

| Question asked – true or false | Correct answers n (%) |
|---|---|
| You should eat more than one type of food every day to be healthy. | 113 (81,3) |
| Soya is good food for animals. | 26 (18,7) |
| Eating soya can protect you from heart disease. | 54 (38,8) |
| Meat, fish or chicken must be eaten every day. | 65 (46,8) |
| Soya can be eaten by people. | 108 (77,7) |
| Eating soya has no health advantages. | 48 (34,8) |
| Soya can be eaten instead of meat or chicken. | 14 (10.1) |
| Soya beans have bad fats. | 49 (35,3) |
| Soya is a vegetable. | 17 (12,2) |
| Eating soya can protect you from cancer. | 39 (28,1) |
| Heart disease is the number one killer in South Africa. | 69 (49,6) |
| You need to soak soya beans before cooking. | 85 (61,2) |
| Soya beans are cheap. | 76 (54,7) |
| Soya milk has the same nutrients as cow's milk. | 29 (20,9) |
| It is not necessary to soak soya beans before cooking. | 44 (31,7) |
| The food industry uses soya in many food items. | 80 (57,6) |
| You should eat at least five portions of fruit and vegetables per day. | 19 (13,7) |
| You should drink at least eight glasses/cups of water/fluids per day. | 106 (74,1) |

health improvements in a rural South African community.

A soya nutrition programme was implemented in 2023 in a primary school in a low-income community in the Vaal region. An industrial soya milk processor (the Soya Cow) that produces 30ℓ of soya milk per hour was installed at the school, and school food service personnel were trained to provide soya milk and yoghurt to the children as part of the daily school lunch programme as an affordable and nutritious food, and also because it is the only plant-based milk recommended for children as a replacement for cow's milk by a number of health and nutrition organisations. The learners were also educated about the health benefits of soya for human health.

Building on this project, this study aimed to assess the perceptions and knowledge of soya, as well as DD of mothers and/or the women child caregivers of the children attending the primary school in the Vaal region.

## Results

### Socio-demographic characteristics

The median (IQF) age of the respondents was 35 (30,8; 43) years, and the majority were single (n=88, 63,4%), including divorced and widowed respondents). Although the majority (n=102; 73,4%) of the respondents attended secondary school, only 67,6% (n=94) completed secondary school education (n=94; 67,6%) with 19,4% (n=27) obtaining a post-school certificate or degree. However, 59,4% (n=82) of the respondents were unemployed. Many respondents were accustomed to using social media, specifically WhatsApp (n=93; 66,9%) and Facebook (n=67; 48,2%), however, 22,3% (n=31) did not have access to any social media (*Table 1*).

### Soya consumption results

Most respondents (55,4%) reported that they never consumed any soya or soya products. However, of those respondents who consumed soya (n=62), 9,7% (n=6) consumed it every day, 32,3% (n=20) and 4,8% (n=3) consumed it two to four times and five to seven times per week, respectively, whereas 38,7% (n=24) consumed it once per month or less frequently (n=9; 14,5%). Most of those respondents who consumed soya indicated they used texturised soya protein (TSP) in the preparation of stew (n=26; 43,3%) and 28,3% (n=17) used soya milk in their households.

A large proportion of the respondents liked the taste of soya (17,3% liked a lot and 28,8% liked a little) whereas only 15,8% did not like the taste of soya (2,9 and 12,9% disliked a little and a lot, respectively). The rest (38,1%) neither liked/nor disliked the taste.

### Soya knowledge and perceptions

The results showed 81,3% of respondents knew that daily consumption of more than one type of food is required to maintain health. Although the majority of respondents (77,7%) knew that soya could be consumed by humans as an affordable food option (54,7%), poor knowledge of soya benefits for human health was observed. Most respondents knew that at least eight glasses of water/fluids should be consumed per day, but only 13,7% knew that five servings of fruit and vegetables should be consumed per day (*Table 2*).

Many of the respondents knew soya could be used as a meat replacement (n=95; 68,3%) and can be added to vegetables (n=105; 75,5%), legumes (n=84; 60,4%) and meat or stews (n=87; 62,6%). Although TSP and soya sauce were familiar to 49,6% (n=69) and 63,3% (n=88) of the respondents respectively, they were not familiar with the other products prepared from soya, such as yoghurt (n=49, 35,3%), flour (n=61; 43,9%), oil (n=54, 38,8%), and tofu (n=38; 27,6%).

The majority knew that Imana (n=84; 60,4%), protein bars (n=74; 53,2%) and ProNutro (n=73; 52,5%) contained soya. Not many of the respondents knew about the other commercial products containing soya, for example polony (n=37; 26,6%), viennas (n=41; 29,5%), and bread (n=64; 46%). Some of the respondents also wrongly indicated that tomato sauce (n=34; 24,5%), maize meal porridge (n=26; 18,7%), and margarine (n=28; 20,1%) contained soya.

In general, the respondents did not have a good knowledge of soya. The section about the uses of soya had the highest score of 55,8% (mean 7,3±3,7 out of 13). Despite a large proportion of the respondents indicating that they would be able to prepare a meal with soya beans (47,4%) and TSP (33,6%), only a small proportion indicated it would be easy and very easy to prepare meals with soya beans and TSP (*Figure 1*).

Only a small proportion of the respondents indicated that it would be difficult or very difficult to follow a recipe, measure ingredients, and prepare a balanced meal.

**Dietary diversity results**

The median (IQF) dietary diversity score (DDS) was 8 (7;8) and the majority of respondents (n=128, 92,1%) had a DDS of ≥5 food groups, indicating adequate diet quality. The grains/roots/tubers food group was consumed by most of the respondents (98,6%), followed by the flesh (97,1%), and dairy food group (89,9%). The least consumed were the dark green leafy vegetables (26,6%) and pulses (37,4%) food groups. Diversity within the food groups was poor with the grains, roots, and tubers group being the most diverse (median 4 [2;5]), followed by the other vegetables group with a median of only 3 (2:5).

No significant associations were observed among soya knowledge and any of the socio-demographic parameters or DDS (p>0,05).

## Discussion

While the relatively high level of education among participants is promising for the implementation of future nutrition and soya awareness and education interventions, the high rate of unemployment may contribute to ongoing economic vulnerability within the community. This, in turn, may limit access to or affordability of alternative protein sources such as soya. In this context, the promotion of soya gardening and income-generating initiatives presents a feasible and sustainable strategy to improve food insecurity and address both poverty and malnutrition.

The use of social media platforms such as WhatsApp and Facebook by most of the respondents provides a useful avenue for targeted health and nutrition messaging. However, the fact that almost a quarter of respondents lacked access to social media platforms should be considered in planning future interventions. Digital exclusion may limit the reach of online educational interventions and points to the need for diverse communication strategies, including community outreach.

Soya was not regularly consumed by many of the respondents. Among those who consumed soya, the frequency was generally low, with only a small fraction consuming it regularly. This is consistent with many other studies in South Africa and in European countries where, despite soya foods being regularly promoted, soya consumption remains marginal.

Textured soya protein was the most used soya product, mostly in stews, followed by soya milk in this community. Soya milk is also one of the most known and consumed soya foods in Asia and Europe. Notably, the finding that many respondents (55,4%) reported never consuming soya or soya products highlights a significant opportunity to promote and increase soya uptake through targeted interventions.

**Factors influencing consumers**

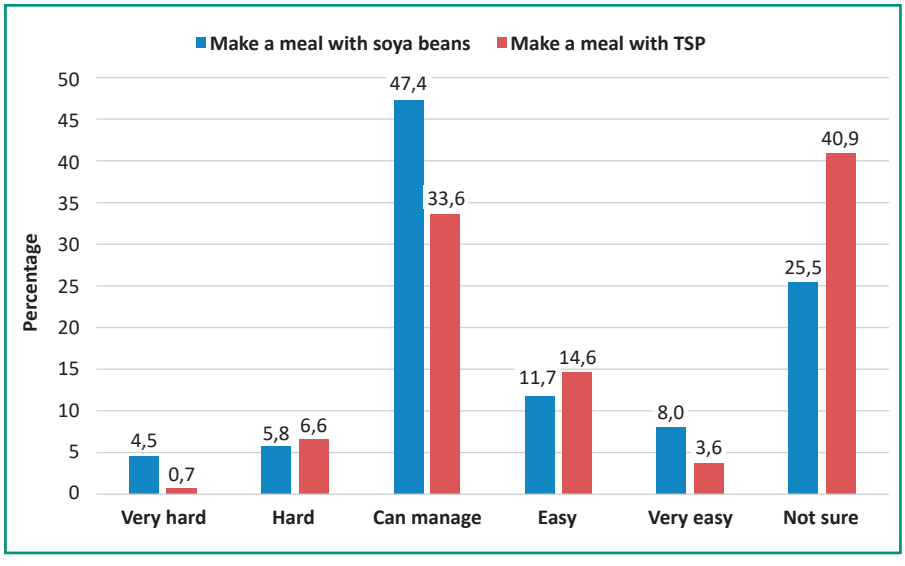
Consumer acceptability of food is influenced by various factors, including sensory attributes, familiarity with the product, visual appeal, and alignment with traditional or cultural values. Taste preferences were varied but generally neutral or favourable, with 46,1% of our respondents expressing some level of liking for the taste of soya and only 15,8% expressing dislike. This suggests that resistance to soya consumption may not be primarily due to sensory attributes but rather due to unfamiliarity, lack of knowledge, or limited access.

This is consistent with a finding that the effect of culture and exposure to foods influence the beliefs and attitudes towards specific foods and, thus the consumption of familiar foods. Repeated tastings may lead to a better attitude and liking towards the food.

Overall soya knowledge and knowledge about the health benefits of soya were relatively low. These results are consistent with other studies conducted among resource-poor communities in South Africa, but also in developed countries such as Canada, the United States, and Asia where soya forms part of the daily diet. Our respondents' knowledge about the applications and commercial sources of soya was also limited.

A large proportion of the respondents reported that they would be able to

**Figure 1: Perceptions of soya meal preparation.**



prepare soya bean and TSP meals and only a few perceived this as difficult, however, more than a quarter and almost half of the sample was not sure about how to prepare soya bean and TSP meals. Most of the respondents reported being able to measure ingredients, follow a recipe and plan and cook a balanced meal. This disconnect between confidence and actual ease of preparation may reflect limited culinary skills or lack of exposure to soya-based cooking techniques.

**An educational approach**

Research has shown that once people become experienced with soya foods, their fear about lack of knowledge on how to cook/prepare soya foods disappears. Interventions aimed at improving food preparation skills, reading and preparation of recipes, and tastings could help bridge this gap as proven by a project implemented in Qwa-Qwa.

Incorporating soya into local dishes also improved the self-efficacy and acceptability of the recipes. In addition, education on reading of food labels should also be included to assist with informed food choices. The *SA Food-Based Dietary Guidelines* (FBDGs) have been in place for over two decades, with the accompanying food guide established more than ten years ago. Interestingly, despite the longstanding presence of these guidelines, their dissemination into smaller or resource-limited communities appears to be limited. In the present study, respondents demonstrated inadequate knowledge of key food groups, particularly vegetables and fruits, as well as dry beans, peas, lentils, and soya.

Despite the gaps in soya knowledge and low soya consumption, respondents' dietary diversity was generally adequate, with a median DDS of 8, and over 92% meeting the minimum dietary diversity (DDS ≥5). However, diversity within the food groups were relatively poor.

While the frequent consumption of staple foods such as grains, roots, and tubers is typical in resource-poor communities, the high proportion of respondents consuming flesh and dairy foods observed in this study contrasts with findings from previous studies conducted in South Africa. This divergence may be attributed to nutrition transition experienced by South Africa.

The increasing global demand for high-quality animal protein is projected to outpace population growth, raising significant environmental and sustainability concerns. Meeting this demand through conventional livestock production is resource-intensive and contributes substantially to environmental degradation. In this context, alternative protein sources, such as those derived from soya, offer a promising solution to reduce the ecological footprint of animal protein production.

**Awareness and nutrition education**

Research has found that the consumption of specific foods is increased when consumers are aware of the health benefits and the perceived benefits of the foods. It is important to consume a variety of foods for dietary micronutrient adequacy and dietary diversity, specifically the food groups that are lacking, could be promoted alongside soya to further enhance dietary quality. Nutrition education programmes or interventions have been reported to improve nutrition knowledge, and short-term soya nutrition training programmes improved knowledge and self-efficacy scores of rural elderly Zambian women.

Household- or community-based vegetable and soya gardening programmes are valuable for promoting sustainable access to affordable, nutritious food sources. Soya gardening initiatives could improve food security, improve dietary diversity, and increase familiarity with soya as a valuable plant-based protein in a low-resource community in South Africa. Involving community members in the cultivation and utilisation of soya may also strengthen nutrition education efforts and support long-term behaviour change toward healthier, more sustainable diets.

Moreover, soya can play a critical role in addressing malnutrition in LMICs, particularly in resource-poor communities, by providing a nutritious and more affordable alternative to more expensive nutritious foods and also offering many health benefits to both adults and children.

No significant associations were found between soya knowledge and socio-demographic factors or DDS, indicating that poor soya knowledge is widespread across different subgroups. This highlights the need for broad-based nutrition education strategies that address the entire community rather than targeting specific demographic segments.

## Conclusion and recommendations

While the respondents demonstrated some nutrition and soya knowledge and maintained acceptable DD, knowledge and usage of soya products were limited. Taste acceptability was not a major barrier, and the familiarity with TSP suggests an entry point for broader soya promotion. Broader public health dissemination and community-based nutrition programmes are essential to support soya awareness and its integration into diverse, healthy diets.

Recommendations for the community include:

- A critical need for targeted consumer education focussing on the nutritional value of soya, its role as an affordable protein source, and practical guidance on soya preparation methods.
- Interventions should include household or community soya gardening, combined with in-person awareness and nutrition education, including the SA FBDG programmes. These programmes should be supplemented by nutrition and gardening information messaging through accessible platforms such as WhatsApp and Facebook, hands-on cooking demonstrations, and simplified soya-based culturally accepted recipes.
- Future research should include larger numbers of respondents to ensure a greater impact on promoting healthy dietary practices as well as consumption of soya.
- Long-term follow-up measurements should be conducted to measure actual dietary intakes and the impact of soya consumption on nutritional status and health of both parents/women child caregivers and the children.

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For more information, send an email to Dr Wilna Oldewage-Theron at wilna.oldewage@ttu.edu

# Are seed oils really bad for you?

*By Jessica Bradley, BBC*

## Seed oils such as canola and sunflower oil have attracted controversial claims about harmful effects in recent times. Is there any truth to them?

In recent years, seed oils have become the target of countless social media posts, with people claiming that they are 'toxic', 'poisonous' and damaging our health. Critics have nicknamed some seed oils 'the hateful eight' – referencing eight popular seed oils, namely canola, corn, cottonseed, grapeseed, soya, rice bran, sunflower, and safflower – and blame them for causing heart disease and type 2 diabetes.

### Do they affect heart health?

Much of the recent criticism of seed oils focusses on their high omega 6 fatty acid content. Omega 6 fatty acids are essential fatty acids, which means we need them, but cannot produce them ourselves. In recent years some scientists have argued that omega 6 can cause chronic inflammation (which can increase the risk of developing diseases including heart disease and cancer).

But controlled trials have found that omega 6 fatty acids do not increase inflammation, says Dariush Mozaffarian, professor and director of the Food is Medicine Institute at Tufts University in Massachusetts in the United States (US). "New research shows that omega 6 fatty acids give rise to unique natural molecules, like lipoxins, that have powerful anti-inflammatory effects in the body," says Mozaffarian.

Recent research studied the diet and health of over 200 000 people in the US for approximately 30 years. The researchers found that people who consumed more plant oils (including seed oils) were less likely to die from cardiovascular disease or cancer over the course of the study. On the other hand, those with a higher intake of butter were more likely to die during the same period.

There are numerous observational studies looking at how omega 6 effects our heart health – where scientists look at data on diet and health and find associations between the two. But some observational studies rely on people's own accounts of what they eat, says Matti Marklund, assistant professor of human nutrition at Johns Hopkins Bloomberg School of Public Health in the US. And this, he adds, can be problematic because people may misremember, or even be dishonest, about their dietary habits.

Another way to measure omega 6 intake is to measure the average amount in the individual components and ingredients in a person's diet. However, Marklund adds, it can be difficult to translate what people say they have eaten into certain quantities.

### Seed oils and the 3:6 ratio

Another common accusation levelled at seed oils is that eating too much omega 6 compared to omega 3 is harmful. In the Western world, omega 6 fatty acids account for approximately 15% of our total energy intake. The average person's ratio of omega 3 to omega 6 can be up to 50:1. However, it should be more like 4:1 to reduce our risk of cardiovascular disease, according to one study.

A 2022 World Health Organization (WHO) review and meta-analysis reported that a higher omega 6:3 ratio was associated with a greater risk of cognitive decline and ulcerative colitis, a chronic inflammatory bowel disease. On the other hand, a higher omega 3:6 ratio was also linked to

a 26% reduced risk of depression. Overall, the scientists involved in the WHO study concluded that a high intake of omega 6 fatty acids from seed oils is unlikely to increase your risk of death and disease – but say that more high-quality research is needed.

But while some scientists argue that you shouldn't have too much omega 6 compared to omega 3, Marklund says it's better to up your intake of omega 3 rather than consume less omega 6, as both are associated with health benefits.

## How seed oils are processed

Unlike other oils, seed oils are extracted from the seeds of plants. There are some concerns that seed oils are extracted with hexane – a chemical made from crude oil – but there is little evidence so far suggesting that this process can cause issues.

While some evidence suggests hexane could be linked to several health conditions, after being extracted, the oil is then deodorised and bleached to remove residues and additives. Cold-pressed seed oils avoid this process entirely, as it involves squeezing the seeds to extract the oil – but this results in a more expensive product.

## Can seed oils fuel tumour growth?

Despite an abundance of research showing the potential benefits omega 6 might have on our health, researchers have recently found that this fatty acid can fuel the growth of a specific type of breast cancer. The findings may have implications for the impact of omega 6 consumption on other diseases, too.

Cancer cells use nutrients as fuel to grow and multiply, but until now, there was limited research looking at the role omega 6 fatty acids play.

But a study published in March this year found a mechanism by which linoleic acid, an omega 6 fatty acid, helps cancer cells to grow and multiply in patients with triple negative breast cancer (TNBC). This is the most aggressive sub-type of the disease, and one that does not respond well to targeted therapies.

Previous studies suggest there is no association with omega 6 fatty acids, or a slight increase in risk, says Nikolaos Koundouros, postdoctoral associate at Weill Cornell Medicine research centre in New York. But these studies, he says, have not considered multiple sub-types of breast cancer, and that they all differ in terms of a patient's survival and prognosis, and how they might respond to targeted therapy.

TNBC seems to respond the most to omega 6 linoleic acid, Koundouros says. Along with a team of researchers, Koundouros discovered in the lab that, when fed omega 6, TNBC cells activate a protein complex linked to tumour growth and progression. Another protein, which is found in larger amounts in TNBC tumours compared to other breast cancer subtypes, is known to take fatty acids and lipids throughout the body and within cells to exactly where they need to be. Koundouros explains that these proteins, along with omega 6, may also be relevant in other chronic diseases, such as obesity and type 2 diabetes.

This research could potentially inform treatment options for TNBC patients, but it does not necessarily have wider implications for everyone, Koundouros says. "It's important to remember omega 6 fats are essential for a reason; if you completely cut them out, you could have detrimental side effects," he says.

## Which seed oil?

Some seed oils – such as canola oil and soya bean oil – have been studied more than others, so have a more rigorous evidence base. "These each provide a balanced combination of healthy fats, including monounsaturated fats, omega-6 polyunsaturated fats, and omega-3 polyunsaturated fats," Mozaffarian says. Canola oil, Mozaffarian adds, has similar anti-inflammatory effects and produces better improvements in blood cholesterol levels than olive oil, which has long been hailed the healthiest of all oils.

One meta-analysis of 27 trials found that canola oil was found to significantly reduce low-density lipoprotein (LDL) cholesterol compared to sunflower oil and saturated fat, while another found that it dramatically reduced body weight, especially in those with type 2 diabetes.

"Canola oil produces excellent benefits for blood cholesterol levels, and also modestly reduces body weight. The healthy fats in canola oil, especially the omega 6 polyunsaturated fats, also improve blood glucose, insulin resistance, and insulin production," says Mozaffarian.

## Which seed oil is healthiest?

"Seeds are one of nature's most nourishing gifts; a package of beneficial healthy fats," says Mozaffarian. That something so well studied within nutrition science has had such a backlash has been a source of confusion for some scientists. But this misunderstanding may come from a "misplaced combination of partial truths."

For instance, some people may link seed oils to ultra-processed foods (UPFs), which often contain seed oils, particularly canola, corn, soya bean, and sunflower oils. In recent years there has been a huge focus on the health risks of consuming too many UPFs, including increased risk of developing type two diabetes and heart disease.

"But these dangers arise from too much starch, sugar, and salt, loss of natural intact food structure and dozens, or even hundreds, of artificial additives," Mozaffarian says.

Some people have also drawn a correlation with increased consumption of seed oils in recent years and the rise in obesity and diabetes. "But if you want to draw parallels with people eating more seed oils and unhealthy outcomes, it's because we're eating food that tends to contain a lot of sugar and sodium," Gardner suggests. He says there are ways to consume seed oils at home that do not involve UPFs, such as with a salad or stir-fry. "I'd hate to see people tossing out seed oils because of this seed oil war," says Gardner.

Ultimately, while some scientists call for more rigorous trials looking into the effects of seed oil consumption on our health, others, including Marklund, argue that there is already a wealth of good quality trials showing benefits on blood cholesterol, blood glucose and insulin levels for the general population.

"Omega-6 fatty acids are excellent for health," says Marklund. "They have been linked to lower onset of heart disease, stroke, diabetes, and even death from all causes."

Find the original article at *www.bbc.com/future/article/20250530-are-seed-oils-really-bad-for-you*

# The new *Expropriation Act*: The legal history of land reform in South Africa

*By Hans-Jurie Moolman, Moolman & Pienaar Incorporated*

Sections 25(2) and 25(3) of the *Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)*, in its current form, have been in force since 1996 and as such interpreted by the courts. The wording and interpretation of the *Constitution* remains the supreme authority against which all, and even new legislation and its application, will be measured in future.

Approximately 70 000 out of some 75 000 restitution claims lodged have been settled, with market-related or close-to-market compensation paid to landowners. Moreover, market-related compensation has formed the basis of several court judgments pertaining to just compensation in terms of the *Constitution*.

In cases where claimants' ownership of land was not restored, the historical market value of the land formed the basis for calculating and paying just and equitable compensation. The *Restitution of Land Rights Act, 1994 (Act 22 of 1994)* refers explicitly to Sections 25(2) and 25(3) of the *Constitution* in order to determine what just compensation claimants ought to receive. The 'injustice' that is being redressed or corrected by land claims relates to the less than reasonable and fair (market value) compensation paid to people who were deprived of their land rights in the past because of racial legislation or practices.

## The state department dilemma

Unfortunately, just and equitable compensation has been erroneously identified as the stumbling block and reason why land reform in South Africa has failed. Since 2014, legislative interventions have attempted to resolve these land reform failures and move away from market-related compensation, without addressing the governance issues in government departments.

In 2014, and shortly before the general election, the *Restitution of Land Rights Amendment Act, 2014 (Act 15 of 2014)* (the *Amendment Act*) was enacted to extend the filing date for claims to 30 June 2019. The *Property Valuation Act, 2014 (Act 17 of 2014)* was enacted in the same year, and the *Act's* regulations promulgated in 2018. These regulations drastically changed the basis of compensation for the purchase of private land for land reform. Many new claims were filed, after which the state decided to apply the regulations under the *Property Valuation Act* to all land reform transactions.

These laws failed. The Constitutional Court declared the *Amendment Act* unconstitutional. In addition, the Land Claims Court of South Africa (now the Land Court) cast doubt upon the formulas used for calculating just and equitable compensation in terms of the regulations of the *Property Valuation Act* when the state's expert witnesses were unable to prove their validity.

Following these failed attempts, a new attempt was made to amend the wording of Section 25 of the *Constitution* with the aim of making explicit what was allegedly implicit in the *Constitution*. It referred to the authorisation of expropriation without any compensation being paid. This attempt also failed, because there wasn't enough support for the amendment of the *Constitution* in the national legislature to achieve a two-thirds majority.

Despite these failures, the new *Expropriation Bill* was passed on 28 September 2022 and signed by president Cyril Ramaphosa. The aim of the *Expropriation Act*, without amending the *Constitution*, is to try and force the courts to depart from the historical application and interpretation of Sections 25(2) and 25(3) of the *Constitution*.

## To be tested in courts

The new *Expropriation Act* will not only be tested against the wording of Sections 25(2) and 25(3) of the *Constitution*, but also against its historical application and interpretation in practice and by the courts.

In *Mvelase vs Director-General of Rural Development and Land Reform 2019 (6) SA 597*, the Land Court raised the question of whether those responsible for the failure of land reform will be held accountable. The court found that the department had compromised the constitutional security and future of all citizens, not just the rights of land claimants. South Africans, the ruling states, have been waiting for fair land reform for more than 25 years, some for centuries.

The department's failure to manage and expedite land reform measures based on constitutional and statutory undertakings has had a severe negative impact on the land reform debate in the country. The ruling states that neither the *Constitution* nor the courts or South Africa's laws are flawed or deficient, and that the crisis was rather caused by the institutional inability of the department to give effect to the *Constitution* and applicable legislation.

For more information, send an email to Hans-Jurie Moolman at hj@mmlaw.co.za or contact the Potchefstroom office at 018 297 8799 or the Pietermaritzburg office at 033 032 0241.

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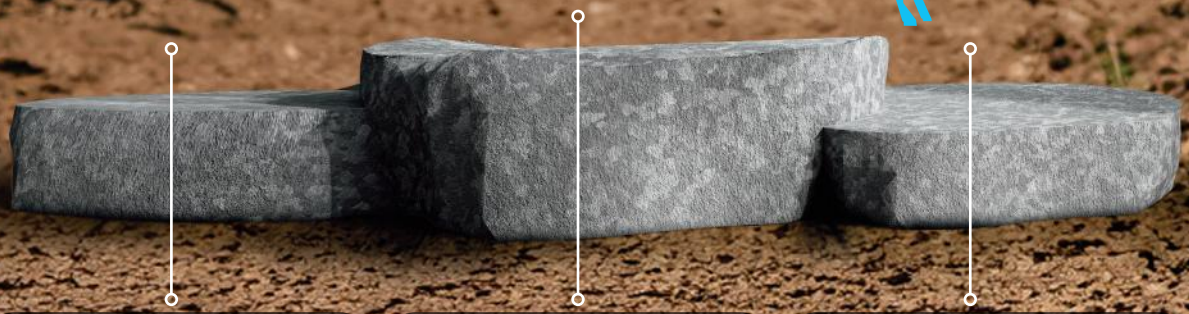

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# Features of a valid employment contract

*By James Pretorius, legal advisor, LWO Employers Organisation*

**An employment contract is not only a legal requirement but a necessity. It can be described as a legal and binding agreement between an employer and an employee, and sets out the terms and conditions of the employment relationship. It specifies the rights, responsibilities, and obligations of both parties.**

According to the *Basic Conditions of Employment Act, 1997 (Act 75 of 1997) (BCEA)* and *Sectoral Determination 13* for the agricultural sector, incorporated under the *BCEA*, an employer must provide the following details in writing to the employee upon commencement of his or her employment:

- Full name and address of the employer.
- Name of the employee, as well as a job title or brief description of the work for which the employee is employed.
- Physical workplace. If the employee is required or permitted to work from multiple locations, it must be specified as such.
- Date on which employment started.
- Employee's normal hours of work and working days.
- Employee's wages or the rate and method of calculating such wages.
- Rate of payment for overtime work.
- Any other cash payments to which the employee is entitled.
- Any food or accommodation payment to which the farm worker will be entitled and the value of that food or accommodation as calculated in terms of the relevant clauses of *Sectoral Determination 13*.
- Details of any payment in kind (goods or services) and the value thereof.
- Frequency by which remuneration will be paid.
- Any deductions to be made from the employee's remuneration.
- Leave that the employee is entitled to.
- Notice period required upon termination of employment, or if employment is for a set period, the date on which employment will come to an end.
- Description of any bargaining council or sectoral determination covering the employer's business.
- Any period of service with a previous employer that counts towards the employee's period of service.
- List of any other documents that are part of the employment contract, with reference to where the employee can obtain a copy of each.

The biggest mistake employers can make is not having a written employment contract in place. In addition to a written employment contract ensuring that the employer complies with all legal requirements provided in the *BCEA*, it also serves as physical proof of the terms of service that have been agreed upon.

With regard to the terms of service, certain minimum provisions must be followed, regardless of whether the parties are willing to agree to less advantageous terms. If an employment contract contains provisions that do not comply with the minimum terms of service as set out in the *BCEA*, Sectoral Determination or main collective agreement in the case of a bargaining council, these provisions will be invalid and unenforceable.

## Probationary period

Another important aspect that should be part of an employment contract is whether the employee's employment is subject to a probationary period. If the employment contract does not contain any provisions regarding a probationary period, an employee's employment will not be subject to it.

The decision to include a probationary period in an employment contract is not stipulated by law but rests with the employer and employee. This is an example of a condition of employment that the parties to an employment contract can voluntarily agree on. If the employee's employment is subject to a probationary period, certain legal requirements apply.

An employee's main duties and responsibilities must also be clearly stipulate in the employment contract. The employee's duties and responsibilities, as set out in the employment contract, serves as the basis for evaluating his or her work performance. If the employment contract makes no mention of the employee's duties and responsibilities, an employee's work performance cannot be evaluated effectively.

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, email James Pretorius at james@lwo.co.za, info@lwo.co.za, or visit *www.lwo.co.za*

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# LOADER PROMOTION*

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## X-SERIES (HEAVY DUTY LOADER)

- Parallel lift
- ± 500 Cycle hours per annum
- Rated for tractors from 30 - 120hp
- Lift capacity, from 1520kg up to 1680kg
- Mechanical joystick control
- 3 Models on offer

**OPTIONAL EQUIPMENT**

- Soft Drive suspension

**NOTE:** Not suited for dairy farming activities.

**PROMOTION PRICE INCLUDES THE FOLLOWING:**

| LOADER | ± TRACTOR SIZE | BUCKET | SUB-FRAME | HYDRAULICS | MECH. JOYSTICK |
|---|---|---|---|---|---|
| X3s | (50 - 80hp) | GM 140 (540L) | ✓ | ✓ | ✓ |
| X4s | (60 - 100hp) | SM 160 (760L) | ✓ | ✓ | ✓ |
| X5s | (70 - 120hp) | SM 160 (760L) | ✓ | ✓ | ✓ |

## Q-SERIES (EXTRA HEAVY DUTY LOADER)

- Parallel lift
- ± 2000 Cycle hours per annum
- Rated for tractors from 80 - 280hp
- Lift capacity, from 1920kg up to 2490kg
- Mechanical joystick control
- 4 Models on offer

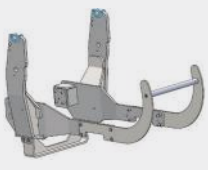
**OPTIONAL EQUIPMENT**

- Soft Drive suspension
- Electronic joystick control
- 3rd Function
- Q-companion

**PROMOTION PRICE INCLUDES THE FOLLOWING:**

| LOADER | ± TRACTOR SIZE | BUCKET | SUB-FRAME | HYDRAULICS | MECH. JOYSTICK |
|---|---|---|---|---|---|
| Q4s | (80 - 140hp) | SM 160 (760L) | ✓ | ✓ | ✓ |
| Q5s | (100 - 180hp) | SM 180 (860L) | ✓ | ✓ | ✓ |
| Q6m | (120 - 220hp) | SM 180 (860L) | ✓ | ✓ | ✓ |
| Q7m | (140 - 280hp) | SM 220 (1060L) | ✓ | ✓ | ✓ |

**SUB-FRAMES IN STOCK FOR SPEEDY DELIVERY** (MODELS NOT LISTED, MADE TO ORDER.)



Sub-Frame

| IN STOCK | MODELS NOT LISTED |
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| 2) JOHN DEERE 5090E | |
| 3) JOHN DEERE 5075E | |
| 4) JOHN DEERE 6140M, 6150M, 6155M | |
| 5) NEW HOLLAND T6050 | |
| 6) MASSEY FERGUSON 275 XTRA | |

**RANGE OF IMPLEMENTS ON OFFER** (ENQUIRE)

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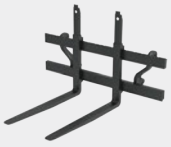
X- & Q-Series

**LIFTING EQUIPMENT**

Q-Series



X- & Q-Series

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**BALE IMPLEMENTS**

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