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OILSEEDS *focus*

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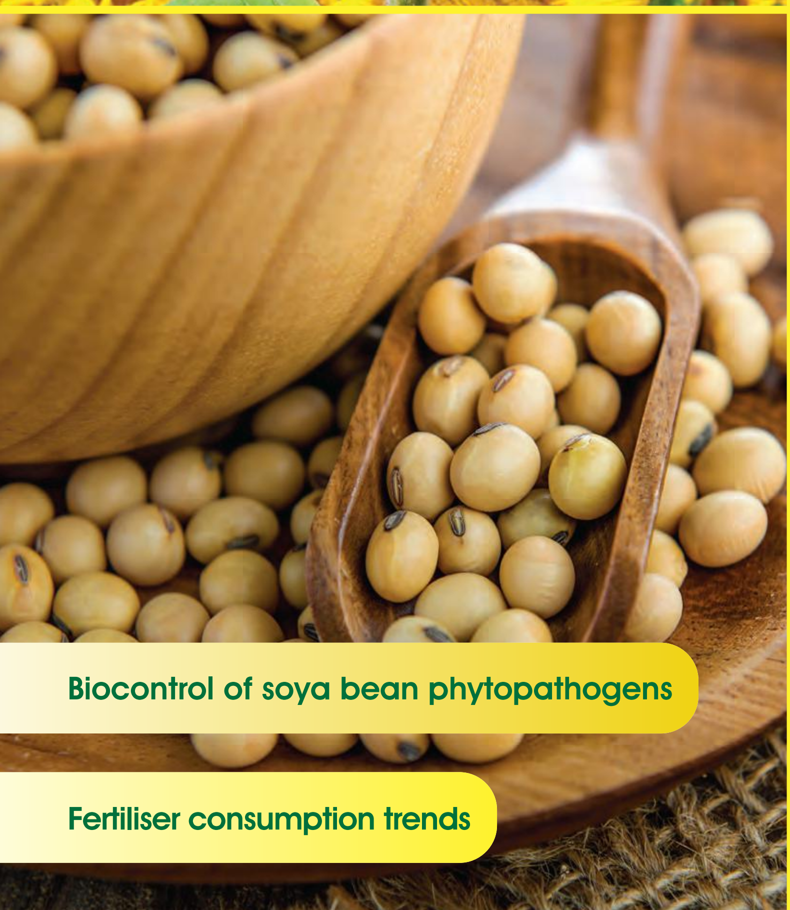

Biocontrol of soya bean phytopathogens

Fertiliser consumption trends

Innovation in *Sclerotinia* management

Nutritional quality of oilcake meal

Continued growth of oilseed production in South Africa

By Kellie Becker, managing director, Southern Oil (Pty) Ltd

The oilseeds sector in South Africa has seen considerable growth in recent years. While sunflower oil production has been fairly stable, soya bean oil production has increased tenfold, and canola oil production sevenfold over the last two decades. This increase in production has led to a reduction in annual oil imports from 920 000 tonnes to approximately 650 000 tonnes in the last five years.

Despite this progress, South Africa still relies on imports to meet edible oil demand. Protein meal production is approaching self-sufficiency, but the market remains vulnerable to supply-demand imbalances. While price discovery continues to follow global import and export parity levels, domestic factors such as logistics, exchange rates, and storage infrastructure often complicate this relationship. In certain seasons, market dynamics shift rapidly from surplus to shortage, causing price volatility and import needs.

Oversupply challenges

Around 2010, oil meal imports exceeded 1,2 million tonnes. That figure has now dropped to approximately 100 000 tonnes, reflecting South Africa's progress towards self-reliance. However, oversupply challenges persist, particularly in seasons marked by strong soya bean and sunflower harvests.

High-volume crushing, if not aligned with market absorption capacity, results in excess oilcake and meal. This oversupply leads to inventory accumulation, which adds additional costs. In an efficient market, these surpluses would be mitigated through exports. Instead, we are observing prolonged and significant supply pressure, causing industry sustainability questions.

Opportunities for local substitution

The market for dedicated canola oil is growing but remains smaller than current production. Surplus canola oil has traditionally been used as a substitute for other soft oils. With the growth in local oilseed production, together with the lower consumption of the last few years, the soft oil market is at least seasonally well supplied.

With the slowdown in the growth of palm oil production, the less attractive pricing of tropical oils of late might become a more frequent occurrence. This creates a potentially viable market for replacement with locally produced soft oils such as canola.

Strong support for local supply, especially amid periods of global uncertainty such as those seen of late, and the right government incentives coupled with sustainable local supply, can transition towards greater consumption of domestically produced oils. Doing so would not only reduce the country's import bill, but also enhance the value derived from existing oilseed crops.

The global village

The high cost of road freight in South Africa weighs heavily against exports. Even with the known restrictions at South African ports, oilseeds and their products are becoming more accessible to international markets. To minimise the effects of oversupply in the local market, we need to be aware of international opportunities as well as product specifications and requirements. By doing so, the market space for oilseed production will continue to grow and the associated benefits will remain.

Kellie Becker.

At Southern Oil (Pty) Ltd (SOILL), we remain committed to this vision. We see canola not only as a crop, but as a catalyst for value creation – not only for the oilseed sector, but for the broader agricultural economy. As we look ahead, our task is clear: Strengthen the systems that connect us and ensure that the value we create is shared across the chain – from soil to consumer.

For more information, send an email to info@soill.co.za.

The evolution of the soya bean crushing industry and meal quality in South Africa

Investment in South Africa's soya bean crush capacity, followed by a significant increase in soya bean production, began in earnest in 2010. From a base of approximately 300 000 tonnes of soya bean produced in 2005 and a dedicated crush of 360 000 tonnes, capacity has grown to an estimated 2,6 million tonnes with a record crop of 2,8 million tonnes in 2022/23.

Early broiler trials in 2018 for South African soya bean meal produced at COFCO in Standerton demonstrated a consistent outperformance of locally produced soya bean meal when compared to Argentine meal, despite higher variability. It took the industry time to adjust to the new norm, with some companies embracing the new availability and cost savings after commercial trials had demonstrated the advantages. This despite the *in vitro* quality analysis indicating that the meal was not as severely processed as its counterpart imported from Argentina.

In 2000, Evonik began to publish excellent work on the negative effects of amino acid availability in overprocessed soya bean meal. This resulted in a global focus on evaluating the negative effects of overprocessing. Unfortunately, traditional processing quality tests such as trypsin inhibitor activity and urease activity that measure underprocessing, have demonstrated very poor – if any – correlation with broiler performance.

Quest for superior quality

Recent research conducted at the University of Madrid in Spain – and again at Stellenbosch University (SU) – has shown South African soya bean meal being among the best in the world despite *in vivo* quality tests and higher variability than Argentine meal.

To date, amino acid digestibility and metabolisability appear to be the best current predictor of broiler performance in the narrow range of commercially available soya bean meals. Thus far no rapid *in vitro* analysis has proven to be an accurate predictor of how various soya bean meals will perform in the fine-tuning of broiler production performance. There is a significant amount of work to be done, and the challenge is to establish a rapid test that is an accurate predictor of how various soya bean meals will perform in broiler diets.

With the growth of local soya bean meal usage increasing from 92 000 tonnes (12% of requirement) in 2005 to 1,3 million tonnes last year (89%) of the required amount, the constant quest for superior quality remains an industry goal. Current trials being conducted at SU, funded by the Oilseeds Advisory Committee and the Oil and Protein Seeds Development Trust, aim to make a significant contribution.

Dr Erhard Briedenhann

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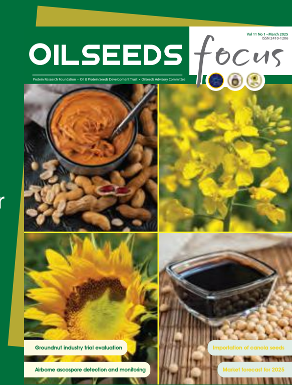

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Slight uptick in tractor sales

April tractor sales of 527 units were approximately 5% more than the 500 units sold in the same month last year. Year-to-date tractor sales are now almost 22% up on last year. A total of 46 combine harvesters were sold in April, 20 more than the 26 units sold in April last year. On a year-to-date basis, combine harvester sales are now approximately 37% up on last year.

The late rains have caused problems with harvesting of most summer crops. However, market sentiment is still positive, with producers waiting to see what the yields and quality of their harvests are going to be once they have harvested their crops. This will delay the whole season, going into soil preparation for the forthcoming summer crops. Sales of agricultural machinery are therefore likely to be delayed due to this. However, commodity prices are still holding up in most cases.

Current predictions are that tractor sales will be similar, or marginally more, than the 6 463 units sold last year. Combine harvester sales this year also look as though they will be higher than the 201 machines sold last year. – *South African Agricultural Machinery press release*

China's soya bean imports hit decade low

China's soya bean imports plunged to a ten-year low as prolonged customs clearance delays and late Brazilian shipments caused by harvest slowdowns and logistics issues disrupted the usual flow of cargoes, traders and analysts say.

The customs delays have severely strained China's oilseed processing sector from April through early May, tightening soya meal supplies for its vast livestock industry. At the time of going to press soya bean cargoes took 20 to 25 days to move from ports to crushing plants, up from the usual seven to ten days, according to four traders, who were granted anonymity given the sensitivity of the issue in China.

By May, several crushing plants in northern and northeastern China had to cut output or halt operations due to backlogs, a trader and analyst said, adding that some feed mills ran out of stock and turned to costly spot cargoes.

To date, there has been no official acknowledgement of delays, which come amid the trade war between China and its second-largest soya bean supplier. China's customs did not immediately respond to questions about the delay.

While crushing activity is gradually recovering, market participants remain cautious about potential port congestion if delays persist. From January to April, soya bean arrivals totalled 23,19 million tonnes, reflecting a 14,6% decline from the 27,15 million tonnes recorded in the same period last year. – *Reuters*

New filter medium to combat microplastics

Four college students spent nine months developing a potential solution to a problem many have not even heard about yet. The goal of the Soy-Logical Filter Media team in the 2025 Student Soybean Innovation Competition was to develop an environmentally friendly filter medium using soya beans to remove microplastics during water treatment processes.

According to the team's research, 60% of fish globally contain microplastics, and adults in the United States (US) consume huge numbers of microplastic particles. Possible ill effects of microplastics are reported more frequently in the press today.

The student team created a biological filter by using soya bean hulls and epoxidised soya bean oil. They calculated that making this filtering medium for just one commercial trickling filter project would consume around 3 175kg of soya bean hulls and 8 706ℓ of soya oil.

Whether or not a commercial soya biological filter ever reaches the market, soya bean growers in Indiana in the US believe the Student Soybean Innovation Competition is a valuable programme. – *Farm Progress*

Peanuts pack a punch

In a recent study published in the journal *Antioxidants*, a research team in Spain explored whether consuming peanuts, which are rich in antioxidants, can influence telomere length in young, healthy individuals.

Telomeres are protective structures at the ends of chromosomes that shorten every time a cell divides. Their length is considered a marker of biological ageing. Accelerated telomere shortening is linked to an increased risk of age-related diseases, including cardiovascular conditions, type 2 diabetes, and certain cancers.

The study found that after six months, the group consuming skin-roasted peanuts showed a modest but statistically significant increase in telomere length compared to the control group. In contrast, peanut butter consumption did not produce significant changes relative to the control.

The authors proposed that whole peanuts, unlike processed peanut butter, may promote gut microbiota-derived short-chain fatty acids, which were previously linked to lower cortisol and depression biomarkers in the same trial.

"These findings highlight the importance of whole foods over processed alternatives in promoting cellular health," the authors said. They emphasised the need for longer trials in diverse populations, particularly older adults, to validate these results. – *News Medical*

Argentina's soya harvest stalls

Argentina's already-delayed soya harvest has stalled further following heavy rains and high humidity in the nation's main agricultural regions. Harvesting in Argentina, the world's largest exporter of soya bean oil and meal, had already fallen behind after rains in March and early April. The delays could hurt the crop, with the high moisture increasing the risk of fungus.

Sales of the crop fell to their slowest pace in 11 years in April due to the rains and industry uncertainty following the lifting of capital controls, which affected exchange rates. They picked back up by the end of April, hitting their highest weekly pace of the season with 1,21 million metric tonnes of the crop sold, government data showed.

Sales typically tick up around May, with producers needing the funds to start wheat planting. The boost is good news for the government of libertarian President Javier Milei, which has pushed for producers to sell their crops to exporters. – *Successful Farming*

FAO wins prize for project in Zim

In May, the Food and Agriculture Organization of the United Nations (FAO) was awarded at the Group on Earth Observations Sustainable Development Goals (GEO SDG) Awards for its sustained effort to help Zimbabwe use satellite-tracked evidence to improve its crop production data.

The EOSTAT-Zimbabwe project, buoyed by funding from the African Development Bank (AfDB), was launched in 2023 to operationalise the use of earth observation data for agricultural monitoring, food security planning, disaster risk reduction, and assess the impacts of climate-related hazards.

The project has already generated Zimbabwe's first national winter wheat map, covering 28 districts, with 95% overall accuracy, and 96% precision for wheat classification. It also led to production of the first national summer crop type map, classifying 14 major crops with 77% overall accuracy, using the Sen4Stat system and Sentinel-2 data.

The tools allow for lower-cost and higher-accuracy assessments of crop acreage and other factors. A national Mapathon organised with the National University of Science and Technology contributed to the digitisation of over 200 000 crop fields across seven districts. – *FAO*

Diseases threaten grain harvests

Extraordinarily high rainfall in North West and the Free State resulted in waterlogged conditions, significantly impacting crop health and production practices. Gerrie Ludick, technical marketing specialist at InteliGro, says the past season was unique as all the disease triangle factors were present in maize, sunflower, and soya bean. The combined effect of heavy rain and wet conditions triggered the outbreak of diseases, especially *Fusarium* infections which act as primary pathogen and are primarily found in soil. It takes on various forms such as root rot, crown rot, stem rot, and head rot.

Several foliar diseases are currently active in sunflower, with *Alternaria* leaf spot being the most threatening – this aggressive disease can destroy a harvest within a week once the disease triangle has been completed. *Septoria* leaf spot exhibits similar symptoms, but is less aggressive, while white and brown rust are also occurring – white rust has a big impact on more susceptible varieties. Stem diseases such as *Alternaria, Septoria* and black spot are often accompanied by *Fusarium* root and stem rot, which can lead to head rot. – *Christal-Lize Muller, Plaas Media*

Biocontrol of soya bean phytopathogens: Prospection of soil samples and selection

By LEC Diniz, VB Moreira, GGP Fantinato, GJ Zocolo, ION Lopes and CDS Seixas

Soya bean diseases are among the factors that prevent a crop from reaching its full yield potential and can affect it from germination to the end of pod filling. These diseases can be caused by fungi, bacteria, viruses, and nematodes (Seixas *et al*., 2020).

To avoid losses, several management strategies should be adopted, considering the common diseases found in the crop area. The use of certified and/or treated seed can prevent the introduction of pathogens into the area. Where available, the use of resistant and/or tolerant varieties is a viable option that can help reduce costs by reducing the use of pesticides.

Other recommended strategies are good soil management, correcting and fertilising according to soil analysis, paying attention to the sowing season, respecting the fallow period in the case of Asian rust, using pesticides correctly, and avoiding successive soya bean crops with crop rotation/diversification (Hartman *et al*., 2015; Godoy *et al*., 2016; Seixas *et al*., 2020).

Using biological agents

The use of biological products is also a viable option, and their use is increasing. Biocontrol agents are antagonistic micro-organisms with the potential to interfere with the survival and/or growth of pathogens. The mechanisms of action are divided into antibiosis, resistance induction, parasitism, predation, competition, and growth promotion – a micro-organism can act by more than one mechanism (Medeiros *et al*., 2018). In addition, micro-organisms can act in the processes of nutrient solubilisation (Richardson, 2009) and/or growth promotion (Woo *et al*., 2014; Monte *et al*., 2019). These are not mechanisms directly related to parasitism.

The effects of biological agents are directly related to the strain of micro-organism and its formulation, which ensures optimisation of effects in the field, stability of the agents, compatibility with other products, use of lower doses, reduction of toxicity effects, ease of application, and longer shelf life. These characteristics are fundamental in allowing the biological product to be introduced as a control strategy, along with other strategies (Borsari; Vieira, 2022). Most products on the market are based on fungi and/or bacteria.

Bacteria are the largest group of micro-organisms found in soil. Some species can produce antibiotics, while others have antagonistic activity against phytopathogens (Siqueira, 1988).

The first step in obtaining a bioproduct is prospecting, which consists of searching for strains capable of interfering with the survival or growth of the target micro-organism.

The aim of this work was to verify *in vitro* the potential of bacterial strains obtained from soil samples from different locations to control soya bean phytopathogens.

Material and methods

The work was carried out at the Phytopathology Laboratory of Embrapa Soybean in Londrina, Paraná in Brazil. The micro-organisms studied were part of Embrapa Soja's collection of micro-organisms of agricultural interest (CMES).

Eighty-six bacterial strains from soil samples collected in different municipalities of Paraná were evaluated. These strains were tested for control of the fungus *Neocosmospora phaseoli* (syn. *Fusarium brasiliense*) (red root rot), isolate CMES 04; *Cercospora canescens* (cercospora blight), CMES 2159; *Corynespora cassiicola* (target spot and corynespora root rot), CMES 980; *Macrophomina phaseolina* (charcoal rot), CMES 2129; *Sclerotinia sclerotiorum* (white mould), CMES 2250; *Colletotrichum truncatum* (anthracnose), CMES 1080; and *Rhizoctonia solani* (*Rhizoctonia* fall and death), CMES 1796.

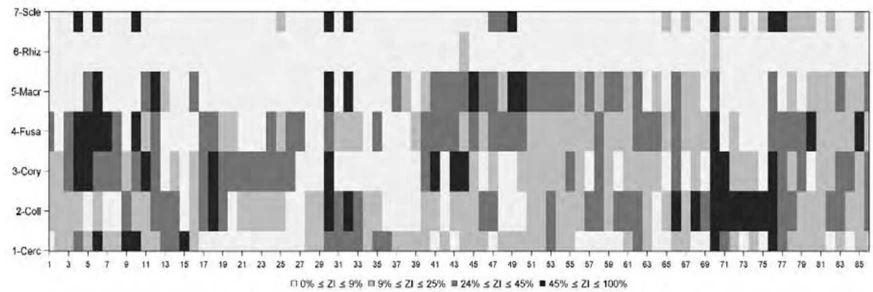
The paired culture method, which directly compares the micro-organisms in the culture medium, was used. The phytopathogenic fungi were grown in BDA medium at 25°C for seven days. The bacteria were grown in TSA medium at 28°C for 72 hours. At the end of this period, a suspension of each bacterium was prepared by adding 5mℓ sterile saline to the plate and homogenising with a Drigalski loop.

Mating was carried out by transferring a 4mm diameter disc of fungal mycelium to the centre of Petri dishes containing BDA medium. At eight points equidistant from the mycelium disc, 5µL of bacterial suspension was added. Plates containing only the phytopathogen were used as controls. The test was carried out in triplicate and the plates were incubated for seven days at 25°C with a 12-hour photoperiod in a growth chamber.

After seven days of incubation, the radius of the phytopathogen colony was measured in the presence and absence of the bacteria. The zone of inhibition (ZI) of each bacterium against each fungus was calculated according to Campanile *et al*. (2007), using the formula (ZI)% = (N1-N2) \ N1 x 100 where N1 is the radius of the colony found in the absence of the antagonist, and N2 is the growth of the mycelium in the presence of the antagonist.

It is important to note that ZI is by nature a relative variable and therefore the values are comparable between the different fungal species. The zone of inhibition data was subjected to analysis of variance. Based on this analysis, least squares estimates were obtained for the ZI means. These estimates, together with a categorical identification variable resulting from the combination of fungal and bacterial identification, were used as input to Ward's hierarchical clustering algorithm (Ward, 1963).

Figure 1: Zone of inhibition of the 86 bacteria against the phytopathogenic fungi *Cercospora canescens* (1-Cerc), *Colletotrichum truncatum* (2-Coll), *Corynespora cassiicola* (3-Cory), *Neocosmospora phaseoli* (4-Fusa), *Macrophomina phaseolina* (5-Macr), *Rhizoctonia solani* (6-Rhiz), and *Sclerotinia sclerotiorum* (7-Scle).



Results

All the bacteria tested had some effect, greater or lesser, on the fungi. The dendrogram generated by Ward's algorithm showed two groups of fungus-bacteria pairs, the first containing pairs with ZIs equal to or less than 25% and the second containing the rest. Within each of these groups, it is possible to obtain other divisions containing pathogen-antagonist pairs with ZIs that are more similar to each other.

The final number of groups was set at four, with the first two groups containing pairs with ZIs of 0 to 9% and 9 to 25%, respectively. The other two groups contained pairs with ZIs of 24 to 45%, and 45 and 100%, as shown in *Figure 1*. Considering the inhibition range of 45 to 100%, 30 of the 86 bacteria stood out when confronted with at least one fungus. Only for *Rhizoctonia solani* the maximum inhibition was in the 9 to 25% range, with bacteria 44 and 70.

The strain 70 was able to affect all seven fungi, five in the 45 to 100% inhibition range (*Cercospora canescens, Colletotrichum truncatum, Corynespora cassiicola, Neocosmospora phaseoli, Sclerotinia sclerotiorum*). The bacteria strains 30 and 76 affected four fungi in the 45 to 100% inhibition range; the strain 30 affected *Colletotrichum truncatum, Corynespora cassiicola, Macrophomina phaseolina* and *Sclerotinia sclerotiorum*, while bacteria strain 76 affected *Cercospora canescens, Colletotrichum truncatum, Corynespora cassiicola* and *Sclerotinia sclerotiorum*.

Looking at the results for each fungus in the 45 to 100% range, six bacteria were able to inhibit *C. canescens* (6, 9, 10, 15, 70, and 76); 12 inhibited *C. truncatum* (18, 30, 32, 66, 68, 70, 71, 72, 73, 74, 75, and 76); 11 inhibited *C. cassiicola* (4, 5, 11, 18, 30, 41, 43, 44, 70, 71, and 76); eight inhibited *Neocosmospora phaseoli* (4, 5, 6, 7, 10, 70, 80, and 85); seven inhibited *Macrophomina phaseolina* (6, 12, 30, 32, 45, 49, and 50); and nine inhibited *Sclerotinia sclerotiorum* (4, 6, 10, 30, 32, 49, 70, 76, and 77).

This *in vitro* test will be repeated. In each case, the 30 bacteria that inhibited one or more fungi in the upper part of the inhibition zone (45 to 100%) will be identified by sequencing. If they belong to species that do not present any risk, they will be subjected to other types of tests and may also be analysed for the identification and use of their metabolites in the control of phytopathogens.

Conclusion

Several bacteria were able to affect phytopathogenic fungi. This was a first step in verifying the potential of this group of bacteria. *In vivo* tests need to be carried out to confirm any significant effect on fungi, and to develop new biological fungicide.

For more information or references, send an email to Leandro Diniz at leandro.diniz@embrapa.br.

Enhancing sunflower head rot assessments with a purpose-built visual tool

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

Sunflower head rot (SHR), caused by *Sclerotinia sclerotiorum*, reduces yield and seed quality. In South Africa, SHR affects key sunflower regions such as North West, the Free State, and Mpumalanga, especially under cool, wet conditions during flowering and grain filling. Understanding its impact remains difficult without a consistent method to score head rot intensity, making accurate and standardised measurement essential for guiding research and management efforts.

Accurate and precise measurements of disease help estimate yield losses, evaluate control strategies, support predictive modelling, inform management decisions, and justify funding by demonstrating economic impact.

Researchers often focus on incidence, which is a count of how many plants are diseased out of the total number of plants evaluated. However, this only provides a partial view of the disease's impact. For example, high incidence does not always translate to high infection and yield loss if the affected plants have low severity.

From field trials we conducted in 2023/24, there was a moderate negative correlation between the incidence of sunflower head rot and the yield of sunflowers (*Figure 1*). Measuring severity, which is how much tissue of the sunflower head is infected, may give us a clearer understanding of the actual impact compared to incidence.

Accurate and consistent data

This leads to the practical question: How do we turn visual perceptions of disease into usable data? The process of visual assessment depends on an individual's judgement to estimate disease severity based on what they see, drawing from their perception experience and sometimes requiring a rough guess of how much tissue is infected. Often, this is the quickest method for performing disease severity assessments during experimental evaluations.

While this is an advantage of visual estimates, they are prone to errors and compromise reliability, which is the extent to which repeated estimates under different conditions produce similar results. Differences can occur between raters (known as inter-rater reliability) when estimating disease severity on the same affected plant, reducing consistency between raters. Additionally, a single rater might show greater variation in their ratings of the same plant organ over time (known as intra-rater reliability), which impacts their individual consistency.

This inconsistency can stem from the subjective interpretation of symptoms, such as lesions' size, shape, or colour, which can vary even on the same plant organ. The experience and training levels of raters in identifying symptoms and giving a disease estimation can influence the accuracy of their ratings. Other factors, such as lighting conditions at assessment times or fatigue during long hours of disease rating, can reduce the consistency of estimates.

These challenges highlight the need for an improved method to ensure disease severity is more accurately and consistently estimated, especially when symptoms are as variable as those in SHR. To meet this need, standard area diagrams (SAD) offer clear, standardised reference points of severity visualised as illustrations or photographs to support consistency across different individuals.

SADs minimise subjectivity in visual assessments, making plant disease evaluations more reliable and comparable across raters and studies. Improved consistency helps increase accuracy, which is how close estimates are to actual severity. It also enhances precision by bringing estimates closer to the actual value and reducing bias, such as over- or underestimation.

Utilising standard area diagrams

Developing a SAD must follow a purposeful and evidence-based process grounded in real disease expression to ensure these benefits in practice. Plant organs displaying a range of disease

Figure 1: Relationship between head rot incidence and sunflower yield across three planting dates in Delmas.

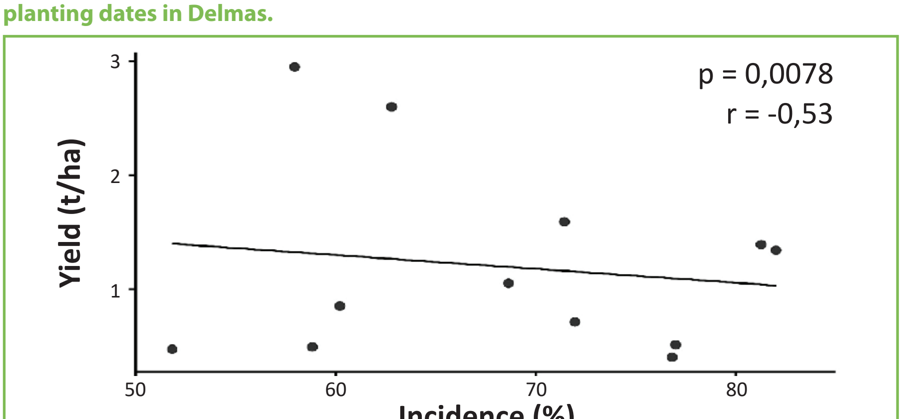
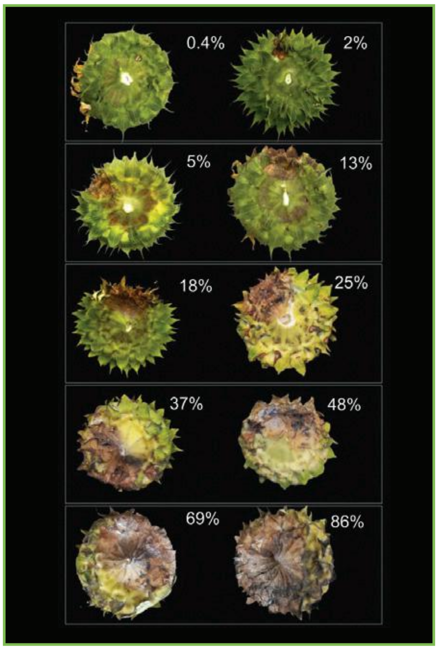


Figure 2: Severity measurement of head rot in ImageJ software, where the red area represents tissue which is considered diseased.

Figure 3: A standard area diagram (SAD) that evaluates the severity of *Sclerotinia* head rot (SHR) on the back of sunflower heads inoculated with *Sclerotinia sclerotiorum*. The values enclosed in the frames denote the actual severity values measured for each respective sunflower head picture.



severity levels are photographed and then measured for actual disease severity using computer-based image analysis tools, such as ImageJ (*Figure 2*). Based on the frequency and distribution of observed severity, selected images are arranged to represent incremental severity values likely to be encountered in the field.

We designed the SAD for SHR using 212 photographs, each analysed for actual tissue damage using ImageJ. The selected images were then arranged to represent a scale of disease severity as shown in *Figure 3*. To illustrate the effectiveness of the SAD, we validated it by asking 16 individuals to rate the severity of head rot, first without a visual aid and then using the SAD.

Once a SAD has been validated, the focus shifts to ensuring it is correctly utilised in practice. Start by visually inspecting the diseased area on the sunflower head you are assessing. Then, compare it to the reference images in the SAD, each representing a specific, predefined severity level. Choose the image with the severity value that most closely matches the severity observed in your sample. (Although SADs are valuable tools for improving disease assessments, they should be accompanied by proper training on recognising the specific disease symptoms and understanding how to apply the scale.)

Conclusion

The designed SAD will be utilised in future field evaluations, supporting fungicide evaluation efforts, and improving our understanding of how severity levels relate to yield outcomes. This data will be incorporated into a decision-support tool to help producers evaluate the return on investments when choosing the timing of intervention. Beyond these applications, the SAD holds potential value for plant breeders, researchers, and extension personnel seeking a method to evaluate disease more consistently across environments and with many raters.

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

Developing innovation in *Sclerotinia* management

By Dr Godfrey Kgatle, research coordinator, Grain SA

In South Africa, *Sclerotinia sclerotiorum* remains a formidable pathogen, affecting a wide range of crops, particularly canola, soya bean, and sunflower. Its economic impact is substantial, leading to significant yield losses when conditions are favourable for disease development. In response to this ongoing threat, the South African Sclerotinia Research Network (SASRN) was established in 2018 as a collaborative platform to coordinate and advance research, surveillance, and integrated disease management strategies.

The network has evolved steadily since its inception, uniting producers, researchers, agronomists, government officials, and industry stakeholders. A notable milestone was the November 2022 Grain SA article titled "Tactics to disrupt *Sclerotinia*", which presented insights from the *Sclerotinia* Day discussion and emphasised that successful management begins with thoroughly understanding the pathogen.

Guiding principles

Two key aspects were highlighted: The greatest contributors to *Sclerotinia* disease development are cool, wet environmental conditions and a susceptible host, typically one that is flowering or wounded; and understanding the pathogen's life cycle (from apothecia formation to spore release, infection, and sclerotia formation) enables producers to apply precise tactics to disrupt its progression.

As a result, four guiding principles were outlined for managing the disease, namely avoidance, exclusion, eradication, and chemical control. These strategies continue to inform ongoing efforts, especially in aligning cultivar development, biological control, and optimised chemical use with precision agricultural technologies.

Since 2018, the initial and core funder of SASRN has been the Oil and Protein Seeds Development Trust (OPDT). Other funders that have since contributed to the research in this network, due to research coordination from Grain SA, are the Department of Science, Technology and Innovation (DSTI), the Technology Innovation Agency (TIA), and the South African Cultivar and Technology Agency (Sacta).

This funding has allowed institutions such as the Agricultural Research Council (ARC), the Western Cape Department of Agriculture (WCDoA), the University of the Free State, the University of Pretoria, and Grain SA to continue providing scientific and field-based contributions. These include long-term cultivar evaluations, soya bean breeding programmes, biological trials, and other collaborative studies. The Free State region has been especially active through its monitoring and trial sites, offering vital data on disease dynamics in commercial production areas.

New SASRN-coordinated projects

As part of SASRN's strategic research coordination, Grain SA is managing several new projects aimed at addressing *Sclerotinia* from different angles. These projects bring together disciplines such as plant physiology, pathology, and agronomy, supported by both public and private stakeholders.

In the **canola surveillance project**, the WCDoA has been monitoring *Sclerotinia* stem rot of canola in the Western Cape for several years. Valuable information on the incidence of this important disease on canola has been gained from collaborating producers' farms and trials. Through numerous trials, farmers' days, and training sessions, awareness of the disease is being raised every season. Another spin-off from this monitoring project is that data is being shared with Stellenbosch University (SU) which is conducting a project to build a *Sclerotinia* prediction model, a first of its kind for the canola industry in South Africa.

The **disease monitoring of national cultivar trial project** focusses on mapping the presence and severity of *Sclerotinia* in sunflower and soya bean national

1a: Sclerotinia head rot on sunflower. 1b: A Sclerotinia-affected soya bean stem. 1c: Soya bean from a field heavily infected with Sclerotinia diseases.

cultivar trials. Led in collaboration with the ARC and regional researchers, field surveillance was expanded last year to include the Free State and North West provinces. Data from these trials is vital for evaluating cultivar susceptibility, understanding disease distribution, and assisting in cultivar recommendations under disease pressure. Disease distribution will also be crucial for biosecurity monitoring and export market negotiations.

Timing is critical in *Sclerotinia* management. The **manipulation of flowering time for disease avoidance project** investigates the use of plant growth regulators to manipulate crop phenology. Specifically, salicylic acid and 1-naphthalene acetic acid have shown promising effects in inhibiting *Sclerotinia* growth *in vitro* while also delaying floret development in sunflowers, potentially shifting flowering outside high-risk infection periods.

Paclobutrazol, a known gibberellic acid inhibitor, is also being studied for its role in modifying plant height and flowering time, which may reduce canopy humidity and delay floret exposure during pathogen-favourable conditions. This work not only builds on physiological manipulation strategies, but also expands on the 2022 'avoidance' tactic by linking plant development more strategically with environmental risk periods.

In the **polymer application to limit *Sclerotinia* infection project**, a novel approach is being piloted using biodegradable polymers applied to flowering heads or stems to form a physical barrier. This strategy aims to prevent the germination of apothecia on susceptible plant tissues, particularly under high humidity conditions. If successful, it may offer a new environmentally friendly tool for integrated *Sclerotinia* control.

With increasing demand for registered and reliable fungicides for *Sclerotinia* control in sunflower, the **sunflower fungicide registration trial project** evaluates active ingredients from eight companies, including several biological formulations. A notable aspect is the inclusion of products from the Ukraine formulation programme, bringing international innovation to South African conditions. The trials focus on timing, efficacy, and compatibility with current agronomic practices. These trials are important for expanding the portfolio of control options available to producers and ensuring that registered products meet the performance needs under field conditions.

WCDoA and Stellenbosch University teams conducting Sclerotinia stem rot evaluations in the Western Cape.

Technological advancements

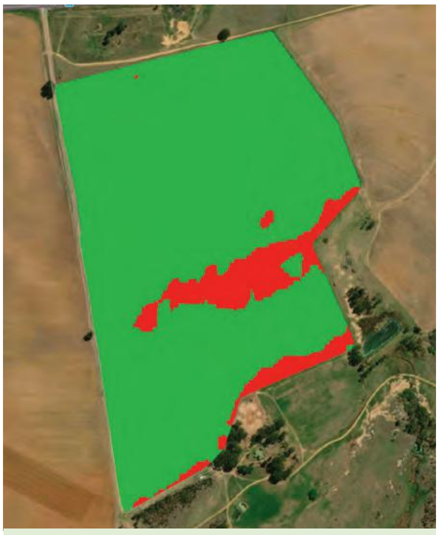
One of the most exciting developments in *Sclerotinia* management is the integration of new technologies such as drone or satellite imaging for scouting, and drone technology in fungicide application. Satellite or drone imaging and remote sensing are now supporting crop scouting. High-resolution imagery helps identify stress hotspots as well as early canopy closure, both of which are critical for anticipating *Sclerotinia* risk. These tools, combined with ground verification, allow for better disease forecasting and more targeted management decisions.

Omnia Nutriology® developed *Sclerotinia* detection algorithms using high resolution satellite imagery. These algorithms help to scout for *Sclerotinia* by detecting areas of plant stress through low

Drone image of a soya bean field infected with Sclerotinia diseases.

vegetation indices – such as the normalised difference vegetation index (NDVI) and leaf area index (LAI) – which may indicate early infection symptoms such as wilting or yellowing. This allows for targeted ground-truthing and monitoring of disease progression over time, improving scouting efficiency and response.

Additionally, drone precision application allows for better coverage at the correct phenological stage, particularly in canola, soya bean, and sunflower, where dense canopies hinder ground-based spraying. The wind propulsion of the drones allows the rows to open, exposing the basal parts of the plant to the fungicides at far lower water volumes compared to traditional sprayers, which require hundreds of litres of water per hectare. Drones also reduce soil compaction and can access fields that are otherwise inaccessible after rainfall, often the same period when fungicide applications are most critical.



NDVI
- **High-risk *Sclerotinia* (4,248ha – 9,6%)**
- **Low-risk *Sclerotinia* (39,979ha – 90,4%)**

Sclerotinia probability map created by Omnia Nutriology®.

Committed to research

SASRN continues to serve as a vital cornerstone in the country's efforts to manage and mitigate the impact of *Sclerotinia* diseases. Funders and researchers in this network are committed to meeting on a quarterly basis to align and ensure that *Sclerotinia* research is impactful to producers.

By fostering collaboration among researchers, institutions, government, and industry stakeholders, SASRN has created a platform that accelerates the development and implementation of practical, science-based solutions. From strategic disease monitoring and cultivar evaluation to the innovative use of plant growth regulators, polymers, and drone-assisted fungicide applications, SASRN's coordinated approach ensures that research translates into real value on the ground.

For producers, the benefit is twofold: Access to cutting-edge tools and knowledge that enhance disease control, and the confidence that national trials and policies are backed by credible research tailored to South African conditions.

As the climate and cropping systems continue to evolve, the work of SASRN will remain critical in safeguarding yields, improving sustainability, and ensuring that the grain industry is equipped to face future plant health challenges with resilience and innovation.

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From signal to symbiosis: Empowering nodulation and nitrogen fixation through *Bradyrhizobium* technologies

By Nadine Loubser and Jonathan Etherington

Soya beans (*Glycine max*) are a cornerstone of global agriculture, valued for their versatility, nutritional profile, and unique ability to fix atmospheric nitrogen through a symbiotic relationship with *Bradyrhizobium* soil bacteria.

Their capacity for biological nitrogen fixation (BNF) not only enhances soil fertility but also reduces the need for synthetic fertilisers, making them a sustainable choice in modern farming systems. The effectiveness of BNF is affected by various factors and can be improved by certain key aspects discussed in this article.

Importance of bacterial numbers

The number of bacteria present on seeds directly affects the efficiency of nitrogen fixation in plants. Internal benchmarks have been established to define the minimum bacterial concentration required on seeds for optimal nitrogen fixation. In addition, the concentration quality of the inoculant significantly affects the number of dry nodules formed, which in turn impacts the overall efficiency of nitrogen fixation.

MBFi has developed a suite of advanced technologies to ensure that the optimal number of viable bacteria is delivered to seeds and that inoculants maintain a high quality and an extended shelf-life.

Formation and number of nodules

Soya bean plants secrete flavonoids into the soil, which act as chemical signals to attract Rhizobia and trigger the expression of nodulation (nod) genes in the bacteria. This, in turn, leads to the production of nod factors – key molecules required to initiate nodule formation.

The direct application of purified nod factors to plant roots can mimic this natural signalling process, inducing root hair curling and nodule initiation even in the absence of Rhizobia. This method can be used to stimulate early nodulation under controlled conditions.

Moreover, Rhizobia strains differ in their ability to produce nod factors and establish effective symbiosis. Selecting and inoculating with highly efficient strains significantly enhances both nodulation and nitrogen fixation. Ultimately, achieving optimal nitrogen fixation depends on the use of high-quality inoculant products that combine advanced technologies with carefully selected microbial strains.

Enhancing leghemoglobin activity

Leghemoglobin is a vital protein found in soya bean root nodules. It plays a dual role: supplying oxygen to nitrogen-fixing bacteria while maintaining low levels of free oxygen to protect the oxygen-sensitive nitrogenase enzyme. The activity of leghemoglobin is closely associated with nodule colouration and nitrogenase function, both of which can be evaluated through visual assessment.

Nodule colour as indicator of leghemoglobin activity

- *Pink to red nodules*: Healthy, active nodules typically exhibit a pink to red interior, indicating the presence of functional leghemoglobin. This colouration reflects optimal oxygen regulation and efficient nitrogen fixation. To assess this, nodules should be evaluated approximately five to six weeks after planting, typically during the V2 to R1 growth stages, by slicing them open and examining the internal colour.
- *White or immature nodules*: White nodules indicate immaturity and insufficient leghemoglobin activity. They may still develop functionality over time. A follow-up assessment is recommended after one week to monitor changes in colour and activity.
- *Green or brown nodules*: Greenish nodules often signal the onset of senescence, with declining leghemoglobin levels and reduced nitrogen-fixing capacity. Brown or mushy nodules are considered non-functional, often resulting from necrosis or environmental stress, and typically show little to no nitrogenase activity.

Allowing optimal BNF

Several key factors can be considered to enhance BNF in soya bean production, one of the most important being the use of high-quality inoculants. In virgin soils or under adverse environmental conditions, double inoculation – combining seed treatment with in-furrow application – can be especially beneficial to ensure adequate Rhizobial presence.

It is also essential to supply the plant with optimal levels of essential nutrients such as phosphorus and potassium, which support healthy root development and nodule formation. Micronutrients such as iron and molybdenum also play critical roles, as they are directly involved in the functioning of nitrogenase – the enzyme responsible for nitrogen fixation. Therefore, the targeted application of these micronutrients should be considered, particularly in soils where deficiencies are common.

Maintaining a soil pH between 6,5 and 7 is another important consideration, as this range supports optimal Rhizobial activity and efficient nodulation. The application of excessive nitrogen fertilisers before planting should be avoided. High levels of exogenous nitrogen can suppress BNF, as the process is energy-intensive and the plant will preferentially absorb readily available soil nitrogen rather than invest energy into forming symbiotic relationships.

Lastly, overall soil health must be managed to reduce the impact of pathogens and pests that damage roots, such as soya bean cyst nematodes and root rot fungi. Soil compaction should be minimised to ensure sufficient oxygen availability for nodule respiration. In addition, implementing a sound crop rotation strategy helps maintain a balanced soil microbiome and reduces the buildup of detrimental soil conditions.

For more information, send an email to Nadine Loubser at nadine@mbfi.co.za or visit *www.mbfi.co.za*.

Highlights from the National Grain Research Programme's annual meeting

By Mike Ellis, manager: research coordination and Nampo-Tech, and Dr Godfrey Kgatle, research coordinator, Grain SA

The theme of this year's National Grain Research Programme's (NGRP) annual meeting was "Farming 2.0: Smarter and Greener". The event took place on 19 and 20 March in Potchefstroom and was hosted by the Agricultural Research Council (ARC) and North-West University (NWU).

As insights and intellectual energy gained traction throughout the event, the focus was firmly on science-driven solutions to the challenges faced by South Africa's grain and oilseeds sector. With climate pressure intensifying, market dynamics shifting, and land availability tightening, the event showcased a range of impactful research aimed at strengthening food security and promoting sustainable growth in the grain production sector.

Divided into four sessions, each with its own subtheme, the programme, presentations, and discussions focussed on the vital role of multidisciplinary research in responding to the needs of the grain industry. The event was attended by producers, research institutions, government officials, as well as industry and private sector representatives.

Technology and precision agri

The opening session was devoted to digital transformation and precision agriculture in the grain sector. Researchers challenged traditional practices and introduced next-generation approaches for data-driven farming.

One key topic was soil nutrient mapping, where Prof George van Zijl, a soil mapping expert at NWU, proposed optimising grid sampling and refining spatial techniques to improve soil management. With the potential for substantial savings per hectare, this research could reshape fertiliser management practices. Adding to this, soil spectroscopy using near-infrared technology was presented as a cost-effective alternative to traditional chemical sampling, with a proposed national soil spectroscopy network in development.

In crop management, high-throughput phenotyping offered new insights regarding planting schedules. Trials across six regions revealed that late maize plantings, especially in January, led to up to 50% less germination due to low post-planting temperatures.

The use of drones in agriculture featured prominently. From identifying pest damage and plant population densities to enabling spot spraying, drone-based monitoring can prove its value in cost savings and environmental protection. Comparative trials also showed that drone spraying can outperform traditional methods.

Finally, the session looked at grain logistics and on-farm practices from an industrial engineering perspective. Lean principles and Six Sigma methodologies were applied to improve silo offloading processes, while research into data timing and traceability proposed a smarter flow of information across the supply chain.

On-farm research

This session focussed on embedding research within the realities of farming, elevating the role of the producer as co-innovator. On-farm experimentation emerged as a crucial method for managing agricultural risk. Producers increasingly use online platforms and study groups to share regenerative agriculture practices. Research that takes place on-farm is often more likely to be adopted, especially when producers are part of the process from inception of the research.

Public-private partnerships were also discussed. Through the Agriculture Bioeconomy Innovation Partnership Programme (ABIPP) led by the Department of Science, Technology and Innovation, over R400 million was leveraged to support innovation platforms across the biosecurity, grain, sorghum, and aquaculture sectors. The initiative emphasised inclusive growth by supporting smallholder transitions into commercial agriculture, as well as promoting technician training and real-time decision support tools.

Climate change and land pressure added urgency to the dialogue. With only 12 million hectares of arable land in South Africa – of which approximately one million is irrigated – calls were made for expanded research into crop protection, high-yielding cultivars, drought-resilient crops, and irrigation optimisation.

At the policy level, plant breeders' rights and debates over genetically modified organisms (GMOs) and gene-editing regulations signalled a shifting legislative landscape. Balancing innovation with biodiversity and market access was flagged as a priority, alongside the ongoing need to align government and industry efforts in responding to new innovations and techniques.

Breeding landscape

Genetic innovation took centre stage in the third session, with researchers exploring ways of future-proofing grain crops against environmental, economic, and biological threats. Plant breeding was recognised as both essential and capital-intensive, with long development cycles of up to 20 years and high regulatory costs.

The keynote stressed the importance of intellectual property protection, policy alignment, and market access to incentivise investment in breeding. Innovative methods such as speed breeding were presented as game changers, especially in dry bean programmes where up to three generations can now be produced per season. Advances in phenomics, such as automated colour sorting machines and a state-of-the-art indoor scanning facility, enable researchers to select traits with greater accuracy and scale.

Disease resistance remained a major priority. In soya bean trials, resistance to

Attendees of the 2025 NGRP annual meeting.

Sclerotinia stem rot and sudden death syndrome was identified in several cultivars, including some with dual resistance. Calls were made for stronger collaborative breeding networks to avoid duplication and accelerate progress. In wheat, some research focussed on integrated pest management and the strategic use of weather data for forecasting outbreaks. Climate change has made pest pressures more unpredictable, requiring smarter breeding strategies that include biosecurity monitoring, host resistance, and agrochemical alternatives.

Student researchers also contributed, exploring the roles of biostimulants, marker-assisted selection, and gene expression under salinity stress, reinforcing the importance of new tools and young talent in shaping the breeding landscape.

Protection of grain systems

The final session of the NGRP focussed on safeguarding South African grain systems against critical threats such as mycotoxins, nematodes, and declining soil health, while also reinforcing the role of diagnostics and surveillance. Dr Lindy Rose, senior lecturer at Stellenbosch University, emphasised the need to future-proof the sector by addressing mycotoxin contamination, a longstanding challenge in grain safety.

The findings of research conducted in the Eastern Cape by Dr Neriman Yilmaz, senior lecturer at the Forestry and Agricultural Biotechnology Institute (FABI) at the University of Pretoria, revealed that multiple *Fusarium* species and associated mycotoxins, such as fumonisins and deoxynivalenol, are prevalent even in healthy maize, posing significant health and trade risks. Her call for integrated surveillance, genomic profiling, and stronger food safety regulations underscores the urgency of addressing mycotoxin threats under changing climate conditions.

Dr Lisa Rothmann, senior lecturer at the University of the Free State, advocated for a proactive, coordinated national surveillance approach to plant diseases, proposing a centralised platform for plant disease monitoring and information, which can enable real-time reporting and regional disease mapping to prevent and manage outbreaks such as Goss's wilt.

The session elaborated on soil and nematode health, emphasising its foundational role in sustainable crop production. Gerhard du Preez, associate professor at NWU, offered insights into soil health as a multifaceted concept that affects everything from nutrient cycling to plant resilience, proposing scientifically sound metrics to guide decision-making.

Dr Sonia Steenkamp of the ARC highlighted that reliance on chemical nematicides is becoming unsustainable as many are being phased out. She urged the adoption of resistant cultivars and crop rotation strategies to manage nematodes through integrated pest management.

Collectively, the session illustrated the interconnectedness of plant and soil health, diagnostics, and surveillance, and the critical need for data-driven and multidisciplinary approaches to ensure food security and economic resilience in the grain industry.

Fostering smart producers

This year's annual meeting reinforced the importance of evidence-based innovation in securing the future of grain and oilseed production. From drones and spectroscopy to weather models and gene editing, the research presented reflected a dynamic, multi-layered approach to agricultural resilience.

With strategic investments, partnerships, and regulatory alignment, these scientific advances are poised to translate into real-world impact, helping South Africa's producers grow smarter. As pressures mount on land, climate, and trade, the future of grain production will depend not only on what we know but how we work together to apply this knowledge.

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Canola in Australia:

21st century progress – Breeding (Part 1)

By Dr Harsh Raman, Kate Light and Justin Kudnig

Canola breeding programmes have been the backbone of the Australian canola industry since 1970, when the first public breeding programme was initiated in Victoria. New South Wales and Western Australian programs followed in 1973.

In the early years, canola breeding programs focused on *Brassica rapa* (common mustard, AA genome, 2n = 2x = 20), *Brassica napus* (rapeseed/canola, 2n = 4x = 38) and *Brassica juncea* (Indian mustard, AABB genome, 2n = 4x = 36). Varieties of *B. rapa* and *B. juncea* were targeted for low rainfall areas. Recently, genetic improvements have been made in *Brassica carinata* (Ethiopian mustard, also called Abyssinian mustard, BBCC genome, 2n = 4x = 34).

The first private breeding program in Australia was initiated in 1980 by Pacific Seeds (now Advanta Seeds Pty Ltd), followed by AgSeed Research Pty Ltd (now part of NuSeed Pty Ltd). Both public and private breeding programs supported the fledging canola industry. Approximately 329 canola-quality varieties and hybrids were released between 1980 and 2022 – 327 of these were *B. napus*.

Non-herbicide resistant (conventional) canola first established the industry. However, triazine tolerant (TT) followed by imidazolinone (IMI) tolerant and then glyphosate resistant canola types grew the industry to over 3,5 million hectares (Mha). Glufosinate resistant hybrids and multi-herbicide tolerant types (stacks) are now also important integrated weed management (IWM) tools.

Australian canola breeding programs use all available technologies to improve efficiencies, stay ahead of blackleg disease, and continue to drive yield gains. The industry continues to innovate and release varieties that meet grower needs, fitting into different farm management systems (herbicide tolerance), regions (maturity), markets (specialty or canola quality, GM or non-GM), and budgets (open-pollinated versus hybrids).

Canola breeding participants

The Australian canola breeding landscape significantly changed in the late 1990s when public canola breeding ceased.

The original public breeding programs in Victoria and NSW continued to provide pre-breeding research services to private breeding companies via the National Brassica Germplasm Improvement Program (NBGIP). The program ran from 1992 to 2017, in partnership with the Grains Research and Development Corporation (GRDC). NBGIP focused on pre-breeding activities including identifying novel and existing genetic resistance to blackleg (causal fungal agent *Leptosphaeria maculans*), oil quality attributes, pod shatter resistance, drought tolerance, and heat tolerance.

> Australian canola breeding companies are early adopters of new plant breeding technologies that help to improve selection efficiency.

Several private breeding companies accessed germplasm, phenotypic and genetic data that the NBGIP generated.

Since 2023, seven established private canola breeding programs operate in Australia. They include Advanta Seeds Pty Ltd, Australian Grain Technologies (AGT), BASF, Corteva AgriScience, NPZ Lembke (in partnership with the University of Western Australia [UWA]), NuSeed Pty Ltd, and Nutrien Ag Solutions Ltd.

All programs except AGT are actively breeding and releasing canola hybrids (five Ogura based and one in the NPZ Lembke MSL system). They continue to develop inbred material that could be released as OP varieties. Overseas programs not actively breeding in Australia but are, or have, marketed canola varieties in specific regions of Australia include RAGT and AGF Seeds.

Australian breeding programs have successfully released varieties with different maturities (early, mid, and late), disease resistance, agronomic traits, herbicide tolerances, and oil/seed quality parameters. Selecting for these traits has led to material adapted to diverse regions from south-eastern Australia to Western Australia. Current breeding efforts are focused on extending canola cultivation and its related species to the hotter and drier climates of northern NSW and Queensland.

Breeding methods – high yield

Originally, the Australian canola industry was based on pedigree breeding methods of selection for developing OP, non-herbicide tolerant, and TT canola varieties. Multiple traits in the same generation were selected using tandem and simultaneous selection. Some programs also used index selection as a part of their breeding pipeline, although no formal data was published in the literature.

In 1988, Pacific Seeds released the world's first canola hybrids in Australia. Grower uptake of hybrids was slow compared to Canada, as they initially baulked at the increased seed cost and not being able to retain harvested seed for the next cropping season. This changed with the release of the first IMI (Clearfield®) tolerant hybrids in 2005 and a conventional hybrid in 2007. Yield gains were quickly realised by growers.

From 2014 to 2023, more than 90% of all canola varieties released in

Australia have been hybrids (83 hybrids, nine OP varieties). Hybrids have higher yield potential, plant vigour, response to nitrogen, and resistance to lodging. Hybrids also provide broader herbicide tolerance options. Canola yields have improved by 5 to 7% every two years since hybrids were introduced, and this growth is not slowing down.

Australian canola breeding companies are early adopters of new plant breeding technologies that help to improve selection efficiency, such as using near-infrared (NIR) calibrations to predict seed and oil quality attributes; doubled haploid (DH) production; reduced generation time in greenhouses; molecular marker development and marker-assisted selection strategies; biometrics – the deployment of statistical designs, modelling, and data analytic methods to increase the efficiency and accuracy of general combining ability (GCA) predictions; overseas seed and contra-season production (largely in Chile); genomic selection and associated modelling; and drones for large-scale field experiment phenotyping and plot integrity analysis.

It is now common to use DH technology to develop both male and female hybrid parental pools where possible as well as pedigree selection where necessary. Depending on the target herbicide tolerance group, forward breeding (including backcrossing), trait introgression, or a combination of both, are used to develop hybrid parents.

Field phenotypic blackleg resistance screening: Infection of a susceptible breeding line at the cotyledon stage in a field blackleg nursery grown on stubble from a previous year's crop (Nutrien Ag Solutions disease nursery, Toolondo Victoria, 2023). (Photo: Kate Light, Nutrien Ag Solutions)

Many Australian canola breeding programs are owned and operated by global breeding companies. These companies are well supported by their overseas colleagues to carry out these activities.

Australian biometricians, under the leadership of Prof Brian Cullis (firstly at NSW DPI and later at the University of Wollongong), have radically improved statistical design and analysis techniques. These developments cannot be underestimated when considering improvements to varietal performance. As Australian programs moved towards hybrid breeding, the value of advancements such as partial replication, spatial correction, and the use of pedigree to calculate GCA of parental lines were quickly recognised.

iClasses is becoming increasingly popular with some breeding organisations and is also being used in technical development trials to accurately compare statistical results across all varieties and all herbicide technologies. These innovations have resulted in improved efficiency and accuracy and greatly improved estimates of GCA, all of which drive the genetic gain in any breeding program.

Blackleg resistance

Australia has the highest blackleg resistance levels in spring canola varieties or hybrids worldwide. Canola cannot be grown for commercial production in Australia without some level of effective blackleg resistance. Blackleg-susceptible varieties collapsed the local industry in the early 1960s. The fungal causal agent *Leptosphaeria maculans* is endemic in Australian soils. It has high evolutionary potential as it undergoes both sexual and asexual reproduction. There is clear host resistance-pathogen virulence gene-for-gene interaction. Canola sowing and early establishment times in Australia coincide perfectly with major *L. maculans* ascospore release events, so crop infection without effective host resistance is highly probable.

Consequently, blackleg resistance has become a major breeding objective of all canola breeding programs. Initially, Australian breeders relied on French winter and Japanese donor sources of resistance, e.g. Jet Neuf and Norin 20. A large collection of diverse accessions of *B. rapa* subspecies, especially *Sylvestris*, *B. napus*, *B. juncea*, *B. carinata*, and wild crucifers and identified accessions of interest were evaluated. Introgression of resistance genes from *B. carinata* (especially from the B subgenome) and wild crucifers into canola germplasm has been challenging due to sexual incompatibility barriers.

Several blackleg-resistant varieties derived from crosses between *B. napus* and *Sylvestris* were developed and released by Pacific Seeds in the early 2000s. Later, these varieties were used as disease-resistance gene donors by other Australian programs.

The Australian canola industry is a world leader in developing traditional in-field-phenotyping methods and knowing how to combine these with new phenotypic and molecular marker methodologies to determine qualitative (major, race-specific) resistance.

Blackleg-resistant germplasm

Selection of blackleg-resistant germplasm in disease nurseries under field conditions, comprising stubbles from previous crops, is commonplace in Australia (*Photo 1*). This technique has been instrumental in maintaining the still elusive quantitative blackleg resistance (minor, non-race specific). In the early 2000s, the canola industry worked across disciplines to develop a coordinated national blackleg rating system (NBRS). The NBRS rates variety resistance on a scale of 1 to 9 (Potter *et al*. 2007) and is based on overall plant survival in disease nurseries across Australia. This system is still used today.

With the support of pre-breeding and blackleg research initiatives, Australia has also pioneered new phenotypic and molecular marker methodologies. The University of Melbourne and Marcroft Grains Pathology (MGP), in collaboration with the INRA (Institut national de la recherche agronomique, France), developed a differential set of isolates that recognises individual blackleg resistance genes (Marcroft *et al*. 2012).

Differential isolate screening is used to classify commercial canola varieties into blackleg resistance groups based on genetic resistance type. It is constantly built upon as new resistance types are identified. There are now eight resistance groups (A to H) and combinations of the same. As molecular markers are developed, they replace/complement the characterisation of certain resistance genes by the differential isolate set.

Blackleg resistance group classifications were first released to growers in 2011 and are now updated twice annually. Molecular markers for certain genes and differential isolate set testing have been used extensively within breeding programs to assist with selection strategies at earlier generations.

Large-scale glasshouse-based phenotypic screening for qualitative resistance to blackleg, ascospore shower (also called 'tub test'), and disease nurseries for quantitative screening are well developed. These tests characterise germplasm and commercial varieties for resistance conferred by known qualitative genes *Rlm* (*Rlm1, Rlm2, Rlm3, Rlm4, Rlm6, Rlm7, Rlm9*, and *LepR1* and *LepR3*), discover new qualitative genes that confer resistance, and are used to investigate quantitative trait loci associated with resistance, including for upper canopy infection (Light *et al*. 2011; Raman *et al*. 2011; Marcroft *et al*. 2012; Raman *et al*. 2016a; Van de Wouw *et al*. 2021; Raman *et al*. 2020a; Raman *et al*. 2021).

Australian research has also shown that the durability of blackleg resistance in varieties depends on the blackleg pathogen's population structure. For example, the breakdown of *Sylvestris* resistance derived from *B. rapa* due to virulent isolates against *Rlm1* and *LepR3* genes (Li and Cowling 2003; Sprague *et al*. 2006; Larkan *et al*. 2013) reinforced the need to breed varieties with alternative qualitative and quantitative resistance sources. It was anticipated that combining quantitative and qualitative resistance genes would improve the durability of resistance.

Recent Australian studies have shown that the durability of gene stacks for race-specific genes and race-specific plus non-race-specific genes can be ineffective in conferring blackleg resistance under certain conditions (Raman *et al*. 2020a). This is because matching genes for virulence in *L. maculans* may be present and will result in the breakdown of the blackleg resistance in canola varieties.

A learning curve

To-date, Australian canola breeders have continually kept ahead of the blackleg pathogen. As new resistance sources (or resistance combinations) are released in commercial varieties, the industry learns how the resistance genes work and how to manage them.

In addition to deploying blackleg-resistant varieties, the canola industry also manages disease by following appropriate crop rotation and fungicide spray schedules (including seed dressing, treatment of fertiliser and foliar fungicides) under accepted industry stewardship guidelines.

Blackleg resistance will always be a shifting target for Australian canola breeders as the pathogen continues to overcome new genetic resistance sources and growers continue to tighten canola cropping rotations.

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*.


"My grandfather and father both planted Pannar, and now I do too."

The delicate balance of South African soya bean production

By Dr Antony Jarvie, consultant, Pannar Seed and Corteva Agriscience

For every action, there is an equal and opposite reaction. You may recognise this as Newton's third law of physics, but it applies metaphorically to all aspects of our lives. In this article, we explore the drivers in the South African soya bean sector, and show how they influence business and farming decisions.

Soya bean production cannot be viewed in isolation; it is an integral part of our farming system. As one component in the system changes, others may need to adapt to take that change into account. It is as if the elements of our production system are connected by the finest strand of spiderweb, holding it in equilibrium.

One of the key aspects of local soya bean production is the competitive position that soya bean holds in rotation with maize. To maintain this position, we rely on soya bean yield advancements to at least track genetic gains made in maize. If soya bean yields do not advance at the pace of our maize crop, the proportion of soya bean in the rotation will diminish.

For soya bean yields to progress we need continued access to the world's most elite germplasm. New traits drive the global soya bean business, and if we do not embrace those relevant to us, we risk falling behind the soya bean yield curve. These new traits each have their own value, but the conduit for their delivery is elite cultivars. Accessing the world's best germplasm requires contemporary trait technology.

Viability of trait deployment

The stimulus for bringing new soya bean traits to South Africa is the return on investment for trait owners. Trait development and deployment is a lengthy and costly task, and no company would consider this without equitable remuneration. In maize, trait fees are gathered through seed sales, but in soya bean less than 15% of the production area is planted to certified seed. The end-point royalty was introduced to allow companies to capture some of the value of their genetics and technology. The future of the South African soya bean industry hangs on this tenuous thread.

Over the last 30 years, the top end of soya bean yield in South Africa has increased dramatically. However, the national average yield has not increased at the same rate, reflecting the trailing edge of production rather than the leading edge. The solution to increasing the national yield average is simple in theory: reduce the number of poor or failed hectares. In practice, this is more difficult to achieve as the number of hectares involved escalates and our climate increasingly defies historical patterns.

Thankfully, many new traits being developed globally are centred on preserving yield. Looking into the global soya bean industry research pipeline, traits for new herbicide resistance, next-generation lepidoptera resistance, nematode resistance, soya bean rust resistance, and drought tolerance are being developed to protect yield and reduce the risk of crop failure.

Continued access to contemporary traits and elite soya bean cultivars is essential to reduce the risk of soya bean production and maintain a sustainable crop rotation system. Whether or not any or all of these traits get deployed in South Africa in the future, undeniably hangs on that golden thread linked to the end-point royalty.

Future prospects

The future of soya bean production in South Africa is intricately linked to advancements in genetic traits and the economic viability of trait deployment. As we strive to enhance soya bean yields and maintain a balanced crop rotation system, it is crucial to embrace contemporary trait technology and ensure equitable remuneration for trait developers.

The delicate equilibrium of our farming system depends on our ability to adapt to changes and leverage global advancements. By doing so, we can secure a sustainable and prosperous future for soya bean farming in South Africa, ensuring that every action taken today leads to positive reactions for tomorrow's agricultural landscape.

For more information, send an email to antony.jarvie@corteva.com or visit *www.pannar.co.za.*

Crop-damaging interactions between agrochemicals and legume inoculants

By Dr Charlie Reinhardt

Inoculation of legume crops with nitrogen-fixing bacteria was a development that revolutionised crop production, specifically the production of legume crops. The discovery of nitrogen-fixing bacteria and the development of techniques for inoculating crops with these bacteria, took place during the latter two decades of the 19th century.

Earth's atmosphere consists of approximately 80% nitrogen gas (N_2). The amount of nitrogen (N) fixed by legume crops can exceed 100kg/ha for use by the following cereal crop. Several factors such as climate, soil type, and the type of legume in the rotation system determine the amount of legume-fixed N that can carry over to the next growing season for the benefit of a cereal crop in the rotation system.

Legume and microbe interaction

Rhizobium and *Bradyrhizobium* bacteria (collectively referred to as *Rhizobia*), growing in symbiosis with legume plants, are responsible for fixing N_2 by building it into substances in plants that are essential for growth and development. This 'bio-fertiliser' technology allows the cultivation of legume plants with limited synthetic N fertiliser inputs, thereby saving significant input costs.

N-fixing bacteria typically live in colonies contained in nodules that form on plant roots upon infestation by these bacteria. This relationship between plant and bacterium is symbiotic, namely both partners gain from it; the phenomenon occurs solely in the legume species.

South African soils – like Australian soils – lack natural *Rhizobia*. Therefore, regular applications of factory-cultured *Rhizobia* are required in legume crop production. Before nodulation and N-fixation can take place, the plant-compatible, effective *Rhizobia* must be present in the soil the legume plants are growing in. An inoculum of *Rhizobia* can originate from a natural source due to a legume crop preceding the current legume crop, or the inoculum can be supplied in the form of a commercial product that is used to coat the seed of the legume crop and/or applied in the planting furrow.

The first-time growing of a legume crop, due to the probable absence or low incidence of plant-compatible, effective *Rhizobia* in the soil, requires the application of commercial inoculums in a highly concentrated form. Inoculation of both legume seeds and the soil is advocated globally for optimal *Rhizobia* inoculum efficiency. The production and distribution of legume inoculants is a well-established industry in many countries.

Protection of *Rhizobia*

Rhizobia are microscopic-sized, living organisms that must be protected from harmful environmental conditions and toxic substances. Therefore, inoculants must be kept, placed, or applied at a safe distance from substances that might harm these bacteria and reduce their N-fixing ability. Potentially harmful substances include pesticides (herbicides, fungicides, insecticides) and fertilisers.

Fertilisers

Direct contact between inoculated seed and fertilisers must be avoided as it will kill *Rhizobia* due to desiccation and exposure to excessive acidity. Fertilisers such as superphosphate and related products such as mono-ammonium phosphate (MAP) are acidic and toxic to *Rhizobia* when in solution and making direct contact with the inoculum. Direct contact between inoculated seed and the fertiliser should be avoided, as well as combinations of fertilisers and inoculum in liquid mixtures.

Metal elements such as mercury, copper, and zinc are harmful to *Rhizobia*. Generally, the longer the period of direct contact between potentially harmful substances or products and the inoculated seed, the higher the risk for inoculum failure or inefficiency. Lime, dolomite, or gypsum do not pose a risk to *Rhizobia* bacteria. The micro-element molybdenum (Mo) is required for nodulation and N-fixation to occur, especially if soil pH is acidic (below pH 6). However, Mo in the form of sodium molybdenum is toxic to *Rhizobia*; the use

Table 1: Examples of legume crops and their paired *Rhizobia* species.

Crop	***Rhizobia* species**
Chickpea	*Mesorhizobium cicero*
Clovers	*Rhizobium leguminosarum* var *trifolii*
Lupin, serradella	*Bradyrhizobium* species
Medics	*Sinorhizobium* species
Pulse crops	*Rhizobium leguminosarum* var *viciae*
Soya bean	*Bradyrhizobium japonicum*

(Adapted from M. Ryder et al.*, 2022, Inoculant and seed treatment fact sheet, Grains Research and Development Corporation, Australia, grdc.com.au)*

of either molybdenum trioxide (MoO_3) or ammonium molybdate $(NH_4)_2MoO_4$ is advised for application on seed.

N and phosphorus (P) are essential elements for early and later growth and the development of plants. An exogenous (from outside the plant) supply of N as a start-up dose during legume seedling development are required until the nodulation stage has been proven critical for optimum soya bean production. *Rhizobium* bacteria also require P to provide energy for nodule formation and N-fixation. Besides its promotion of healthy crop and root growth, which provides ample infection sites for *Rhizobium*, other benefits of P have been directly linked to specific mechanisms underpinning N-fixation.

Rhizobia are sensitive to solutions with pH values below 5 or above 7,5. At too low (acidic) soil pH, soya bean plants can have trouble absorbing certain nutrients from the soil, including N and P that are essential for the formation of root nodules. Liming of legume crops to increase soil pH can also improve general plant health which, *inter alia*, depends on the formation of root nodules.

Fungicides

For seed-coating with fungicides such as thiram and metalaxyl, which are toxic to *Rhizobia* upon direct contact, it is critical to allow the fungicide-coating to dry before the inoculum is applied to the seeds. The treated seeds should be planted without delay in moist soil. Alternatively, or additionally, a granular or a liquid formulation of the inoculum can be applied in-furrow at planting.

In-furrow applications minimise the risk of direct contact between pesticide treatment and *Rhizobia* in the inoculum, thus averting potential harm to *Rhizobia*. The double inoculum option is advised for soil naturally bereft of *Rhizobia*, such as newly established lands or where a non-legume crop had been grown the previous season.

Herbicides

If a herbicide is able to injure a legume crop – either directly at the time of application or indirectly through the presence of phytotoxic residues in soil originating from the previous crop – it might impact inoculum efficiency. The optimum functioning of the inoculum is dependent on a healthy host plant.

The risk of carry-over of herbicide residue to sensitive crops is particularly high when dry spells follow herbicide application as well as on alkaline soils, which favour the long persistence of many herbicides. Herbicide residue and in-crop usage of herbicides belonging to the HRAC group B (namely imidazolinones and sulfonylureas) are implicated from time to time in the reduction of growth, N-fixation, and yield of legume crops. It is of utmost importance to strictly adhere to label-recommended dosages of herbicides and the safety (waiting) periods stipulated for sensitive follow-up crops.

Herbicides reported in scientific literature that reduce the N-fixing capacity of inoculants are imazethapyr and imazapic (imidazolinone types), s-metolachlor, and diclosulam (sulfonylurea type). Apart from imazapic, the other herbicides are registered for use with regard to soya beans in South Africa. Glyphosate was also tested but had no effect on N-fixation. Compared to insecticides, herbicides are generally considered less toxic to *Rhizobia*. However, herbicides can indirectly reduce *Rhizobia* efficiency if they injure the legume crop.

Insecticides

Inoculum-damaging interactions between certain pesticides and specific inoculum products are well-reported in scientific literature. The suppression of nodulation on, *inter alia*, soya bean roots have been reported as well as the death of bacterial cells of certain inoculums due to exposure to specific pesticides.

A scientific study reported that a pesticide product that contained the fungicides pyraclostrobin and thiophante-methyl, as well as the insecticide fipronil, caused the death of *Bradyrhizobium* cells – and smaller colonies of the inoculum were recorded on soya bean plants. It was also found that the detrimental effects of this kind of insecticide increased as the time of exposure to the inoculum increased.

Other researchers found that several insecticides, especially organophosphates, dramatically reduced the N-fixing capacity and the nitrogenase enzyme of the inoculant organism *Gluconacetobacter diazotroficus* as follows:

- Monocrotophos (organophosphate) – 100% reduction.
- Dichlorvos (organophosphate) – 100% reduction.
- Chlorpyriphos (organophosphate) – 83,3% reduction.
- Malathion (organophosphate) – 80,9% reduction.
- Endosulfan (organochlorine) – 33,4% reduction.

In the case of *Bradyrhizobium* inoculum on cowpeas, the bacterial cell count was significantly reduced in a hydroponic system (water solution) in the presence of the insecticides methomyl (carbamate) and lambda-cyhalothrin (pyrethroid) by 88 and 56%, respectively. However, in a soil medium this damaging interaction was not observed, again proving that spatial separation between inoculum and pesticides is an essential safety measure.

Producers should strictly avoid tank mixtures or slurries incorporating liquid inoculum, liquid fertilisers, trace elements, organic soil ameliorants, and pesticides. In such preparations the inoculum safety imperative of spatial separation of harmful substances is nullified. Follow the instructions on the product label to the letter as the label signifies a legal contract in law (*Act 36 of 1947*) between the registration holder and the user.

In a nutshell

The contact time between *Rhizobia* and potentially harmful products and substances must be as short as possible, and ideally *Rhizobia* should not be exposed to these products and substances at all. Dry soil conditions and lack of rain will extend the contact period and increase the risk of poor inoculum performance.

Dry soil conditions alone exert stress on *Rhizobia* and nodulation efficiency. When such stressors are anticipated, it is advisable to use the doubled inoculation approach, namely seed inoculation as well as in-furrow application at planting.

Dr Charlie Reinhardt is a research leader in the South African Herbicide Resistance Initiative (SAHRI) at the University of Pretoria, and a member of the agricultural programme development panel at Akademia NPC. He can be contacted at 083 442 3427 or dr.charlie.reinhardt@gmail.com.

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Fertiliser consumption trends and implications for the South African oilseeds industry

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

Fertilisers are crucial for improving soil fertility and maintaining agricultural productivity, especially in nutrient-limited soils commonly found in key grain-producing regions such as the Free State, Mpumalanga, North West, and the Western Cape. Inefficient fertiliser use can harm the environment and decrease farming system profitability, highlighting the importance of optimising fertiliser management strategies.

The agricultural sector frequently encounters challenges such as erratic rainfall patterns (droughts and floods) which affect annual fertiliser consumption. Additionally, the South African fertiliser industry is significantly influenced by global trade dynamics, local agricultural needs, and environmental factors, all of which directly impact on-farm activities and farming system profitability.

Over the past decade, fertiliser prices have fluctuated due to supply challenges in response to geopolitical tensions, supply chain disruptions, and the Covid-19 pandemic. Prices peaked in 2021 and 2022 due to rising energy costs, supply shortages, and trade sanctions on major fertiliser-producing countries. South African farming systems, dependent on fertiliser imports, require adaptable strategies to mitigate resultant high crop production costs and environmental challenges associated with costly fertilisers.

Therefore, understanding fertiliser trends and sustainable practices is crucial for maximising crop profitability and minimising environmental impact over the long term.

Fertiliser import dynamics

South Africa remains heavily dependent on fertiliser imports, with total import values reaching US$824 million in 2023, following a significant peak exceeding US$1,5 billion in 2022. During the 2019 to 2023 period, nitrogen-based fertilisers dominated the import market, accounting for 56% of import value and 64% of volume, followed by potassium (21% by value and 20% by volume), and phosphorus (18% by value and 13% by volume). This composition is particularly relevant to oilseed crops, which generally have high nutrient demands to ensure optimal yields.

The data reveals a concerning trend: While import volumes have grown modestly at 2% annually between 2019 and 2023, the value of these imports has surged by an average of 18% annually during the same period. This price-volume disparity presents a significant challenge for oilseed producers, who must absorb or pass on these increased production costs.

South African fertiliser access

The global fertiliser market experienced substantial volatility, with nitrogen fertiliser import values increasing from US$6,46 billion in 2001 to US$38,45 billion in 2023. These price increases were particularly pronounced during 2021 and 2022 when global import values increased by approximately 65% despite volumes declining by 5%. This market volatility creates significant planning challenges for South Africa's oilseed producers.

South Africa ranks 29th among global fertiliser importers, representing just 0,9% of global import value (2019 to 2023 average). This relatively modest position in the international market potentially leaves South African oilseed producers vulnerable to supply disruptions during periods of global scarcity. The country's fertiliser import market includes a mix of major suppliers, emerging markets, and declining contributors. Growth from Qatar and Oman offers opportunities for stronger ties with new markets, while stable relationships with Saudi Arabia and Germany provide consistency.

Over the past decade, urea has consistently been South Africa's most imported fertiliser, representing approximately 40 to 42% of all fertiliser imports in both value and volume. Urea's nitrogen content makes it particularly valuable for oilseed crop production, which typically requires significant nitrogen inputs to achieve optimal oil content and yields.

Supply chain vulnerabilities

Several factors drive fertiliser price increases that directly impact oilseed production costs in South Africa:

- Global supply chain disruptions, particularly the Russia-Ukraine war, have severely affected fertiliser availability. With Russia being the leading global exporter of fertiliser products from 2019 to 2023, exporting around 36% more than China (the second-largest exporter), any disruption to Russian exports has outsized the impacts on global markets.
- Rising energy costs have significantly increased fertiliser production expenses, which are ultimately passed on to agricultural producers. This is particularly relevant for nitrogen fertilisers, which require substantial energy inputs during production.
- Exchange rate fluctuations have further compounded these challenges for South African oilseed producers, as the depreciation of the South African rand has increased the cost of imported agricultural inputs.

Future outlook

Oilseed crops are among the top 15 major fertiliser-consuming crops in

South Africa, with soya bean ranking sixth, sunflower seventh, and canola 15th. Fertiliser consumption per crop is driven by the total cropping area and the fertiliser application rate (kg/ha), which in turn depends on the crop's nutrient requirements, as well as the soil fertility status and climate conditions. Due to the crop rotational benefits linked to oilseed crops, the soya bean and canola cropping area is expected to expand over the next ten years, further increasing fertiliser consumption by oilseed crops (Bureau for Food and Agricultural Policy).

While organic fertiliser imports have risen steadily since 2001, they represented only 2% of imported value and volume between 2019 and 2023. This suggests the limited adoption of organic alternatives within South African agriculture, including the oilseeds sector, despite the linked environmental benefits. However, this excludes locally produced organic fertilisers (such as livestock manure and poultry litter), which are already commonly applied to field and pasture crops. This practice is often limited to site-specific applications due to availability and logistical costs associated with organic fertilisers.

Analysing fertiliser trends and drivers can help inform agricultural policies focussed on promoting sustainable and profitable practices, including developing guidelines for optimal fertiliser use and investments in research on alternative nutrient sources. These approaches would benefit the oilseeds industry by potentially reducing input costs while addressing environmental concerns.

Targeted strategies required

Dependence on fertiliser imports makes South Africa vulnerable to price fluctuations and supply chain issues, as highlighted by recent global events such as geopolitical tensions and the Covid-19 pandemic. The country's fertiliser import market consists of a mix of major suppliers, emerging markets, and declining contributors. Geopolitical challenges and price volatility necessitate strategies to ensure a sustainable and secure fertiliser supply, particularly for nitrogen-based fertilisers comprised of urea and ammonium nitrate.

Fertilisers containing the three macronutrients nitrogen, phosphorus, and potassium remain essential for sustainable crop production across all crop production industries. The adoption of precision agriculture technologies in grain and oilseed cropping systems presents opportunities for optimising fertiliser use, enhancing economic returns, and reducing environmental impacts.

The expansion of soya bean production across the central and northern production regions underscores the evolving nutrient needs of South Africa's agriculture industry. Addressing soil nutrient deficiencies, high production costs, and environmental concerns requires targeted strategies, such as improving fertiliser use efficiency, exploring alternative sources, and building resilience against global market uncertainties.

For more information, send an email to Prof Pieter Swanepoel at pieterswanepoel@sun.ac.za.

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Enhanced efficiency through innovation

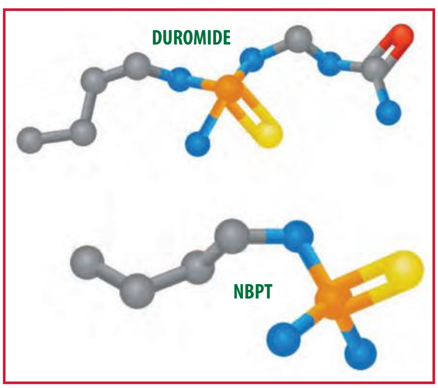
Kynoch

Kynoplus Pro® the solution to urea volatilisation

By Hentie Cilliers, optimiser agronomist, Kynoch

Urea is a cost-effective source of nitrogen (N) but losses due to volatilisation remain a challenge. Kynoch has a solution. Through further innovation and enhancement we present Kynoplus Pro® powered by Anvol, a product that contains the two active ingredients duromide and NBPT (*Figure 1*) that work in synergy to limit N losses. The new formulation is more stable to maximise its efficacy in various conditions.

Figure 1: Duromide and NBPT molecules.



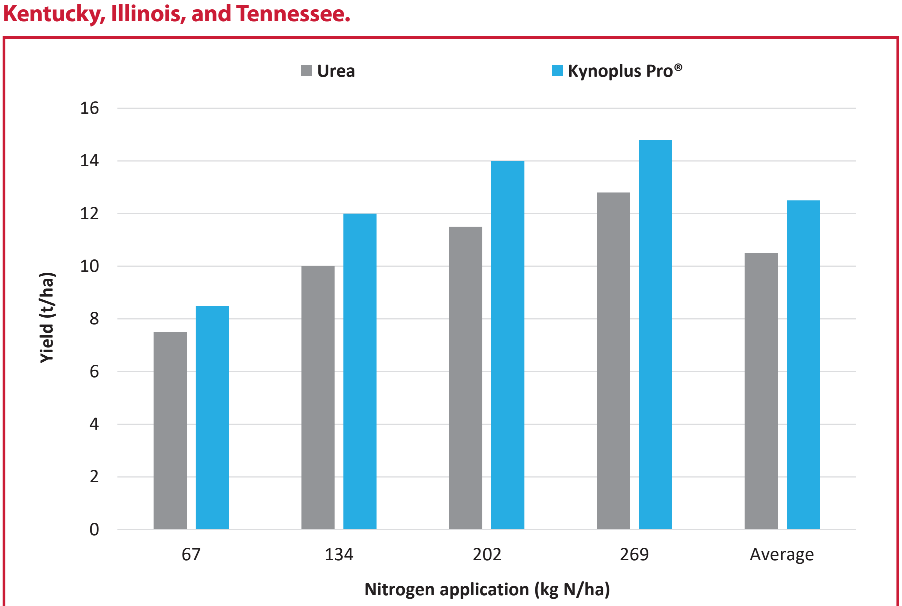
Important research-based facts

- Low pH does not prevent urea volatilisation, but Kynoplus Pro® reduces losses to just 4%, ensuring more N remains available for plant uptake.
- Temperature affects volatilisation. Volatilisation still occurred at 28 and 38°C. However, Kynoplus Pro® reduced these losses by up to 79% in both cases.
- Dry soil does not guarantee lower losses, and a small amount of moisture can trigger the volatilisation process. However, even after 60 days on the soil surface, Kynoplus Pro® reduced N losses with 78%.
- Irrigation after application is not sufficient. Research shows that even with 10mm of irrigation, losses still occur. Kynoplus Pro® provides more effective protection against N losses.
- Incorporation of fertiliser does not always prevent losses. Even with 5cm of tillage, significant losses can still occur. Kynoplus Pro® further minimises these losses.
- More urea is not the solution. Increased urea concentrations accelerate volatilisation, with losses that can increase from 36% at 30kg N/ha to 52% at 150kg N/ha.
- Enhanced N uptake and higher yields. With Kynoplus Pro®, plants have higher N levels that ensure improved nutrition and higher yields.

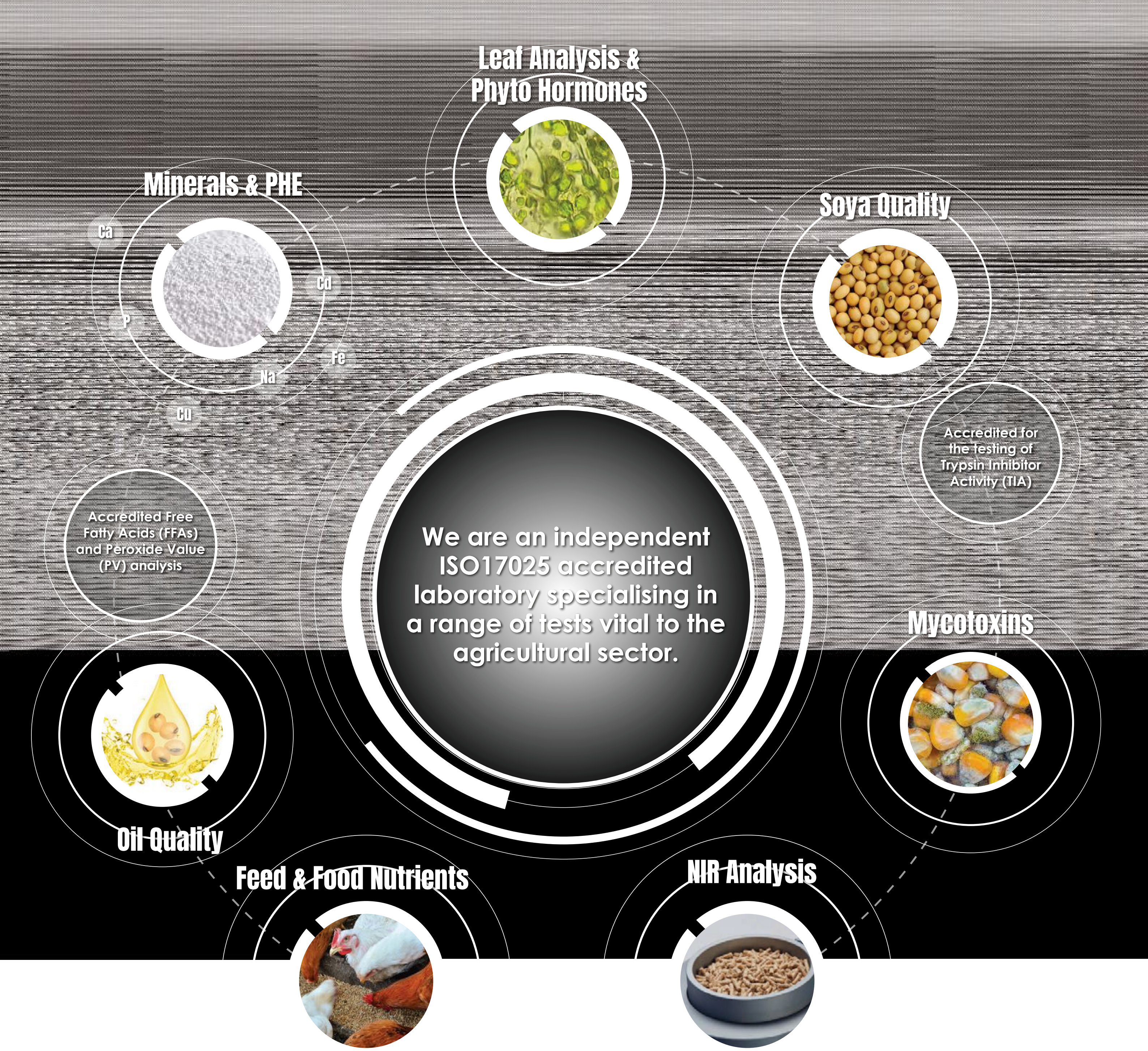
Maximise N = maximise yield

Figure 2 shows that the benefits of Kynoplus Pro® directly extend to higher yields over various N levels and seasons. This technology ensures improved N utilisation and profitability. Do not accept losses as a given – Kynoplus Pro® is the key to effective N management and improved harvests.

Figure 2: Average of eight trials conducted between 2016 and 2018 in Virginia, Kentucky, Illinois, and Tennessee.



Kynoplus Pro® (Anvol) registration number M295 under *Act 36 of 1947*. For more information, visit *www.kynoch.co.za*.



Leaf Analysis & Phyto Hormones
Minerals & PHE
Ca
Cd
P
Fe
Na
Cu
Soya Quality
Accredited for the testing of Trypsin Inhibitor Activity (TIA)
Accredited Free Fatty Acids (FFAs) and Peroxide Value (PV) analysis
We are an independent ISO17025 accredited laboratory specialising in a range of tests vital to the agricultural sector.
Mycotoxins
Oil Quality
Feed & Food Nutrients
NIR Analysis

SoyaGuard:
Revolutionising soya quality assurance

The demand for high-quality soya oilcake and full-fat soya continues to grow, driven by evolving consumer expectations and tightening quality standards. Ensuring consistency, purity, and optimal processing outcomes has long been a challenge in the industry. Chem Nutri Analytical is proud to introduce SoyaGuard, an advanced NIR (near-infrared) calibration solution designed to streamline and enhance quality assurance in soya processing.

Soya processors and feed mills operate in a landscape where both speed and precision are essential. While traditional wet chemistry remains the gold standard – critical for validation and regulatory compliance – it is time-consuming, labour-intensive, and less suited for routine in-process checks.

Proximate analysis (such as moisture, protein, and oil) is widely available from many NIR providers. However, critical functional parameters such as trypsin inhibitor activity (TIA), the protein dispersibility index (PDI), potassium hydroxide (KOH) solubility, and urease activity are not commonly available (*Table 1*).

Transforming soya processing

Chem Nutri Analytical has addressed this gap with SoyaGuard, a specialised NIR calibration suite developed to rapidly and accurately assess these advanced quality markers directly in production environments. This empowers processors to make proactive, real-time decisions without waiting on lab results – enhancing consistency, efficiency, and product safety.

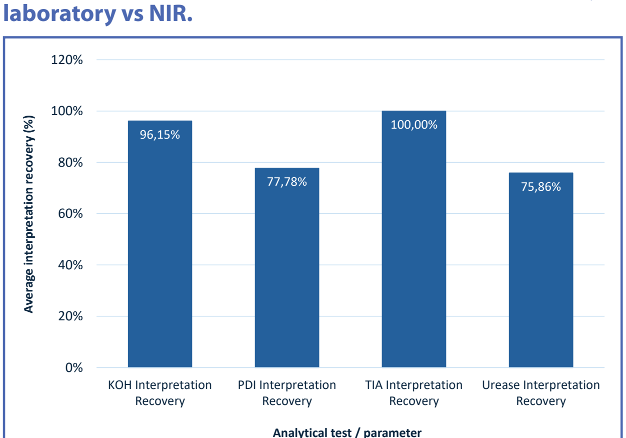
Wet chemistry remains essential for validation, and when paired with cutting-edge NIR tools such as SoyaGuard, it forms a powerful, integrated approach to modern soya quality control (*Figure 1*).

SoyaGuard is an innovative NIR calibration that offers rapid, precise, and non-destructive analysis of key quality parameters in soya products.

Table 1: Validation data for soya oilcake model.

Name	Unit	Mean	Min	Max	SD	SEC	RMSECV
Protein (Dumas)	(g/100g)	46,594	39,100	52,430	1,077	0,375	0,385
Protein (Kjeldahl)	(g/100g)	44,911	39,150	47,460	1,086	0,517	0,689
Moisture	(g/100g)	11,122	5,270	14,550	1,492	0,567	0,577
Fat	(g/100g)	2,062	0,490	13,680	0,855	0,166	0,170
Ash	(g/100g)	6,108	4,760	8,400	0,452	0,289	0,303
Fibre (crude)	%	4,278	2,180	9,180	1,052	0,316	0,322
PDI	%	23,748	6,930	50,860	9,646	2,719	3,576
KOH	%	79,210	36,900	100,150	4,050	2,279	2,440
TIA	(mg/g)	3,044	0,620	9,020	1,064	0,505	0,535
Urease activity	(±0,05)	0,141	0,010	2,300	0,094	0,070	0,072

Figure 1: Comparison of average interpretation recovery: laboratory vs NIR.



Key benefits of SoyaGuard

- **Speed and efficiency:** Delivers near-instantaneous results, supporting faster operational decisions.
- **Accuracy and consistency:** Provides reliable, reproducible data to ensure consistent product quality.
- **Cost-effective:** Minimises the need for chemical reagents and manual testing, reducing operational costs.
- **Non-destructive testing:** Preserves product integrity while enabling continuous quality monitoring.
- **Risk averse:** Enables confident load acceptance and delivery decisions, reducing the risk of non-compliance.

This state-of-the-art solution provides real-time data, enabling processors to maintain stringent quality standards with greater efficiency.

Setting a new standard

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Importantly, SoyaGuard is not a substitute for wet chemistry, but a complementary tool that enhances quality assurance strategies by enabling faster, data-driven decisions within production environments. By bridging the gap between laboratory accuracy and in-line efficiency, SoyaGuard empowers processors to maintain high standards without compromising turnaround time.

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The future and global competitiveness of South Africa's soya bean industry

By Prof Ferdi Meyer, Bureau for Food and Agricultural Policy

As one of the fastest-growing agricultural subsectors over the past two decades, the South African soya bean industry has demonstrated significant expansion. Production increased from a modest 264 000 tonnes cultivated on 165 000ha in 2008 to more than 2,7 million tonnes across 1,1 million ha in 2023. Despite the challenges posed by drier El Niño weather patterns and extreme temperatures, South Africa successfully harvested 1,8 million tonnes of soya beans last year, achieving a national average yield of 1,6 t/ha – an outcome that remains reasonable given the severity of the drought.

Favourable weather conditions in the current season are expected to drive a recovery in production levels, with the national Crop Estimates Committee (CEC) forecasting a crop of 2,3 million tonnes. This volume is anticipated to adequately meet domestic demand, consisting of crushing (approximately 90%), full-fat soya (approximately 8%), and a minimal 2% designated for human consumption. Small volumes of exports could potentially also materialise.

Soya bean crushing operations have also expanded rapidly, and in 2023 South Africa achieved self-sufficiency in soya meal production, eliminating the need for imports for the first time in history. Furthermore, during the 2023 marketing season, South Africa exported 597 000 tonnes of soya bean.

Starring role as exporter

When evaluating industry prospects, the fundamental question is: To what extent can growth continue? This requires an examination of the key drivers that have contributed to the sector's expansion over the past two decades, and an assessment of whether these factors will persist moving forward. More simply, the question is whether growth has been driven by a 'demand pull' or a 'supply push' dynamic.

While it may be argued that this represents a typical 'chicken-and-egg' scenario, in which cause and effect are intertwined, the reality is that the rapid expansion of poultry production – spurred by rising chicken meat consumption – has created a strong demand pull for soya meal as a protein source in animal feed. Consequently, soya meal imports increased sharply to meet domestic requirements, with South Africa importing nearly 1 million tonnes by 2010. This presented a significant opportunity for investment in local soya bean crushing facilities, setting the stage for one of the nation's most notable success stories.

The establishment of clear policy directives by the Department of Trade, Industry and Competition (dtic) prompted private-sector investments exceeding 2,3 million tonnes of crushing capacity during the early 2010s. These investments, coupled with extensive cultivar trials, improved farming practices and the introduction of a technology levy, catalysed rapid production expansion. The levy is paid by producers to incentivise seed companies to provide South African growers with access to the latest seed technology.

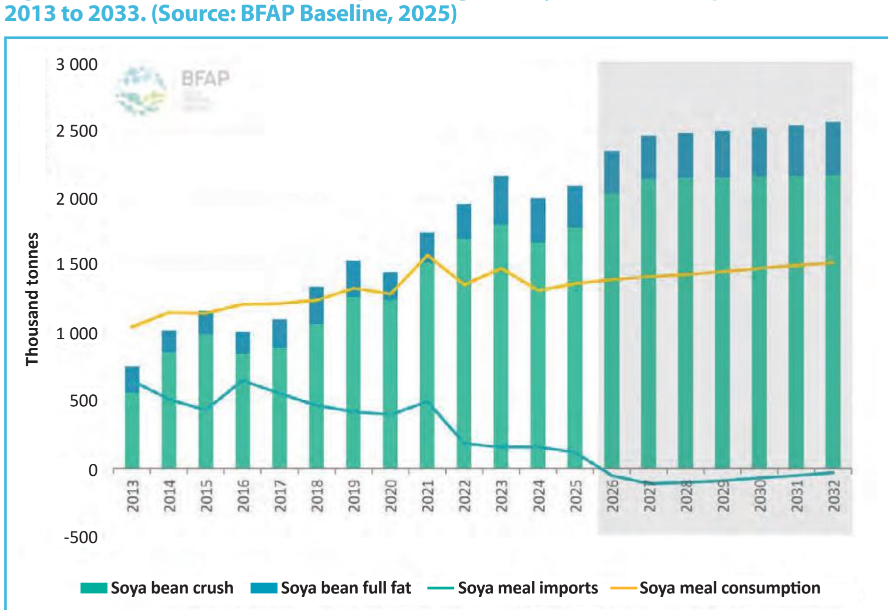
Thus, through effective co-ordination and close collaboration among the private sector, government, industry organisations, and researchers, South Africa transitioned from being a net importer to a net exporter of soya beans within just over a decade.

Staying competitive

Figure 1 clearly illustrates the declining trend in soya meal imports as local soya bean crushing has increased over the past decade. According to the latest baseline projections from the Bureau for Food and Agricultural Policy (BFAP), South Africa may even emerge as a soya meal exporter within the next few years. However, the rate of increase in soya bean processing is slowing considerably over the outlook, as the industry has effectively closed the gap in import replacement. Consequently, future growth will be contingent upon increases in domestic soya meal consumption and potential export opportunities.

Figure 1 further highlights a more concerning trend of a steady rise in

Figure 1: South African soya bean processing and soya meal consumption and trade, 2013 to 2033. (Source: BFAP Baseline, 2025)



domestic soya meal consumption only until 2021, after which volumes have largely remained stable. Over the outlook period, soya meal consumption is projected to expand at an annual rate of only 1,6% compared to the 2,3% annual growth recorded over the past decade.

This deceleration can primarily be attributed to two key factors. First, improvements in feed efficiency driven by advances in genetic improvements mainly of broilers, have led to a reduction in protein requirements per animal. Second, poultry consumption is no longer increasing at the pace observed in previous years, largely due to sluggish growth in disposable income amid a slow-growing domestic economy.

As a result, unless South Africa experiences a significant improvement in its economic growth trajectory, the soya bean industry will need to focus on expanding its presence in the export market for both soya beans and soya meal. BFAP's latest baseline projections anticipate soya bean production increasing by approximately 40% over the next decade to reach 3,2 million tonnes, primarily driven by yield improvements.

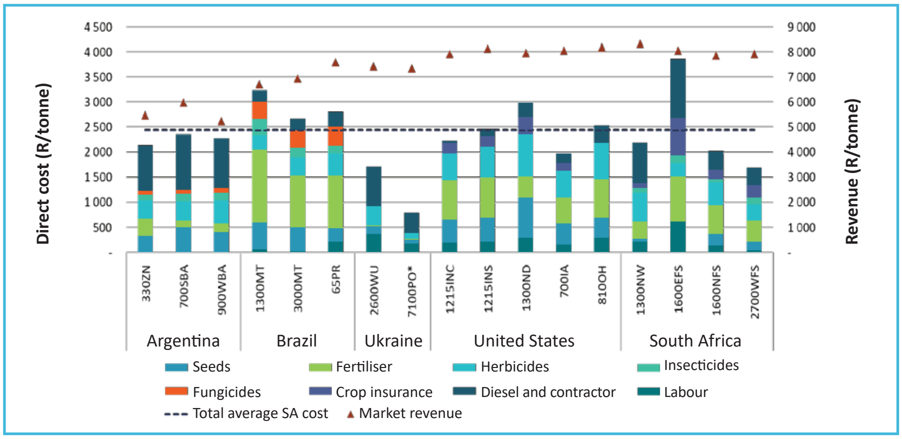
The baseline scenario assumes that the country's local crushing capacity will remain at approximately 2,3 million tonnes, necessitating the export of surplus soya beans, with volumes projected to rise to around 700 000 tonnes per annum over the next ten years. This future trajectory underscores the necessity of maintaining the global competitiveness of South African producers.

Production costs and yield

Figure 2 provides a comparative analysis of South Africa's average direct production costs per tonne against those of major soya bean-exporting nations for the period 2021 to 2023. The findings indicate that South African producers are generally well positioned, with production costs per tonne aligning with, or in some instances falling below those of international exporters.

However, it is important to note that the exceptional yields recorded during this period were largely attributable to favourable weather conditions, except in the Eastern Free State, where average yields were approximately 2t/ha, subsequently leading to higher production costs per tonne. This comparison highlights the

Figure 2: Benchmarking South Africa's soya bean total direct cost of production per tonne, average 2021 to 2023. (Source: agribenchmark, 2025)



necessity of sustained yield improvements while maintaining cost-efficiency.

Access to advanced seed technology and high-quality germplasm will be critical in driving future progress. Thus, fostering a strong partnership between the government and the private sector is essential to creating an optimal regulatory environment that ensures access to cutting-edge technology without compromising biosafety and security measures.

Global competitiveness

In the future, a more consistent transition to exportable surpluses and export parity-based pricing will reveal inefficiencies and challenges within the soya bean value chain. In essence, the segment beyond the farmgate will need to enhance efficiency to compete sustainably in global markets at export parity levels. This strategic shift is already underway.

For instance, while the Protein Research Foundation (PRF) initially identified overall farm-level productivity and competitiveness as the key driver for unlocking growth in the soya bean value chain, the focus has gradually evolved towards a more integrated approach. Given the rapid improvements in farm-level productivity rates, greater attention is now required beyond primary production to ensure that the entire value chain is optimised for global competitiveness.

The PRF launched the Soybean Value Chain Initiative (SVC) to serve as a discussion platform for stakeholders across the soya bean value chain, including related agricultural segments and government entities. This initiative facilitates deeper insights into the interconnections between different nodes within the value chain. Through this platform, strategically important issues are deliberated, potential solutions are evaluated, and collective action points are carefully formulated and implemented.

Insights from the SVC indicate that a combination of market trends, geopolitical dynamics, and domestic service-related challenges are contributing to an increasingly complex landscape for South Africa's soya bean value chain, which continues to evolve. The deterioration of the country's road and rail infrastructure, port facilities, and electrical grid has adversely impacted agricultural and agro-processing value chains, placing them at a significant disadvantage. Given South Africa's relatively small role in the global market for grains, oilseeds, and livestock production, these logistical inefficiencies have emerged as key determinants of the nation's competitiveness in international markets.

Collaboration is key

To navigate these challenges effectively, robust partnerships and meaningful dialogue between stakeholders in both the private and public sectors are essential. A collaborative approach will be critical in prioritising strategic actions that enable South African agricultural value chains to thrive, foster employment creation, and drive inclusive economic growth amid increasingly complex global dynamics.

For more information, send an email to the author at ferdi@bfap.co.za.

South Africa's oilseed sector navigates a wet harvest season

By Marguerite Pienaar, economist, Grain SA

As South Africa moves deeper into the 2025 harvesting season, the oilseed sector is in full swing with sunflower, soya bean, and groundnut harvesting well underway across key summer rainfall regions. Meanwhile, in the winter rainfall areas of the Western Cape, canola planting has once again reached record levels – a testament to the growing confidence in the crop and its economic potential.

From the Highveld to the Swartland, producers and industry stakeholders are navigating a season of mixed conditions. Excessive rainfall during critical harvesting windows has raised fresh concerns about quality, logistics, and profitability.

Weather watch: A recurring risk

One of the key takeaways from this season is the impact of erratic weather on oilseed production. While rainfall is essential, its timing and intensity can significantly influence harvest efficiency and crop quality. Excessive rains during harvesting not only delay operations but also increase input costs due to drying, replanting, and crop protection interventions.

In many ways, this underscores the importance of adaptive management strategies, including improved drainage, use of short-maturing cultivars, and enhanced forecasting tools. The following are snippets from Grain SA's bi-weekly crop condition report (*www.grainsa.co.za/pages/industry-reports/production-reports*). *Figures 1* and *2* highlight the fact that the average rainfall for the majority of the summer rainfall area was above average this season. Moreover, the rainfall started late in the season and continued into the harvesting window.

Sunflowers

The sunflower crop has remained an integral part of South Africa's oilseed complex, particularly in the Free State and North West. This season, producers welcomed relatively favourable pricing as sunflower oil continues to benefit from global demand, especially in Eastern Europe and Asia.

However, heavy rains during the latter part of the growing cycle have slowed harvest operations and, in some cases, increased the risk of seed discolouration and fungal infection. Lodging – where plants fall over due to saturated soils and wind – has also been reported in isolated areas. While sunflowers are known for their resilience under dryland conditions, persistent wetness can quickly erode quality and reduce extraction efficiency at the processing stage.

The 2025/26 season's deliveries show that the first ten weeks of deliveries amounted to 279 065 tonnes (*Table 1*), which is approximately 38% of the expected deliveries as per the third production estimate by the Crop Estimates Committee (CEC). The deliveries are updated each week and can be found on *www.sagis.org.za/weekly_prod_deliveries.html.*

Soya beans

South Africa's soya bean industry has grown significantly over the past decade,

Figure 1: Deviation from mean rainfall. (Source: Grain SA and GeoTerra)

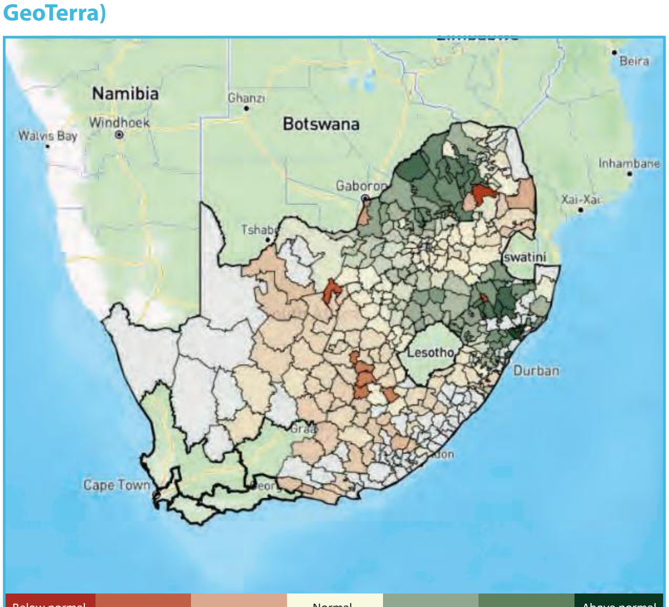


Figure 2: Total rainfall. (Source: Grain SA and GeoTerra)

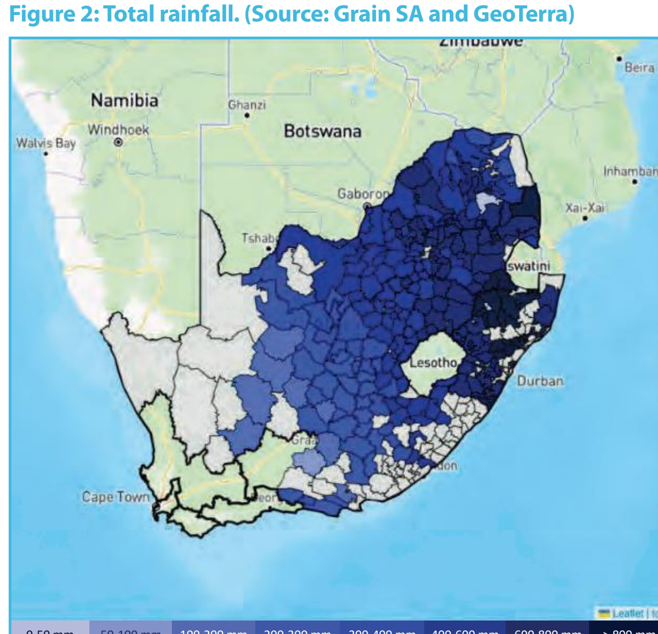


Table 1: Delivery estimate vs CEC estimate, 2025/26 marketing year. (Source: Grain SA)

	Sunflower
Total deliveries (tonnes)	**279 065**
CEC production estimate (tonnes)	742 800
Adjustment for on-farm consumption and storage (tonnes)	–
Adjustment for seed retention	–
Crop estimate minus farm consumption, storage, seed retention, etc.	**742 800**
Deliveries as % of CEC estimate minus retentions (%)	**37,6%**
Outstanding after adjustment (tonnes)	463 735
Remaining weeks for delivery	42
Delivery tempo needed to obtain CEC estimate	**11 041**

Table 2: Delivery estimate vs CEC estimate, 2025/26 marketing year. (Source: Grain SA)

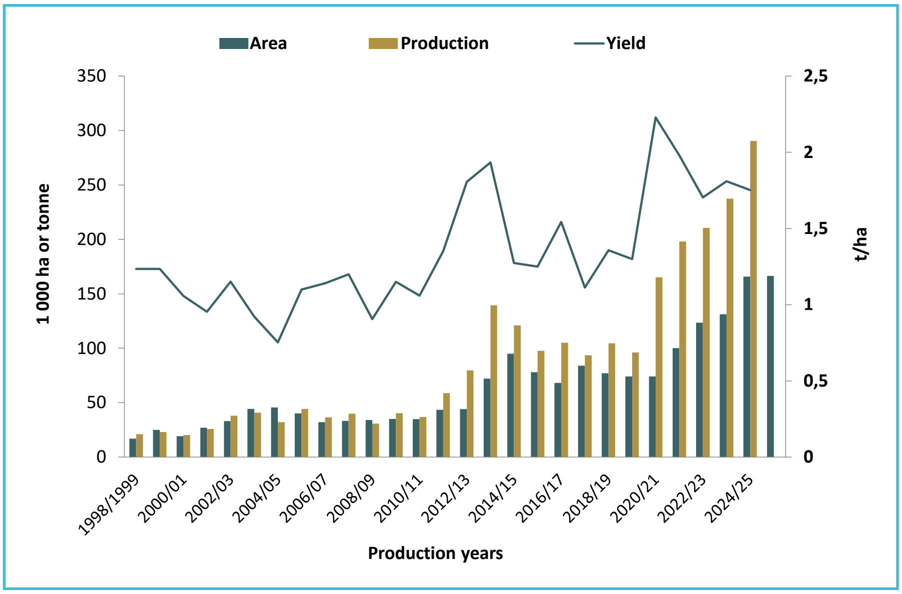
	Soya bean
Total deliveries (tonnes)	**977 797**
CEC production estimate (tonnes)	2 330 975
Adjustment for on-farm consumption and storage (tonnes)	44 000
Adjustment for seed retention	–
Crop estimate minus farm consumption, storage, seed retention, etc.	**2 286 975**
Deliveries as % of CEC estimate minus retentions (%)	**42,8%**
Outstanding after adjustment (tonnes)	1 309 178
Remaining weeks for delivery	42
Delivery tempo needed to obtain CEC estimate	**31 170,90**

driven by increased local crushing capacity as well as strong demand from the animal feed sector along with increased exports. This season, planted area once again surpassed the 1 million ha mark, confirming soya beans as a central player in the country's oilseed strategy.

In the first ten weeks of deliveries for the 2025/26 season, a total of 977 797 tonnes had been delivered, making up approximately 43% of the total expected deliveries based on the third production estimate of the CEC. At the same time last year, 1 166 111 tonnes of soya beans had been delivered, indicating that this year's pace is lagging. Deliveries are also lagging the five-year average pace of 1 255 465 tonnes. *Table 2* indicates the delivery pace needed to reach the estimated 2 330 975 tonnes.

Soya bean meal remains a staple protein source for the country's poultry and livestock industries, and domestic crushers are maintaining steady demand. On the global front, softer prices out of South America have created a more competitive environment, but South Africa's relative self-sufficiency in soya bean processing continues to buffer producers from major international price shocks.

Figure 3: Canola area planted, production and yield. (Source: Grain SA)



Canola: A rising star in the Cape

While much of the oilseed sector is focussed on harvesting, the Western Cape is in the midst of another record-breaking canola planting according to the intentions to plant by the CEC. Producers have responded enthusiastically to strong processor demand, and the rotational benefits canola brings to cereal-based systems.

The estimated hectares planted increased from 165 750 the previous season to 166 500 this season. Canola oil's growing reputation as a heart-healthy product with versatile food and industrial applications continues to support both domestic use and exports.

Looking ahead

The 2025 oilseed season in South Africa presents a complex picture. On the one hand, increased planting areas, strong local demand, and export potential offer real opportunities for growth and resilience. On the other, climate variability, quality management, and logistical constraints continue to test producers' agility and margins.

Still, the outlook remains broadly optimistic. If weather conditions stabilise in the coming weeks and harvesting can proceed at pace, South Africa's oilseed producers may yet turn a challenging season into a profitable one.

For more information, email marguerite@grainsa.co.za or visit *www.grainsa.co.za*.

Soya beans: New season crop

By Lourens Uys, oilseeds trader: grain, Bester Feed & Grain

South Africa's soya bean sector is rebounding strongly, driven by improved weather conditions, technological advances, and an increase in production. As the 2025/26 season approaches, producers must navigate climate risks, market pressures, and leverage new opportunities to sustain growth and boost competitiveness in both regional and global markets.

Climate variability

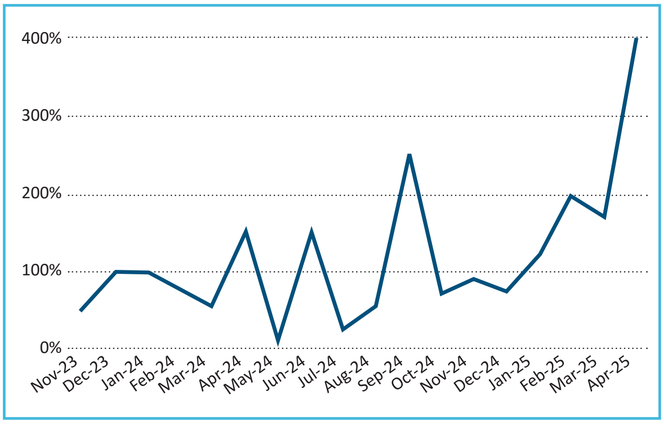
As we saw from January to April this year, weather patterns are expected to fluctuate significantly going forward. Producers should remain vigilant about potential climate anomalies that could impact yields and planning going forward.

Market dynamics

With harvest pressure pushing the markets down, staying informed about global supply trends and domestic demand shifts will help producers to make timely marketing decisions. Global soya bean prices are under pressure due to high global stocks, particularly from major producers such as Brazil. This surplus may lead to price moderation in the coming seasons. South African producers are advised to consider forward contracts or hedging strategies to mitigate potential price volatility.

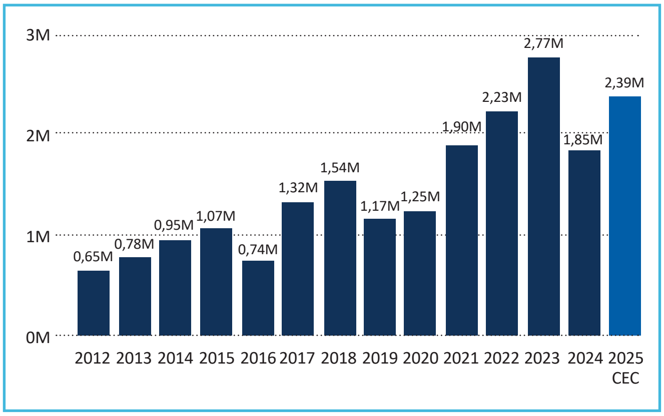
Lourens Uys.

Figure 1: Rainfall from November 2023 to April 2025 (% of median/mm). (Source: *www.octopusbot.ai*)



Percentage of median for the first four months of 2025: January – 121%, February – 193%, March – 168%, April – 397%.

Figure 2: Actual and estimated production (tonnes). (Source: *www.octopusbot.ai*)



Crop forecast

South Africa's soya bean industry is experiencing a significant rebound in the 2024/25 season, following a challenging 2023/24 period marked by drought and disease outbreaks. The Crop Estimates Committee's latest production estimates for the 2024/25 season indicate a 26% increase in soya bean production, reaching 2,3 million tonnes. This growth is attributed to improved weather conditions and proactive disease management.

Investment in breeding and technology has been pivotal in bringing about this recovery. The South African Cultivar and Technology Agency has facilitated the development of new soya bean varieties, enhancing yield and quality. This initiative led to more sustainable cultivation practices and increased processing capacity, reducing the need for imported soya bean oilcake and oil.

Looking ahead, South Africa's soya bean industry is poised for continued growth. With advancements in seed technology and favourable weather conditions, production is expected to increase, positioning the country as a key player in regional soya bean exports. If the projected production of 2,3 million tonnes is realised, it will be the second biggest harvest South Africa has ever produced.

Specialisation

The outlook for soya beans in South Africa presents clear opportunities but also challenges that require informed, strategic action. At Bester Feed & Grain we specialise in providing producers with expert support throughout the value chain. Our soya bean specialists focus on managing market risks, optimising sales strategies, and supporting long-term sustainability.

World oilseeds markets and trade, May 2025:

Slower soya bean supply growth limits carryout gains

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

Global oilseed production in 2025/26 is forecast at a record 692 million tonnes, up 2% compared to the 2024/25 marketing year. Production gains are led by higher soya bean output in South America, but at a lower rate of growth than in recent years. Following last year's drought that reduced yields across Europe, sizeable recoveries are expected for both rapeseed and sunflower seed.

Global soya bean production is forecast to rise nearly six million tonnes to almost 427 million tonnes on a larger Brazil crop, despite lower soya bean harvests expected in the United States (US), Canada, and Argentina. Global rapeseed production is expected to rebound over 5% on gains in the European Union (EU), Canada, and Russia, far outpacing declines in the US, the United Kingdom, and Ukraine. World sunflower seed production is forecast to grow four million tonnes on substantial recovery in the EU, Ukraine, and Russia. Other oilseeds including peanut, palm kernel, and copra are also expected to grow marginally.

Global oilseed consumption is forecast to rise 3% in 2025/26, driven by increased soya bean, rapeseed, peanut, and sunflower seed crush. Global oilseeds crush is forecast at a record 580 million tonnes, largely on increased soya bean utilisation and recovery in sunflower seed and rapeseed crush. Global soya bean crush is projected to grow on higher crush in China, the US, Brazil, and Argentina, as well as in importing countries such as Egypt, Bangladesh, and Pakistan. Global rapeseed crush is forecast to expand by nearly 2% as crushing increases across the globe, notably so for the EU, India, and Canada.

Brazil leads global exports

Global oilseed trade is forecast to grow 3%, almost entirely on soya bean exports which offset a decline in rapeseed exports. Record Brazil soya bean exports contrast with slightly lower US exports due to a smaller crop and increased domestic utilisation. Import growth is led by China, Argentina, Egypt, Pakistan, and Bangladesh soya bean imports. Rapeseed trade is forecast to decline nearly 4% on decreased EU imports as its domestic production recovers.

Global oilseed meal production is forecast to grow 3% to 400 million tonnes led by raised soya bean crush in China, the US, Brazil, and Argentina. Sunflower seed meal production is forecast to increase 10% as EU and Ukraine sunflower seed crush recovers. Global oilseeds meal consumption is forecast to grow nearly 4% on increased soya bean meal demand within China, Brazil, the US, and Southeast Asian countries. Sunflower meal consumption is forecast 10% higher, driven by consumption gains in China and the EU.

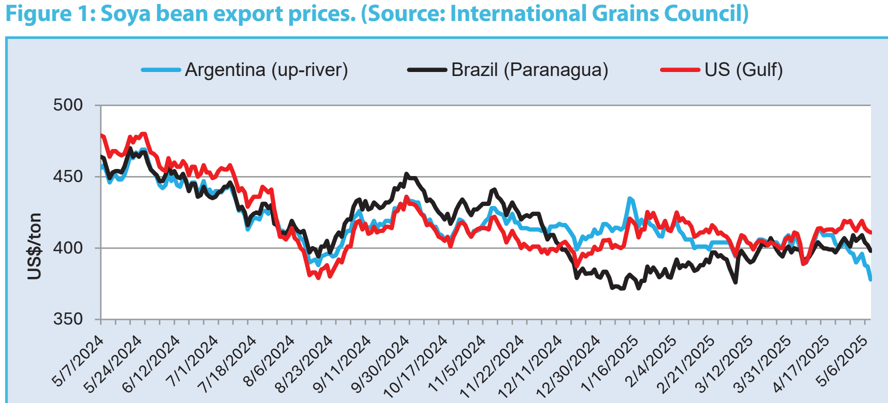
Commodity outlook for 2025/26

Global soya bean production is forecast at a new record in 2025/26, with yet another record crop in Brazil driving global production despite smaller crops in North America. Soya bean imports are forecast at a new record. Continued recovery in the oilseed processing sectors of Pakistan, Egypt, and Bangladesh accompanied by increased crush from global soya bean importers continues to push global imports higher. Record soya bean exports are expected from Brazil, aided by an ample crop. Argentina imports are forecast up on higher supply in Paraguay.

Global soya bean stocks are expected to increase slightly. China is forecast to hold stocks at a similar level to the preceding year. Carryout in the US is expected to fall to eight million tonnes on a smaller crop and increasing crush utilisation. Argentina and Brazil are expected to slightly increase ending stocks in 2025/26 (October to September) when compared to the preceding year.

Global soya bean consumption is forecast to rise in all major markets but

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.

the EU, driven by growth in global feed demand and competitive soya bean meal prices. Higher domestic consumption is increasingly supported by higher domestic processing of soya bean rather than increased trade. Soya bean meal trade is forecast at a new record, but growth is expected to slow from the robust gains in recent years. Argentina, the leading soya bean meal exporter, is forecast to modestly increase exports, with similar gains expected from the US.

Global soya bean oil production is forecast to grow to a new record in 2025/26, but exports are expected to fall compared to the preceding year. Higher production in Brazil and the US is expected to be captured by domestic use. Due to growing crush in major soya bean importing countries, soya bean oil stocks are expected to grow slightly in 2025/26 despite reduced trade in oil.

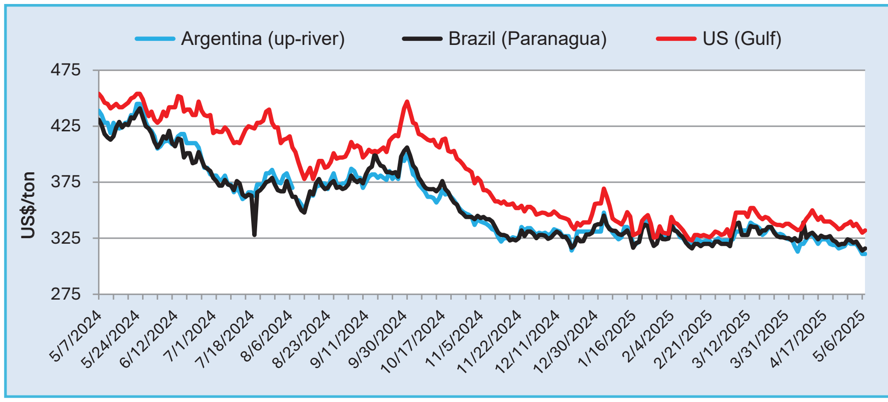
Global rapeseed production in 2025/26 is forecast at near record levels on the highest area estimate on record, partially offset by trend yields. Canada is expected to remain the top producer, closely followed by the EU. Rapeseed exports are expected to decline, largely on reduced Canada exports on account of reduced carryin. The recent uptick in China's purchases of rapeseed in reaction to tariffs on Canadian rapeseed products contribute to lower global 2025/26 beginning stocks.

Rapeseed crush is forecast at a record on an expected recovery in EU utilisation of rapeseed and higher crush in Canada and India. Global ending stocks are largely unchanged with higher production in 2025/26 halting the drawdown of stocks seen in 2024/25.

Despite record crush, rapeseed meal trade is not expected to grow in 2025/26. China imports of rapeseed meal are expected to continue declining in 2025/26 as it seeks less costly alternatives to Canada rapeseed. Rapeseed oil exports are similarly expected flat year over year and Canada is expected to ship less in 2025/26. The production of rapeseed meal and oil in Canada is still expected to grow, but at a slower pace. Despite announced growth in Canada's crush capacity, lower canola meal exports to China and uncertainty over the US biofuel policy are expected to constrain utilisation.

Recovery is expected in global sunflower seed production on improved yields in

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



continental Europe. Leading the recovery are the EU and Ukraine, with Russia and Turkey also boosting production. Consistent with higher production, crush is expected to rise in the aforementioned countries.

The recovery in sunflower seed crush will enable a rebound in sunflower seed products from three-year lows realised in 2024/25. Substantial increases of sunflower seed oil imports are expected in China and India, largely for food use. China is also expected to expand imports of sunflower seed meal as it seeks alternatives to rapeseed meal.

Global overview 2025/26

Global oilseed production is forecast higher in 2025/26 on increases in Brazil soya bean, EU, Canada, and Russia rapeseed, and EU and Ukraine sunflower seed. Accordingly, crush, trade, and ending stocks are all expected higher. Crush is elevated on higher processing of soya bean in China, the US, Argentina, and Brazil. Ukraine and EU sunflower seed also contribute to the growth in crush. Oilseeds trade is forecast higher on Brazil soya bean exports. Global oilseed carryout is slightly higher on growth in soya bean, peanut, cottonseed, and rapeseed global ending stocks. The US is expected to draw down soya bean ending stocks.

Global meal trade is up due to increases in the US and Argentina soya meal exports. Global oil production is forecast higher on increases to China and US soya oil, Indonesia and Malaysia palm oil, and Ukraine and EU sunflower seed oil.

Global overview 2024/25

Global oilseed production is raised slightly on upward revisions for Central African Republic peanuts as well as Zambia and Uruguay soya bean, which are not offset by a downward revision for Paraguay soya bean. Oilseed trade is reduced on lower shipments from Brazil, Paraguay, Ukraine, and Argentina soya bean exports, despite an increase in US exports. Global crush is decreased on lower China and South Korea soya bean and Ukraine sunflower seed processing. Global oilseed carryout is higher, largely on higher Brazil soya bean and China rapeseed stocks.

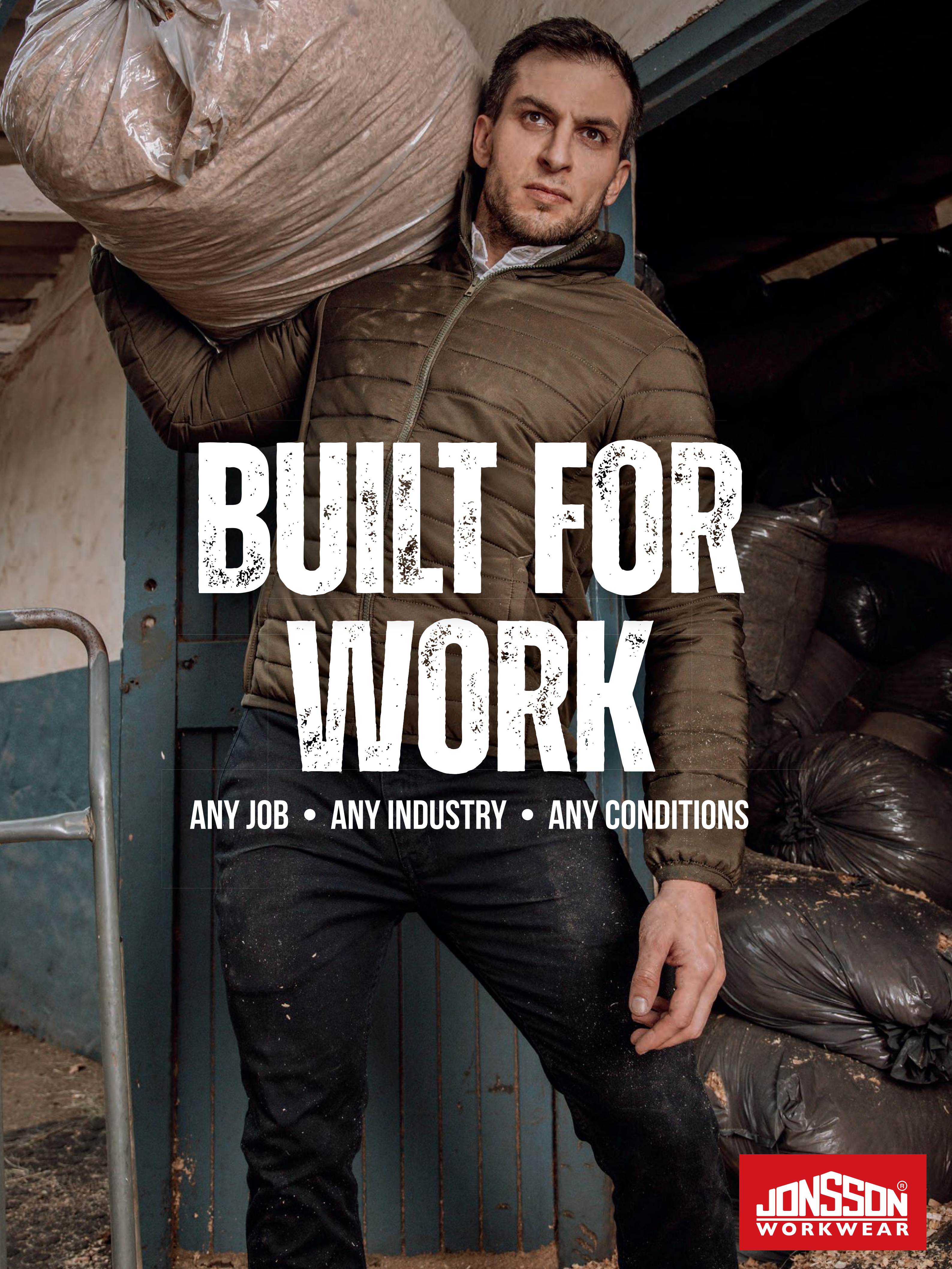
Global protein meal trade is decreased on lower shipments of Ukraine sunflower seed meal coupled with China and EU soya bean meal exports.

Export prices

Soya bean prices have rebounded from the brief drop at the beginning of April in response to tariff announcements. Brazil and US soya bean prices have remained relatively constant while Argentina soya beans have declined since mid-April on the devalued Argentine peso. Soya bean meal prices generally tracked with soya beans and have remained fairly constant. Argentina soya bean meal remains the most price competitive.

Brazil and Argentina soya bean oil prices slowly tracked downwards over the past month while US soya bean oil prices increased steadily since mid-April. US soya bean oil prices surpassed other vegetable oils and is selling at a premium in comparison to Brazil and Argentina oil. The price increase is likely attributed to robust domestic and export demand. The price of EU rapeseed oil continues to remain high on tight supplies.

For more information and the full report, visit *www.fas.usda.gov*.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Repositioning South Africa's agriculture to respond to global uncertainty in a multipolar trading system

By Wandile Sihlobo and Tinashe Kapuya, Agbiz

The upheaval of the global geo-economic and political landscape creates heightened uncertainty, which demands a set of interventions that can effectively reduce risk, preserve economic interests, and continue to grow the country's economy through its export-led strategy. In that sense, a need for export expansion to new markets is necessary.

To the careful observer, export diversification is not a new conversation; it is a discussion that began well before the anticipated higher tariffs in the United States (US) market. The motivation for export expansion was premised on the projected growth of South Africa's agricultural output, particularly fruit, red meat, wine, and grain production, all of which will require markets that can absorb expanding exports. Strategically, diversifying exports across different markets helps the sector to reduce the risk of over-reliance on few dominant markets.

We share a few thoughts on how South Africa can begin to navigate the Trump tariffs, while ensuring that it enhances its prospects for growth through export diversification.

Enhancing growth prospects

This export diversification builds on an environment in which South Africa has made significant progress and is now among the key agricultural exporters in the world. Last year, the country was ranked 32nd with exports totalling US$13,7 billion, up 3% from the previous year, according to data from Trade Map.

South Africa also imports various agricultural products. Last year, South Africa's agricultural imports amounted to US$7,6 billion, making the country an exception in Africa as a net exporter of agricultural products, with a surplus that is ever expanding.

From a regional perspective, the African continent maintained the lion's share of South Africa's agricultural exports last year, accounting for 44% of the total value. The products leading the exports list in the African continent were maize, maize meal, wheat, sugar, apples and pears, fruit juices, wine, soya bean oil, sunflower oil, oilcake, and rice, among others.

As a collective, Asia and the Middle East were the second-largest agricultural markets, accounting for 21% of the share of overall farm exports last year. The exports to this region were mainly citrus, nuts, apples and pears, wool, berries, sugar, beef, mutton, wool, wine, fruit juices, maize, apricots, and peaches. The European Union (EU) was South Africa's third-largest agricultural market, with a share of 19%. Citrus, grapes, wines, dates, avocados, pineapples, fruit juices, apples and pears, berries, apricots and cherries, nuts, and wool were among the top agricultural products South Africa exported to the EU in 2024.

The Americas region accounted for 6% of South Africa's agricultural exports last year. The main exported products include citrus, grapes, wine, fruit juices, and nuts. The rest of the world, including the United Kingdom (UK), accounted for 10% of the exports.

Need for export diversification

Over the past two-and-half decades, South Africa has enjoyed duty-free, quota-free market access into the US under the African Growth Opportunity Act (AGOA) preference programme. However, the Trump tariffs presented an abrupt end to AGOA by introducing tariffs that will likely have some profound and long-term implications for South Africa and other markets globally. The new tariffs, previously set at 31%, but now (at the time of publication) temporarily set at 10% for a period of 90 days, present greater urgency for export diversification.

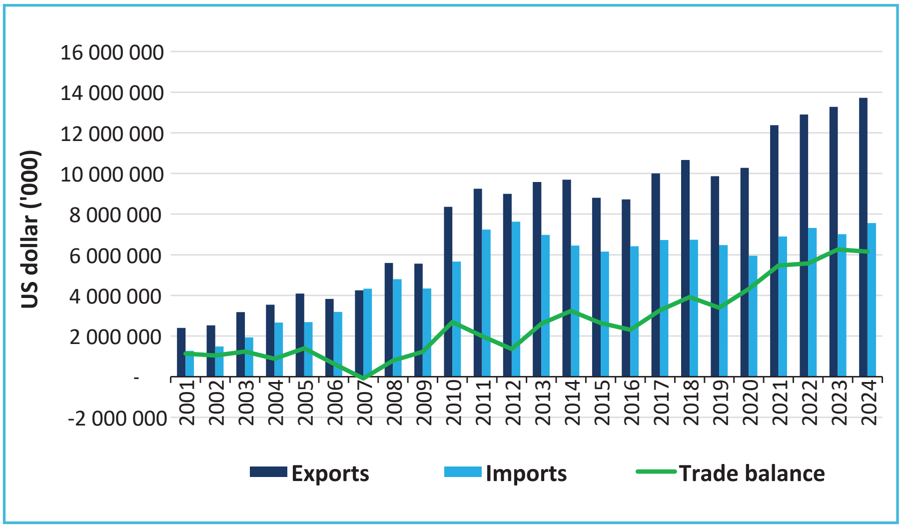
Export diversification will take time to achieve. New markets take time to open up and develop, as negotiations with countries, especially relating to agricultural products, are complex. For example, it took 16 years for South Africa to reopen Thailand for apple exports.

Moreover, reciprocal trade agreements typically take a minimum of five years to conclude. Given that establishing a reciprocal trade arrangement is likely to take time, it will be important to establish interim processes and procedures that can resolve immediate challenges.

First, the broader agricultural industry stakeholders can play a constructive role in supporting government's efforts to engage the US government and its own constituencies by providing data and information that can provide the scope and scale of the impact of the increased US tariff on their exports.

Second, the government needs to negotiate in earnest the existing tariff and

Figure 1: Trade balance. (Source: Trade Map and Agbiz Research)



technical barriers, and how these can be resolved expediently, in order to establish parity and access to market for US products in South Africa.

Third, and in the long term, the government, together with its Southern African Customs Union (SACU) and SADC partners, need to urgently lay out a framework for a reciprocal trade agreement with the US. It seems for all practical intents and purpose, that this round of tariffs by the Trump administration signals the end of the US preference programmes – including GSP and AGOA.

Long-term trade approach

The approach to resolving the US tariffs imposed on South Africa, and the consequent need for reciprocal trade agreements to retain market access to the US, necessitates a much broader discussion around what and how South Africa should approach strategic market diversification.

There are three key considerations that ought to frame these discussions:

- Social partnership dialogues and public-private partnerships (PPP) engagements.
- Identifying and prioritising key markets for expansion, including China, the Middle and Far East, and the US.
- Consolidating and strengthening negotiation for market access through regional blocs, in particular, SACU.

As a matter of urgency, South African trade authorities should put resources into understanding the opportunities in dynamic markets in the Gulf and Asia. Saudi Arabia, the United Arab Emirates (UAE), and Qatar are some of the key markets in the Gulf. Asia, China, India, and Vietnam should remain priorities. The Middle East has more potential for expansion, as it is not as saturated as the EU, and there are no competing domestic farmer interests in this region.

While a big share of South Africa's agricultural products is already being exported to the Middle East, the presence of South African agriculture in this region is arguably still peripheral. For example, according to Trade Map data, Saudi Arabia imports approximately US$25 billion in agricultural products annually. South Africa is one of the smaller exporters, accounting for 1% of that country's imports, ranking 31st in its agricultural imports list.

Moreover, the UAE is a large agricultural market that imports approximately US$22 billion of agricultural products annually. South Africa has a 2% share and is the 16th largest supplier. Qatar imports approximately US$4 billion of agricultural products a year. But here, South Africa also plays a minor role, ranking tenth in the list of suppliers and having a 2% market share in Qatar's agricultural imports.

The Middle East and China

China offers the biggest opportunity, largely due to its population and economic size. South Africa should position itself among the key suppliers of agricultural products to China in addition to its current export activity. The leading suppliers of agricultural products to China are Brazil, the US, Thailand, Australia, New Zealand, Indonesia, Canada, Vietnam, France, Russia, Argentina, Chile, Ukraine, the Netherlands, and Malaysia.

The only African country in China's top 30 agricultural suppliers is South Africa, which ranked 28th in 2023. Still, South Africa remains a negligible player in the Chinese agricultural market, accounting for a mere 0,4% (US$979 million) of China's agricultural imports of US$218 billion in 2023. Sudan and Zimbabwe are other African agricultural suppliers to China, ranked 33rd and 34th, respectively.

South Africa has an agricultural surplus each year, exporting about half of its yearly production. In 2023, South Africa's agricultural exports amounted to a record US$13,2 billion. Indeed, this is nowhere close to the amount of money China spends annually importing agricultural products from the world, a staggering US$218 billion. China is already one of South Africa's major agricultural markets for various fruits, wine, red meat, nuts, maize, soya beans, and wool. However, there is room for more ambitious agricultural export efforts.

The South African agricultural sector – organised agriculture and researchers – consistently points to the need to lower import tariffs in China and remove phytosanitary constraints on various products. This should be a topic of conversation in engagements with Chinese authorities.

An African collective

South Africa is also part of the African Continental Free Trade Agreement (AfCFTA) and has secured critical market access into parts of West and North Africa for agricultural products. The African continent is the largest trading partner for South Africa's agriculture, accounting for 44% of the total value last year, but there are prospects for growth, despite the risk of this higher saturation from Asian and Middle Eastern competition. Retaining and growing the current export markets, such as the African continent, is critical for South Africa's agriculture.

There is strength in numbers, and as a larger collective, Africa can use its common interests and leverage its combined size to negotiate for market access to countries such as the US and China.

The AfCFTA is a natural anchor for moving regional and continental market access negotiations. However, given that the AfCFTA is heterogenous, and still finding its feet as countries seek to integrate their economies, the natural fallback for pushing market access positions abroad is SACU. However, SACU comes with its own unique set of challenges, with fractures threatening to weaken the continent's oldest customs union.

In the recent past, some trade friction in South Africa's trade relations with the SACU partners became increasingly apparent, as Botswana banned imports of vegetables from South Africa, which extended until December last year. Namibia followed suit.

Each country's rationale for banning vegetable imports was that they were building their domestic industries and required cushioning. Previously, Lesotho banned mohair exports into South Africa, and all these bans on agricultural products add uncertainty and weigh negatively on business. Moreover, they have fuelled a lingering political sentiment in some quarters that SACU needs a review.

In the wake of SACU's weakened position, it must become a priority for South Africa and the BELN partners to make deliberate efforts to strengthen and deepen trade, and consolidate SACU, as a means of presenting negotiating positions as a regional bloc.

The SACU relationship should also be maintained, and the focus must not be primarily on the EU, US, BRICS, and others. It is through such an approach that South Africa's agricultural sector will secure lasting export markets that are essential to South Africa's plans to grow the domestic agricultural sector.

Export market expansion

South Africa should maintain its focus on improving logistical efficiency. This entails investments in the port and rail infrastructure and improving roads in farming towns. Secondly, the role-players must work hard at retaining the existing markets in the EU, on the African continent, and in Asia, the Middle East, and the Americas.

The state departments referred to previously must lead the way for export expansion in the current export markets and the search for new export markets. South Africa should expand market access to key BRICS countries such as China, India, Saudia Arabia, and Egypt. The BRICS grouping should emphasise the need for member countries to lower import tariffs and address artificial phytosanitary barriers hindering deeper trade within this grouping.

Other strategic export markets for South Africa's agricultural sector include South Korea, Japan, Vietnam, Taiwan, Mexico, the Philippines, and Bangladesh. The private sector and the South African government share the ambition of export market expansion. In the current fragmented world, more resources and marketing must be used to perform this work.

This article has been shortened for publication. For references and the complete version, email the authors at wandile@agbiz.co.za or tinashe@agbiz.co.za.

Dynamics and versatility of the soya bean industry in the 2024/25 marketing year

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

By now we are all familiar with the effects of the drought that lasted from November 2023 to February 2024, and the impact it had on production yields and volumes. We tend to forget, however, that the downstream industries – such as trade, crushing and processing plants, and ultimately the consumers – only started feeling the impact of this after the crop was harvested in May last year. These entities had to adjust quickly to new and diverse supply chains. Their immediate focus was to service their customers; however, the most important motivation was survival.

Maize and soya bean production was significantly impacted, resulting in a notable shift in South Africa's trade position from exporter to importer of yellow and white maize, as well as soya bean and soya bean cake. While South Africa's own maize and soya bean production was sufficient to cover domestic consumption, the extent of the regional drought had not been fully anticipated. As neighbouring countries also experienced significant crop failures, their demand for South African grain surged beyond expectations.

This unexpected export pressure exacerbated local supply constraints and pushed domestic prices to record-high import parity prices. Members of the South African Cereals and Oilseeds Trade Association (Sacota), China Oil and Foodstuffs Corporation (COFCO), Seaboard, and Ameropa started to import yellow maize, soya bean cake, white maize, and soya bean from Argentina, Brazil, and the United States (US).

Soya bean

South Africa's soya bean production – available for the 2024/25 marketing year – declined by 930 000 tonnes (34%), dropping to 1,84 million tonnes. With ending stocks at just 141 000 tonnes, it was significantly lower than the 320 000 tonnes carried over from the previous year.

Despite limited local availability, South Africa still exported 334 552 tonnes of soya beans and soya bean products, mainly to drought-affected neighbouring countries such as Zimbabwe and Mozambique. Whole soya bean exports amounted to a total of 150 238 tonnes, mostly to Zimbabwe (105 950 tonnes). Unfortunately, the total of 150 000 tonnes is skewed since it included a late shipment of the previous season (2023/24) by the Export Trading Group (ETG) that was loaded in early March last year for export to Vietnam.

As domestic demand grew around March to May last year, local prices

Figure 1: South African soya bean exports 2024/25.

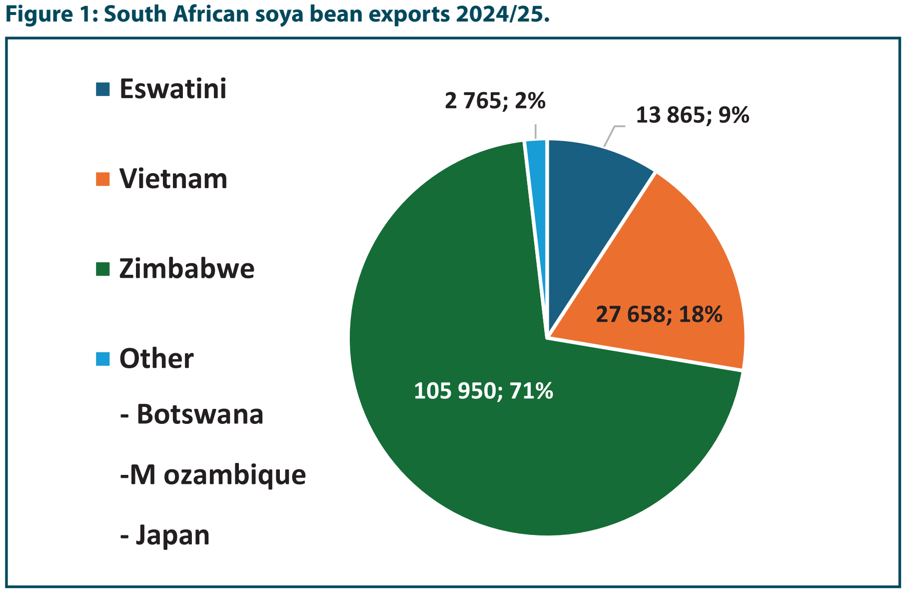
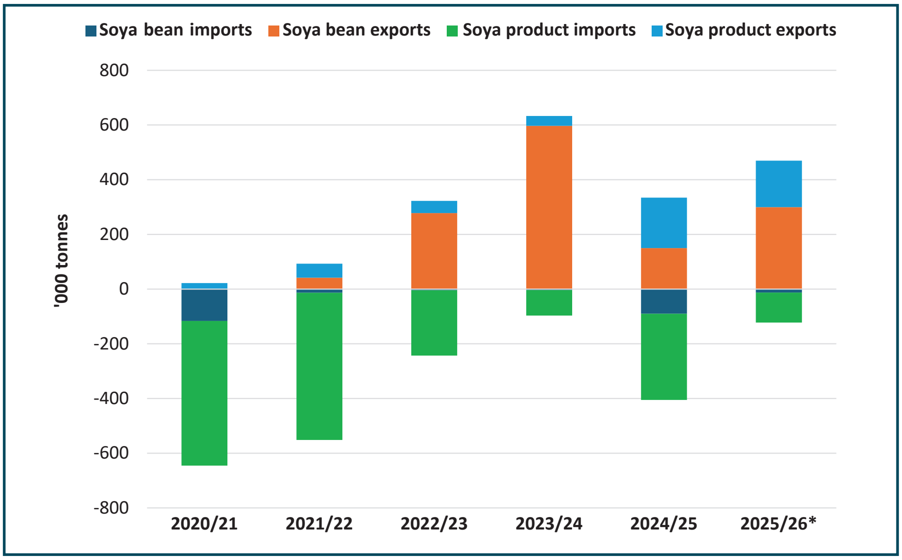


Figure 2: Yearly soya bean and soya bean product imports and exports.



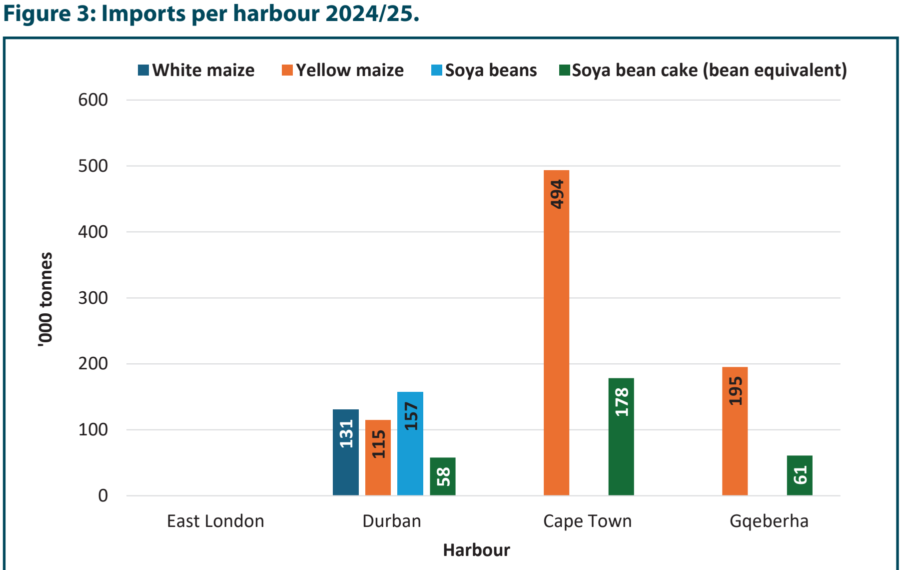
**Projection – data reflects an aggregated National Agricultural Marketing Council (NAMC) and industry view.*

surged by nearly 20%. Sacota members began sourcing soya bean cake and seed internationally, and imports continued throughout 2024/25. *Figure 1* depicts the strong demand from Zimbabwe. Eswatini also has its own crushing plant owned by Eswatini Oil Mill Industries (SOMI), which utilises approximately 10 000 to 15 000 tonnes of soya bean per month – more than 13 000 tonnes of soya beans were exported to Eswatini.

Some 223 000 tonnes of soya bean cake were imported, more than triple the previous season's volume, and Seaboard Trading took the initiative and was the sole importer and supplier. Further to the soya bean cake imports, approximately 160 000 tonnes of whole soya bean were imported from the US between November last year and April this year and in this case, Ameropa took the initiative and acted as the sole supplier.

Figure 2 depicts the dramatic change in the trend line during 2024/25. During the preceding four years, local soya bean production surged to such an extent that substantial volumes were exported in 2022/23 (270 000 tonnes), and again in 2023/24 (590 000 tonnes). And then the drought struck. However, the 2025/26 crop looks promising and although it will not fully recover to the trend line, Sacota forecasts a sharp reduction in imports and a resumption of deep-sea soya bean exports, albeit in limited volumes – the latter will depend on the final size of the crop.

Figure 3: Imports per harbour 2024/25.



Maize import data 27 April 2024 to 11 April 2025 (Sagis).

Trade flow dynamics and patterns

Due to a very successful maize and soya bean export season during the two to three years preceding the drought year, trade patterns established themselves in terms of wheat and rice imports and maize and soya bean exports. This was coupled with declining soya bean cake imports due to the growth of the soya bean crop size and local crush.

This was suddenly disrupted in 2024/25. Local maize availability declined by 22,5%, (white maize [WM] 29,3% and yellow maize [YM] 15,4%) as determined by the Crop Estimates Committee. These declines occurred alongside aggressive cross-border exports, with South Africa supplying over 2,4 million tonnes (including products) to regional markets until March this year, of which approximately 50% was exported to Zimbabwe – a record for the period.

Faced with domestic tightness and regional demand, South Africa resorted to importing a substantial amount of maize – 509 684 tonnes of YM – for the first time since 2019/20. For the 2024/25 season a total of 820 000 tonnes of YM is expected to be imported, including 690 000 tonnes from Argentina and 106 000 tonnes from Brazil, while 9 000 tonnes were imported from the US. White maize, which had not been imported since the 2016/17 drought, was imported from the US and is expected to total 131 000 tonnes for the season.

Figure 3 illustrates the imports per harbour. Given the high transportation costs from inland production areas to supply product to the feed millers around Cape Town, when prices start to increase due to reduced production volumes and stocks, Cape Town will be the first to import. It is often said that it costs as much to transport a tonne of YM from Argentina to Cape Town as it is to transport from the inland production areas to the same city. Depending on the extend of the national shortage, imports would move higher up the coast to Gqeberha and then Durban, which is exactly what transpired this season.

In addition to maize, soya bean, and soya bean cake imports, South Africa also imported 2,14 million tonnes of wheat, according to the South African Grain

Table 1: Approved events in the exporting countries versus those in South Africa.

		South Africa	Argentina	Brazil	US	Canada
Soya bean	Approved per country	23	22	23	26	34
	Originally not sync		6	8	13	14
	Outstanding events		6	0	0	0

Information Service (Sagis), and 950 505 tonnes of rice from May 2024 to February this year, according to the South African Revenue Service (SARS). The majority of these imports were handled through the Port of Durban.

GMO synchronisation

In order for South Africa to import genetically modified (GM) soya bean or maize, registered events approved in the exporting country also need to be approved in South Africa for commodity release or general release. If not approved in South Africa, confirmation from the exporting country must be obtained that those approved GM events have not been commercially released for cultivation and/or planted yet.

Since South Africa had no need to import product for at least five or more years, these lists were in asynchrony. It took a dedicated effort between Sacota, which took the lead on behalf of its members, and the former Department of Agriculture, Land Reform and Rural Development (DALRRD), now the National Department of Agriculture, foreign embassies, and multinational seed developers to obtain approval.

The first biosafety permit for YM was issued in April last year for Argentina and for soya bean from the US in September in the same year. *Table 1* indicates the approved events in the exporting countries versus those in South Africa. More importantly, the events that were not in synchrony and that needed confirmation that it had not been commercially released previously, were required.

Expectations for the 2025/26 season

Given a significant increase in the production outlook for soya bean and maize this season, we are likely to see a resumption of deep-sea exports, although in limited quantities. Soya bean production estimates are on the rise with current expectations of a 29% increase compared to the previous year. The crop is estimated at 2,39 million tonnes compared to 1,84 million tonnes last year.

It may be that some vessels will depart through Durban during peak harvesting season; a few months later imports through Cape Town could resume for YM and soya bean cake. However, this will depend on the final crop size for both commodities.

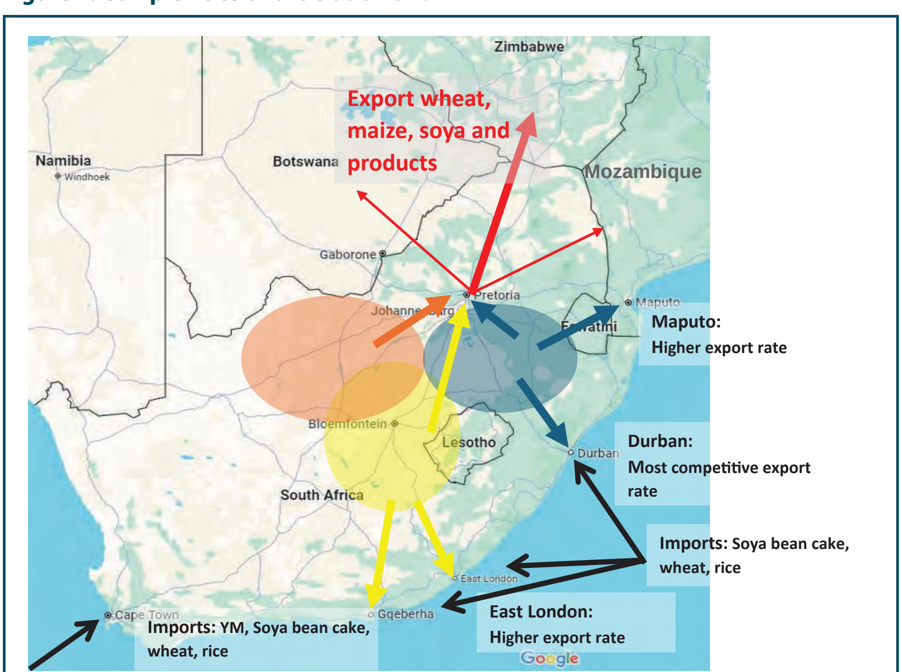
Late seasonal rains were beneficial for the crop, but in the case of soya bean there may have been some damage due to excessive rains. Soya beans are much more sensitive to rain when the pods have ripened than maize.

The other crucial factor will be cross-border demand from neighbouring African countries, with countries such as Zimbabwe, Zambia, and Mozambique that had a good production season. Sacota expects demand from these countries to significantly decrease, especially over the harvesting period until around October/November this year, and then it could increase again but not to the same degree as last season.

The dynamics in the South African trading environment have developed to such an extent that an annual supply and demand table does not reflect all the movement – sometimes it is required to break it into shorter periods to fully understand the product flows (or add more line items within a category). *Figure 4* illustrates the complexities of the trade flow.

These indicators are also based on annual information and as mentioned, shorter periods are more beneficial to gain a better perspective. Be that as it may, the availability of stock, local prices versus international prices, imports versus exports, and deep sea versus cross border will bring significant volatility in local prices and regions. Producers and stakeholders will have to be mindful of the potential impacts of these factors.

Figure 4: Complexities of the trade flow.



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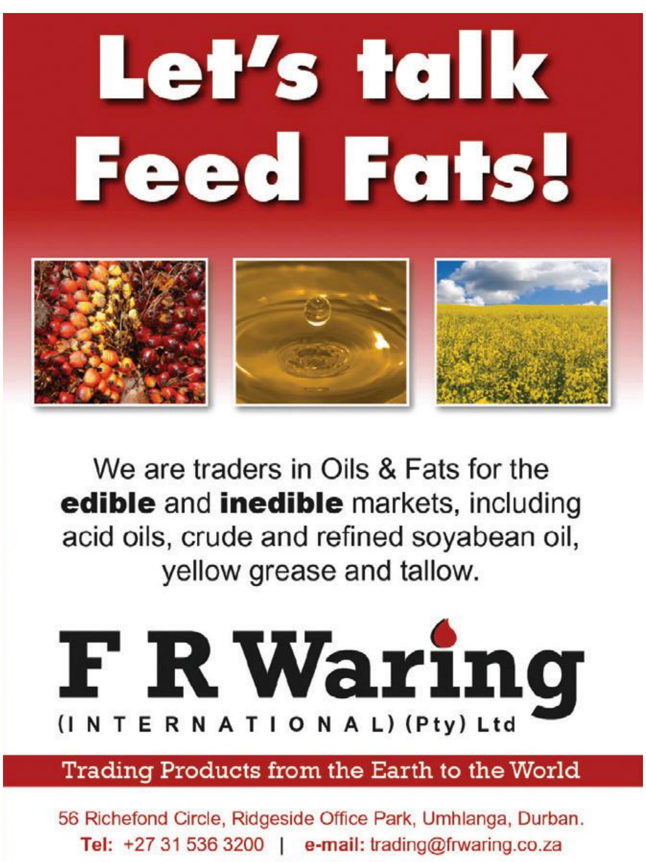
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Proficiency testing:
Improving soya bean analysis

By Theresa de Beer, specialist analyst, Southern African Grain Laboratory NPC (SAGL)

In South Africa, soya bean production is projected to reach 2,4 million tonnes in the 2024/25 season. This growth has been stimulated by the growing demand for soya bean oilcake by the animal feed industry, such as high-protein poultry feed, in turn driven by South Africa's increased consumption of poultry meat (NAMC, 2024).

Accurate determination of the nutritional composition of soya bean and soya bean oilcake (meal) is crucial to determine animal feed formulations and to achieve optimal processing targets. In comparison, the estimated demand of 22 000 tonnes in the 2024/25 season for human consumption may appear of little significance, but applications such as breakfast cereals and meat replacements require strict control of nutritional quality to ensure accurate formulations and support-related health claims.

Proficiency testing (PT) is a system used to objectively evaluate a laboratory's performance by comparing its results to those of other laboratories using the same samples. PT schemes ensure that laboratory results are accurate and reliable, which is crucial for making informed decisions based on those results. Participating in PT schemes further provides independent evidence of a laboratory's technical competence and the effectiveness of its quality assurance systems, and provides a way to benchmark a laboratory's performance against other laboratories, helping them to identify areas in which they excel or which may require improvement.

Soya bean proficiency testing

The soya bean PT scheme was developed in 2021 upon request of the oilseeds industry and is funded by the Oilseeds Advisory Committee (OAC) and the Oil and Protein Seeds Development Trust (OPDT). The Southern African Grain Laboratories NCP (SAGL) has presented this scheme since 2021 in four cycles per year (February, May, July, November) for both soya bean and soya bean meal. The soya bean PT provides for soya bean grading, the analysis of whole and milled soya bean (selected by participants according to their testing instrument capabilities and calibration), as well as soya bean meal (oilcake).

The participants conduct the analyses (using their own testing methods), and the results submitted by them are statistically analysed to provide an assigned value for each analyte, which is derived from the consensus of the results submitted by participants. This consensus value is established through interlaboratory comparison and discrepancies, such as incorrect reporting or outliers, resulting in a finalised value.

Where applicable, the assigned values are then used in combination with the standard deviation for proficiency to calculate a z-score for each result. Each individual z-score represents the decimal number of standard deviations by which an analytical result differs from the assigned value, where an absolute value of less than two is satisfactory, between two and three is questionable, and more than three is unsatisfactory.

Meaningful evaluation

Different statistical techniques are used to process the data, and among participants variation may exist between primary methods and NIR prediction models, resulting in a spread of results that necessitates determining the standard deviation of the proficiency assessment (SDPA). The use of a modified Horwitz model and robust statistics (MADe) is important to confirm that the SDPA used for a specific test is a 'fit for purpose' value in the specific application sector, to allow meaningful evaluation of the participants' performance.

After completion, participants receive a report compiled by SAGL, and in order to preserve confidentiality, each participant has their own uniquely coded results. *Figure 1* illustrates the use of statistics to evaluate a set of results, where the outlier result (participant 11) was excluded from the calculation.

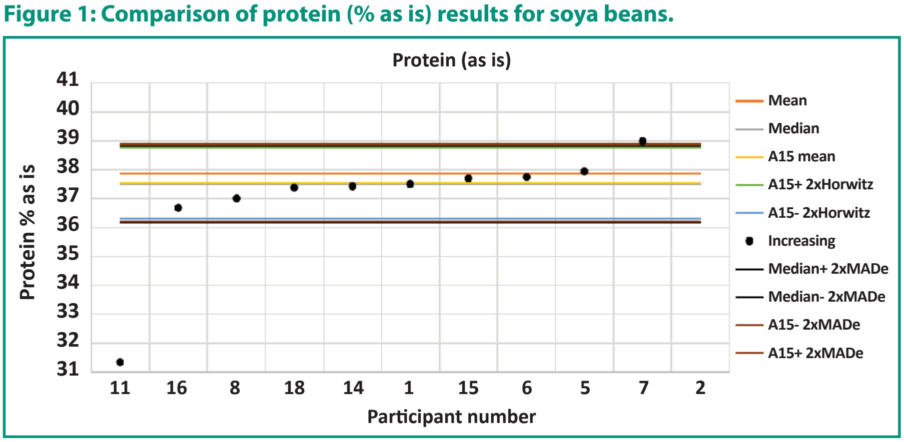

Figure 1: Comparison of protein (% as is) results for soya beans.

Conclusion

The soya bean PT scheme, with the financial support of the OAC and OPDT, offers role-players in the industry access to valuable information that can supplement their internal quality control systems, thereby improving their overall quality of service to the soya bean food and feed applications industry.

For more information,
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Nutritional quality of locally produced soya bean oilcake meals

By Prof Rob Gous, Stellenbosch University

The South African soya bean industry has been one of the fastest growing agricultural subsectors over the past two decades. The industry expanded production from a mere 264 000 tonnes on 165 000ha in 2008 to more than 2,7 million tonnes on 1,1 million ha in 2023. Consequently, the crushing levels of soya bean also increased and in 2023, for the first time in history, South Africa produced sufficient soya bean meal to meet local demand and replace all imports of the product.

Furthermore, South Africa exported 277 000 tonnes of soya bean in 2022/23 and during the 2023/24 marketing season, total exports reached almost 597 045 tonnes, while 334 552 tonnes were exported in the 2024/25 season. The local industry is transitioning from being dependent on imports to self-sufficiency. Local prices in the 2023/24 season shifted to export parity levels, which implied that local soya bean traded approximately 30% below the value of imported beans.

This significantly boosted crushing margins and volumes and put crushers in a position to offer significant discounts compared to soya meal import parity prices last season. In the 2024/25 season, 154 288 tonnes of soya bean were imported, mainly from the United States (US), and 176 987 tonnes of soya bean meal from Argentina due to local drought conditions.

Given the current crop estimate of 2,39 million tonnes, the National Agricultural Marketing Council's (NAMC) South African Supply and Demand Estimates Committee is projecting a crush of 1,92 million tonnes, full-fat soya production of 120 000 tonnes, and soya bean exports of 200 000 tonnes (Meyer, 2024, *Oilseeds Focus*; NAMC, 2025; Sagis, 2025).

South Africa currently has the capacity to process 2,5 million tonnes. Soya bean oilcake demand in the country is 1,4 million tonnes, which means the industry is sizeable and growing. The processing industry has invested hugely in equipment to heat-treat and extract the oil from soya bean seeds, thereby producing a high-quality oilcake product suitable for feeding poultry and pigs.

The Oil and Protein Seeds Development Trust (OPDT) has invested in research designed to evaluate the quality of the soya bean oilcake produced by the various commercial crushers on a continuous basis – this includes evaluating Argentine imports for South African pig and poultry producers. Testing of the performance of the various soya bean meals should also act as an early warning to the feed and broiler industry should any soya bean meal be likely to cause inferior broiler performance.

The Bureau for Food and Agricultural Policy (BFAP, 2021) produced a comprehensive document that addressed the key drivers of the quality of soya bean products for the feeding of poultry and pigs in South Africa. Some of the information that follows has been taken from that document.

Quality in a nutshell

The feed industry requires a reliable, consistent supply of soya bean meal from the seed crushers; these crushers meet stringent quality characteristics relating to oil and protein (amino acid) content, as well as the digestibility of proteins and amino acids (quality of soya bean meal).

The main characteristics that determine soya bean quality are low and uniform moisture content, a low percentage of foreign material, discolouration, susceptibility to breakage, heat damage (internal cracks), insect and fungal damage, elevated values of density, oil and protein concentration, and seed viability. Some factors that can affect these characteristics are environmental conditions during the grain formation of plants, seasons, harvesting systems, storage techniques, and transport (Briedenhann, 2015).

The processor greatly contributes to the nutritional value of meal by reducing the bioactivity of anti-nutritional soya bean proteins through the proper use of heat during 'toasting'. The challenge with toasting is that sufficient heat must be applied to the de-oiled meal to denature the anti-nutritional proteins, thereby rendering them biologically inactive, but not to the extent that the soya beans are overheated resulting in lower protein digestibility.

Several factors must be continuously managed to consistently achieve the proper toasting 'sweet spot', such as the combination of heating time and heating temperature.

Evaluating soya bean meal quality

Broiler research facilities at Stellenbosch University's (US) Mariendahl Experimental Farm have recently been upgraded to enable the evaluation of soya bean meal quality. Eight soya bean meals can be tested simultaneously in four-week *in vivo* trials, while *in vitro* testing of the meals is conducted at independent analytical laboratories. Soya bean oilcake samples are sourced through the feed companies that purchase meal from the major oil processers in South Africa. Meal from Argentina will also be tested for comparative purposes.

Basal feeds containing 400g soya bean oilcake meal/kg in the starter phase and 300g/kg in the finisher phase are formulated to supply all the essential nutrients required by broiler chickens in the starter (zero to two weeks) and grower (three to four weeks) periods. Two basal feeds (starter and grower), excluding soya oilcake meal, are mixed in a commercial feed mill (Profile Feeds, Klapmuts) and delivered to the research farm where they are blended with each of the soya samples in appropriate proportions to produce the complete feeds to be tested. These feeds are pelleted on site after mixing and cooling before being bagged.

Each of the eight treatments is replicated eight times (64 pens) thereby ensuring an accurate evaluation of each soya bean meal sample. Bodyweight and feed consumption is measured weekly, with final bodyweight, feed intake, and feed conversion efficiency (FCE) for each soya sample being subjected to analysis of variance (ANOVA) to determine significant differences between treatments.

In vitro measurements, conducted by independent laboratories, include urease activity (UA), protein dispersibility index (PDI), potassium hydroxide and trypsin inhibitor activity (KOH and TIA), the Evonik processing index (PCI), including a reactive lysine and reactive/total lysine ratio, a full proximate analysis plus sucrose and stachyose, and seed size distribution.

Two trials have been completed, with a third trial currently being conducted. The results of the first two trials are shown in *Tables 1* and *2*. There is no relationship between the codes given for the South African soya bean meal samples in the two trials.

As can be seen from the results, there are significant differences in meal quality between the processors. A difference of over 100g in bodyweight was measured between the highest and lowest growth rates in the first trial, and 120g in the second, and this resulted in a difference of over 55g gain/kg feed in the first trial and 76 in the second.

These are substantial differences that help to explain the variation in performance of commercial broilers fed different meals. Both soya bean meals imported from Argentina produced significantly poorer FCE g gain/g feed in Trial 2 than any South African meals. The difference in performance compared to the best South African soya bean meals was substantial.

Table 1: Trial 1 – mean (± SEM) bodyweight at 28 days, feed intake to 28 days, and feed conversion efficiency (FCE, g gain/kg feed) of Ross 308 broilers fed soya bean oilcake meals from different sources.

Source	Bodyweight (g)	Feed intake (g)	FCE (g gain/kg feed)
Argentina	1 830^{c,d,e}	2 420^{b,c}	740^{b,c}
SA 1	1 861^{b,c,d,e}	2 432^{a,b,c}	749^{b,c}
SA 2	1 893^{a,b,c,d}	2 468^{a,b}	752^{b}
SA 3	1 932^{a}	2 468^{a,b}	768^{a,b}
SA 4	1 874^{a,b,c,d,e}	2 448^{a,b,c}	749^{b,c}
SA 5	1 825^{e}	2 474^{a,b}	722^{c}
SA 6	1 906^{a,b}	2 508^{a}	744^{b,c}
SA 7	1 896^{a,b,c}	2 382^{c}	779^{a}
SEM[1] LSD[2]	23,1 65,6	26,9 76,2	9,9 28,2

[1]Standard error of the mean; [2]Least significant difference; $^{a, b, c}$Superscripts with the same letter do not differ (P>0,05).

Table 2: Trial 2 – mean (± SEM) bodyweight at 28 days, feed intake to 28 days, feed conversion efficiency (FCE, g gain/kg feed) and feed conversion ratio (FCR) of Ross 308 and Indian River broilers fed soya bean oilcake meals from different sources[3].

Source	Bodyweight (g)		Feed intake (g)		FCE (g gain/ kg feed)	
SA 1	1 822	a,b	2 689	d,e	664	a
SA 2	1 748	b	2 738	d,e	628	a,b,c
SA 3	1 842	a,b	2 965	a,b	607	b,c
Argentina: 1	1 744	b	2 907	a,b	587	c
SA 4	1 862	a	2 757	c,d,e	662	a,b
SA 5	1 768	b	2 794	b,c,d	621	a,b,c
Argentina: 2	1 793	a,b	3 003	a	588	c
SA 6	1 745	b	2 581	e	661	a,b
SEM[1] LSD[2]	29,8 85		66,4 189		19,3 55	
Breed						
Indian River	1 765	b	2 791	a	621	a
Ross 308	1 816	a	2 818	a	634	a

[1]Standard error of the mean; [2]Least significant difference; $^{a, b, c}$Superscripts with the same letter do not differ (P>0,05); [3]As there were no significant interactions between soya and strain, only the main effects of the two factors are presented here.

In vitro measurements

Using four-week live-bird studies is arguably the most accurate method of measuring soya bean meal quality but, due to the relatively lengthy process involved, rapid techniques have been devised to evaluate quality almost instantaneously. Some of these *in vitro* methods are used routinely at feed mills to reject consignments of soya bean meal that are regarded as being below standard. The cost to the processor in having to deal with a rejected consignment is considerable; therefore, the accuracy of the *in vitro* measurements used as the basis for quality evaluation needs to be of the highest standard.

One of the advantages of the study being conducted at SU is that the accuracy of these *in vitro* measurements can be tested against the results of the live bird studies. What we have discovered from the results of the first two trials is that the *in vitro* measurements are nowhere near as accurate as the industry believes.

As an example of the danger of using *in vitro* measurements as the basis for

Evonik processing index

Whereas the consistency between laboratories in the PCI results is good, in the first trial the best soya (fastest growth) had a lower PCI than the worst meal (10,5 vs 12,6), whereas in the second trial the best soya had a higher PCI than the worst (13,7 vs 11,8 and 10,5). The difference between the latter two measurements is considerable for a 1g difference in bodyweight at four weeks of age. If soya bean meals are rejected if the PCI does not fall between 10 and 20, for example, the samples causing significantly poorer performance would have been accepted in these cases.

Potassium hydroxide

Analyses between laboratories were once again consistent, but as soya bean meals are considered as being inferior by some feed mills, if the KOH measurement does not fall within the range of 73 to 85%, only one sample would have been rejected (sample three in Trial 2, *Table 3*). The two other soya bean meal samples would have been accepted but would have resulted in significantly poorer performance in the field. This measure was unable to differentiate between the two soya bean meal samples causing the poorest performance in the second trial, even though the difference was only 1g.

Trypsin inhibitor activity

For a soya bean meal not to be rejected by some feed mills, the TIA must be below 4mg/g. In the examples given in *Table 3*, only one sample would have been rejected, and this was the soya that resulted in the best performance in Trial 2. This measurement (4,4) appears to be an outlier, as the other measurements are relatively consistent between the laboratories. What is particularly worrying is that the soya producing the worst results had the lowest TIA (0,5 as measured by the University of Missouri).

Table 3: Final bodyweights and *in vitro* measurements from three laboratories of the soya bean meals producing the best and worst growth rates in the two trials conducted.

	Body-weight	PCI		KOH		TIA		
		Lab 1	Lab 2	Lab 1	Lab 2	Lab 1	Lab 2	U Miss
	Trial 1							
	1 932	10,8	10,2	78,3	75,4	3,0	2,8	2,5
	1 825	12,7	12,4	78,6	78,0	2,9	2,6	1,7
Difference %	5,5	-17,6	-21,6	-0,4	-3,4	3,3	7,1	32,0
Mean difference	5,5	-19,6		-1,9		14,2		
	Trial 2							
	1 862	14,1	13,3	85,4	80,6	4,4	3,4	3,4
	1 744	12,5	11,0	80,7	76,6	3,3	3,0	2,8
	1 745	10,5	10,6	70,9	68,0	1,7	1,5	0,5
Difference, %[1]	6,8	12,8	20,9	5,8	5,2	33,3	13,3	21,4
	6,7	34,3	25,5	20,5	18,5	159	127	580
Mean difference	6,7	23,4		12,5		156		

[1]*Differences are shown between samples one and two and between samples one and three.*

rejecting soya bean meal from a processor, the *in vitro* measurements provided by three laboratories on the soya bean meal samples that produced the highest and lowest growth rates in the two trials thus far conducted are given in *Table 3*.

These evaluation trials have not been designed to establish relationships between the *in vivo* and *in vitro* results. Had this been a priority, a wide range of samples of under- and overprocessed meals would have had to be included in the evaluation exercise. As it is, only apparently well-processed meals are included in these evaluations, which restricts the range of qualities that limits the possibility of establishing statistically significant relationships between the *in vivo* and *in vitro* measurements.

Fortunately, differences in quality do exist in the soya bean meal samples evaluated thus far, as evidenced by the statistically significant differences in performance in broilers at four weeks of age. These differences enable the *in vitro* measurements to be interrogated, but they are too small to enable the development of meaningful regressions that can identify the most accurate *in vitro* measure of soya bean meal quality. The accuracy of these assessments will be improved as more evaluations are conducted over the coming years.

As a means of understanding the biological basis for differences in performance resulting from soya bean meals that differ in quality, the digestibility of energy, protein, and amino acids in the soya bean meals needs to be measured. The process of measuring digestibility is slower than *in vitro* measurements, but more rapid than broiler growth studies as the birds need to be fed the soya that will be tested for only four or five days.

As part of the evaluation exercise conducted at SU, digestibility studies will be conducted at Mariendahl once the facility for conducting such a study, as well as ethical approval, have been identified and obtained. The data generated will contribute substantially to the accurate measurement of soya bean meal quality for the feed industry.

Acknowledgements

We acknowledge the financial assistance from OAC/OPDT, and the material assistance from Astral Foods through County Fair, as well as soya bean crushers and feed companies that donated the soya bean samples used in the trials, and Epol central laboratory for assisting with the cost of certain analyses.

For more information or references, send an email to the author at gous@ukzn.ac.za.

Trust Nutrifix Verify for informed product selection and optimal ROI

By Dr Anneli Heyns, Nutrico

As we strive to feed more people while minimising the impact on the environment, the solutions Nutrico implements – from novel fertilisers and biopesticides to innovative farming technologies – must be rigorously evaluated. Understanding how effectively these products perform (efficacy) and how well they integrate with existing systems and the environment (compatibility), is paramount to building resilient, productive, and truly sustainable agricultural systems for the future, while optimising the grower's return on investment (ROI).

After many years of planning and dedication, we are excited to announce that an enduring Nutrico vision has become a reality with the launch of Nutrifix Verify, our new product testing and knowledge-sharing platform.

Meet Nutrifix Verify

Nutrifix Verify bridges the gap between lab potential and real-world efficacy with a knowledge-sharing platform grounded in scientific trials. This commercial trial testing platform makes use of rigorous testing protocols, adhering to international standards to provide transparent and reliable efficacy data. Our state-of-the-art facilities and registered scientists underpin the credibility of the Nutrifix Verify findings, ultimately driving enhanced yields and profitability. Furthermore, our commitment to regulatory compliance and product quality ensures consistent manufacturing to guarantee predictable performance, season after season.

The vision of Nutrifix Verify is simple: to empower Nutrico product users with informed decision-making for optimal product selection and application, directly boosting ROI. To show the reliability of Nutrifix Verify, we are proud to share results from the 2024 season indicating that Molboro Tr-X™ is an industry leader when it comes to ROI.

Figure 1: Boron (B) leaf content.

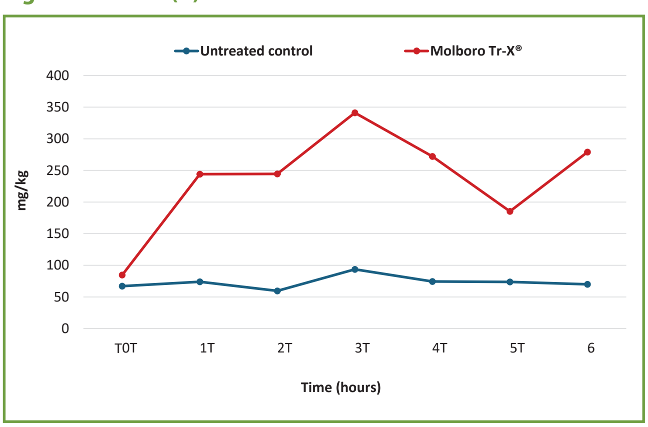
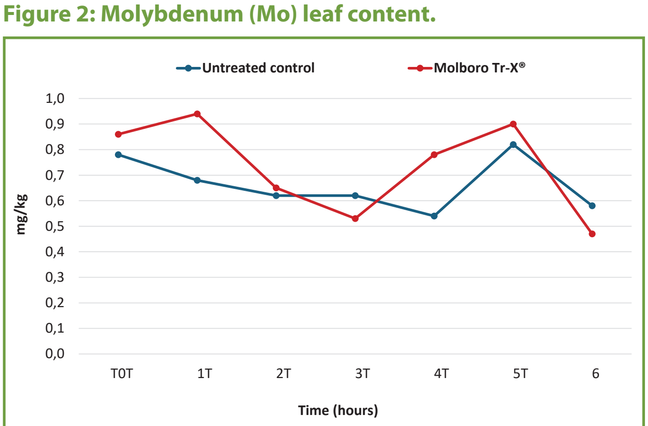


Figure 2: Molybdenum (Mo) leaf content.



Molboro Tr-X®

Soya, a versatile and nutrient-rich crop, has cemented its place as a key player in South Africa's food system and already proven its value as a dietary staple and premium ingredient. It is well documented that foliar applications of molybdenum (Mo) and boron (B) are crucial for enhancing nitrogen fixation, improving overall nutritional status, and ultimately achieving optimal soya bean yields in South African conditions.

Molboro Tr-X® is expertly manufactured by Tandem Translocation and Resistance eXpression (Tr-X®) technology and conveniently formulated so that each 1ℓ/ha provides an optimal blend of B, Mo, cobalt (Co), and important biostimulants including a seaweed extract and amino acids matrix.

A recent range of Nutrifix Verify semi-commercial trials on soya bean measured the effect of Molboro Tr-X® on plant nutrition status, compatibility in tank mixes, yield, and ROI during the 2024 season. The trials were conducted in Standerton (Mpumalanga), Vrede (Free State,) and Olifantsfontein (Gauteng), and compared to an untreated control (standard production programme, without Molboro Tr-X®).

Molboro Tr-X® was applied twice at 1ℓ/ha, namely 1ℓ/ha in autumn and 1ℓ/ha at the start of flowering as foliar spray application in the treatment block. A snapshot from these results highlights a 19% (Standerton) and 23% (Vrede) increase in yield when compared to the control block. This equates to an additional 240kg/ha and 450kg/ha soya yield for Standerton and Vrede, respectively.

The leaf analysis correlates with the yield results, indicating excellent and fast uptake due to the Tr-X® formulation matrix. The leaf samples of each treatment were taken prior to the application (T0) and hourly up to six hours thereafter (T1 to T6), following best practices for leaf sampling and testing. The results from the Olifantsfontein trial are shown in *Figures 1* and *2*.

For more information on the Molboro Tr-X® Verified Soya Performance report carrying the Nutrifix stamp of approval, contact Nutrico on 011 392 4072 or 021 807 5922 or visit *www.nutrico.co.za*.

Oilseeds research in South Africa

Compiled by Gerhard Keun and Maria du Preez

The Oil and Protein Seeds Development Trust (OPDT) and the Oilseeds Advisory Committee (OAC) have since their inception in 1997 been executing their objectives to the benefit of the South African oilseeds industry.

Their main objectives are the promotion and development of the oilseeds industry through the financing of research projects focussed on the improvement, production, storage, processing, and marketing of sunflower, soya bean, groundnut, and canola oilseeds. Information dissemination, advisory services, and marketing also receive the necessary funding.

From 1997 until the end of February this year, funding to the amount of R365 714 288 had been approved for research projects, including awarding MSc and PhD bursaries to the amount of R7 060 000. Research projects are categorised as new research projects, continuation research projects, joint research projects, transformation projects, and provisions – the latter category focusses mainly on technology transfer and generic marketing.

The basics of research projects

The OAC circulates an annual request to research institutions, universities, and researchers to submit their research proposals. Structures within the oilseeds industry such as the SA Groundnut Forum, the Sunflower and Soybean Forum, the Soya Food Forum, and the sunflower value chain in which role-players in the industry participate, are also tasked with identifying research projects that could benefit the industry or that the industry requires.

All research proposals are considered by a Research Priority Committee (RPC) and the OAC. All projects are considered on merit and, in some instances, referred for peer reviewing before being recommended for funding to the OPDT. Oilseed research projects for the 2025/26 financial year were considered recently and projects amounting to R23 573 867 were approved.

New research projects

- "Investigating the role of seedborne and systemic infections in *Sclerotinia* disease of sunflower in South Africa", Dr M Wilken, University of Pretoria (UP).
- "Remote detection of *Sclerotinia* stem rot in soya bean production towards precision management", Dr L Rothmann and M Cloete, University of the Free State (UFS).

Continuation of research projects

- Web page/social media, OAC/OPDT.
- Information project, South African Grain Information Service (Sagis).
- "South African soya bean crop quality survey", W Louw, The Southern African Grain Laboratories NPC (SAGL).
- "Evaluation of commercially available sunflower cultivars", Dr SH Ma'ali, ARC-Grain Crops Institute (ARC-GCI).
- "South African sunflower seed crop quality survey", W Louw, SAGL.
- "Funding of supply and demand estimates committee (SDEC)", Dr MH Lubinga, National Agricultural Marketing Council (NAMC).
- "Evaluation of soya bean cultivars", AS de Beer, ARC-GCI.
- "Cultivar evaluation of oil and protein seeds in the winter rainfall region (canola)", PJA Lombard, Western Cape Department of Agriculture (WCDA).
- "Proficiency testing scheme for soya beans and soya bean meal", W Louw, SAGL.
- "Proficiency testing scheme for sunflower seed and sunflower oilcake", W Louw, SAGL.
- "An integrated approach to control *S. sclerotiorum* on sunflower", Dr B Janse van Rensburg, ARC-GCI.
- "Monitoring and evaluation of herbicide resistant *Amaranthus* species in oilseed crops", Prof BJ Vorster, UP.
- "Investigating the impact of environmental factors and inoculum load of *Sclerotinia* stem rot of canola on the efficacy of fungicide applications", Dr D Mostert, Stellenbosch University (SU).
- "The influence of planting density, timing of application and spray volume on deposition parameters of fungicides on canola in the Western Cape", Dr GJ van Coller, WCDA.
- "Evaluation of advanced oilseed and protein crops for the winter rainfall region of the Western Cape", PJA Lombard, WCDA.
- "Cultivar evaluation of soybeans in the western dryland production area of South Africa", GP de Beer.
- "An evaluation of the quality of locally processed soya bean oilcake meal", Dr B van Zyl and Z Viljoen, SU.
- "Yield potential and adaptation of oilseed crops under optimum and soil acidity conditions in the Eastern Cape Province, South Africa", Prof CS Mutengwa, University of Fort Hare.
- "South African *Sclerotinia* Research Network (SASRN)", Dr D Strydom, Grain SA.
- "Premature desiccation of sunflower to preserve at risk crop from *Sclerotinia* head rot", Dr L Rothmann, UFS.

Joint research projects

- "Evaluating a more biological approach to canola and legume crop production in the Western Cape", Prof JA Strauss, WCDA.
- "Income and cost budgets", Dr D van der Westhuizen, Bureau for Food and Agricultural Policy (BFAP).
- "Impact assessment of soya bean yield and water productivity in South Africa under climate change", Dr R Mangani, UP.

Transformation projects

- "Farmer development by PGP: Pula/Imvula, Training, Trials, Mentorship", L Stroebel and J McPherson, Phahama Grain Phakama (PGP).
- Bursary scheme, OAC/OPDT.
- "Creating job opportunities through soya planting to warrant sustainable income and food security", H Davies, Eden Social Development Foundation.
- "Advanced farmer input support – Inputs, insurance, and mentorship", L Stroebel and J McPherson, PGP.

Provisions – OAC/APDT

Provisions in research budgets focus on aspects such as generic marketing, technology transfer study tours, and a contribution for capital replacement at the SAGL.

Bursaries awarded

New bursaries

- "Impact of elevated CO_2 on canola: Phytotron trials and future production modelling", S Shuku, US.
- "Effect of soya bean oilcake meal origin on digestibility in broiler birds", RH Botha, US.

Continuation applications

- "Utilisation of precision agriculture to improve agronomic management and increase profitability in South African field crop production systems", KJ Truter, US.
- "Soya bean quality and light interception response to row orientation in maize-soya bean intercropping systems in Southern Africa", A Shaikh, US.
- "Development of a colorimetric stigma receptivity assay and the evaluation of stigma receptivity across *Helianthus annuus* L. breeding lines", JC Berry, UP.
- "Investigating the mycovirome of South African *Sclerotinia sclerotiorum* isolates", S Bornman, UP.
- "Information-driven decisions in soybean stem rot management", M Cloete, UFS.
- "Manipulating anthesis with plant growth regulators as a possible escape strategy from *Sclerotinia* head rot (SHR) in sunflower", NSS Shinga, UP.
- "Population structure and diversity of Palmer amaranth (*Amaranthus palmeri*) in South Africa", NA Simelane, UP.

The OPDT/OAC also accepted the policy that trust funding must be managed in a way that promotes its evergreen status and that research projects need to benefit the industry in the short term.

For more information, send an email to Gerhard Keun at oliesade@opot.co.za or Maria du Preez at info@opot.co.za.

The transformative impact of the combine harvester on Sacta-funded producers

By Sandile Mahlangu, transformation manager, Sacta

In agriculture, efficiency and productivity are crucial, particularly for producers who double crop or cultivate two crops in a single year. The Taung Irrigation Scheme follows this practice, engaging in both winter and summer cropping.

The Taung region is regarded as rural, with significant potential for agricultural development that will drive economic growth. However, the Irrigation Scheme experiences its fair share of challenges, chief among them climate change, criminal activities, poor governance of the Scheme, outdated equipment, and a lack of coordinated efforts.

The Scheme, one of South Africa's oldest agricultural projects, established in 1939, was designed to uplift rural communities through agriculture. While the region still holds significant potential, challenges such as those mentioned have constrained its growth. Recent advances in mechanisation, particularly the introduction of a combine harvester funded by the South African Cultivar and Technology Agency (Sacta) and facilitated by Farmsol Holdings, are starting to change the trajectory for local producers.

Revival through mechanisation

Each producer within the Taung Irrigation Scheme typically has access to at least 10ha of irrigated land, with many renting additional land from others. Despite this, land availability, outdated infrastructure, and a lack of access to modern machinery have kept productivity low. Combine harvesters, crucial for timely and large-scale harvesting, have historically been out of reach for most producers.

This article explores how the combine harvester, supported by Sacta and Farmsol Holdings, has empowered the Taung producers and reshaped their agricultural landscape. The harvester was handed to a producer-owned farming cooperative, acting as a machinery service provider for the local Taung producers. The cooperative received a Sacta mechanisation loan to purchase the harvester, which came as part of the solution to curb the challenges faced in accessing machinery from contractors.

Boosting efficiency and speed

The efficiency of a combine harvester is one of its biggest benefits, as the Taung producers have traditionally relied upon contractors for harvesting, which can be time consuming and expensive. In the case of soya bean, harvesting late results in pod shattering and a significant loss of yield.

The introduction of combine harvesters has revolutionised these producers' operations, enabling them to harvest large areas quickly – they can now harvest an average of 20 to 30ha per day, allowing for timely preparations for the next planting season. For producers practicing double cropping, this efficiency is essential in ensuring a seamless transition between crop cycles and maximising productivity.

Maintaining high crop quality is vital for profitability. The timely and efficient operation of a combine harvester minimises crop damage during harvesting, particularly in remote areas where unfavourable weather conditions could jeopardise crops. By harvesting crops at their peak, the Taung producers preserve yield and quality, secure better market prices, and boost overall profitability.

On average, 3 to 4t/ha have been harvested on time, significantly reducing potential losses. For crops such as soya bean, which are susceptible to shattering if not harvested promptly, this improvement has been particularly beneficial.

While the initial investment in a combine harvester is substantial, the long-term benefits far outweigh the costs since increased efficiency allows producers to harvest more in less time, significantly boosting profitability. In rural areas where labour shortages and high costs are prevalent (due to urban migration), mechanisation reduces reliance on seasonal workers while simultaneously

The combine harvester has changed the Taung producers' agricultural landscape.

The combine harvester funded by Sacta and facilitated by Farmsol Holdings.

creating sustainable employment for harvester operators.

Supporting sustainability

In Taung, where machinery contractors often prioritise larger fields in other regions, having locally available harvesting equipment ensures that the producers can operate independently, enhancing economic stability.

The availability of a combine harvester not only improves harvesting efficiency but also supports sustainable farming practices. Efficient harvesting enables producers to clear fields quickly, ensuring they meet planting windows for the next crop cycle. This efficiency is crucial for effective crop rotation strategies, which help maintain soil fertility, reduce pest infestations, and minimise nutrient depletion.

With the ability to transition smoothly between winter and summer crops, producers can strategically introduce nitrogen-fixing crops such as soya bean to enhance soil health. Alternating crops such as soya bean with cereals such as barley or wheat improves soil structure, boosts moisture retention, and disrupts pest and disease cycles. Better soil health eventually reduces reliance on agrochemicals which lowers production costs and encourages ecologically friendly farming.

Ultimately, access to modern machinery such as combine harvesters empowers producers to adopt more sustainable and profitable agricultural practices, ensuring long-term agricultural progress and food security.

Market opportunities

Mechanisation not only increases productivity but also opens new market opportunities for the Taung producers. With the ability to harvest multiple crops efficiently, they produce surplus yields, allowing them to tap into larger markets and boost income potential. Efficient harvesting reduces post-harvest losses, ensuring that crops reach the market at optimal times when prices are higher. The ability to diversify crop production also minimises the risks associated with market fluctuations and climate variability.

A combine harvester makes harvesting easier, increases market delivery, and boosts profitability for the Taung producers, who mostly grow wheat, barley, sunflower, and soya bean. Additionally, mechanisation allows for staggered planting cycles, enabling the Taung producers to produce and sell different crops year-round rather than relying on a single seasonal harvest. This diversification strengthens their financial resilience and sustainability, providing opportunities for value-added ventures such as processing sunflower seeds for oil or soya beans for animal feed.

Better profitability from mechanisation also enables the producers to reinvest in their operations, purchasing higher-quality seeds, fertilisers, and irrigation systems. Beyond individual benefits, mechanisation contributes to the broader farming community by creating employment opportunities for farmworkers, local traders, and agro-processing enterprises. This economic upliftment strengthens the regional agricultural sector, fostering a more competitive and resilient farming economy.

Technology and collaboration

The introduction of combine harvesters serves as a catalyst for broader technological adoption among the Taung producers. As they become more familiar with mechanisation, they may explore precision agriculture, advanced irrigation systems, and data-driven farming tools. Integrating modern technology into farming practices enhances sustainability, boosts productivity, and ensures long-term agricultural success.

In rural agricultural settings such as Taung, the shared use of machinery fosters collaboration among the producers. Many producers in the region are pooling resources to share access to combine harvesters, reducing individual costs and strengthening community ties. This cooperative approach not only makes mechanisation more accessible but also encourages knowledge sharing and skills development among producers.

A final thought

The introduction of combine harvesters has been a game changer for the Taung producers, enhancing efficiency, improving crop quality, and promoting sustainable farming practices. As agriculture continues to evolve, equipping producers with modern tools is essential for ensuring food security and boosting livelihoods.

The success of the Taung producers with combine harvesters highlights the transformative impact of agricultural technology, paving the way for a more prosperous and sustainable farming future. By continuing to invest in mechanisation and agricultural resources, these producers can look forward to increased productivity, economic growth, and long-term sustainability.

For more information, send an email to sandile@sactalevy.co.za or visit *www.sactalevy.co.za*.

Do not abuse the *Trespass Act*

By Clarissa Pienaar, Moolman & Pienaar Incorporated

Landowners must guard against abusing the *Trespass Act, 1959 (Act 6 of 1959)* (the *Trespass Act*) to circumvent the *Extension of Security of Tenure Act, 1997 (Act 62 of 1997)* or to force occupiers under *ESTA* to vacate farms against their will.

The *Trespass Act* prohibits the unlawful entry, without a lawful reason, of or the presence upon land and the entry of or presence in buildings without the consent of the lawful occupier, owner, or the person in charge of the land or building.

The *Trespass Act* is the primary law protecting owners of land from the unlawful entry and occupation of land. The *Act* also criminalises the unlawful occupation of land or entry of a building, and provides a mechanism for the immediate eviction of the trespasser.

Penalties and exceptions

Section 1(1) of the *Trespass Act* stipulates that a person who enters or finds him-/herself upon such land or enters or is in such a building is guilty of an offence, unless he/she has a lawful reason. Any person convicted under Section 1 of the *Trespass Act* is liable to be fined an amount not exceeding R2 000 or can face imprisonment for a period not exceeding two years. In addition, a court that convicts any person may issue an order for the immediate removal of such a person from the land concerned.

There is an exception, however, namely that an occupier who has a right of residence or right to use land under the *ESTA*, shall not be removed in terms of this subsection from land in respect of which he/she has such a right. In this regard, Section 27 of the *ESTA*, read in conjunction with Section 1(1A) of the *Trespass Act*, stipulates that the provisions set forth in the *ESTA* do not affect the rights of an owner or person in charge in terms of the *Trespass Act*, and that a person who has a right to be on land in terms of the *ESTA* has a lawful right to enter and be on that land.

A person charged with unlawful trespassing will be able to raise a defence and argue that he/she had a lawful reason to be on the land in terms of the provisions of the *ESTA*. Such an occupier cannot be found guilty of trespassing in terms of the *ESTA*, as he/she is deemed to have had a lawful reason to be on the land.

In the recent case of *Thys vs S (Review) (246) [2024] ZAWCHS 324 (21 October 2024)* (the *Thys* case), acting judge Montzinger of the Cape High Court cautioned magistrates and public prosecutors to guard against landowners abusing the *Trespass Act* to remove trespassers. They must always first investigate whether the accused's presence on the land was lawful in terms of the *ESTA* or not.

The appellant in the *Thys* case had lived with his mother on the farm his entire life and, prior to his dismissal, had worked on the complainant's farm. The appellant was therefore an occupier under the *ESTA*. However, the appellant was charged with trespassing, pleaded guilty to the charge, and was then found guilty.

Unconstitutional and void

The High Court in the *Thys* case found that any attempt by landowners to use the *Trespass Act* to force a person to vacate his/her home without complying with the procedural requirements of the *ESTA* or the *Prevention of Illegal Eviction from and Unlawful Occupation of Land Act, 1998 (Act 19 of 1998)* (the *PIE Act*), is unconstitutional and void, and amounts to constructive eviction.

The High Court also found that neither the magistrate, public prosecutor, nor the appellant's legal representative heeded the fact that the *Trespass Act* expressly refers to the *ESTA*. The High Court further found that the appellant's legal representative should have drawn the magistrate's attention to the fact that the appellant was an occupier under the *ESTA*, and therefore enjoyed protection against unlawful or constructive eviction.

The High Court consequently found that the provisions set forth in the *Trespass Act* were used to constructively evict the occupier from the farm instead of following the eviction process prescribed by the *ESTA*. It was also found that the magistrate failed to investigate the legality of the occupier's presence. The conviction was therefore set aside with immediate effect.

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Misconduct: To dismiss or not?

By Meyer Louw, legal advisor, LWO Employers Organisation

Dismissal is a critical decision by employers that impacts the business and the lives of employees. The *Labour Relations Act, 1995 (Act 66 of 1995)*, or *LRA*, as amended, offers a framework in *Schedule 8: Code of Good Practice: Dismissal* ('the *Code*') to ensure fairness. This *Code* outlines important principles to balance justice with the operational needs of businesses, and employers need to take note.

The *Code* requires that employers establish clear disciplinary rules in the workplace that set the standard of conduct expected from employees. These rules may vary based on the size and nature of the business. The key is to make sure the rules are easy to understand, fair, and thoroughly communicated to and shared with employees.

Progressive discipline

The *Code* encourages progressive discipline, reserving dismissal for serious cases and as a matter of last resort. Progressive discipline focusses on guiding employees to meet required standards through measures such as counselling and warnings. An informal discussion is often sufficient for minor infractions, while repeated or more serious misconduct may lead to formal written warnings, or other disciplinary actions short of dismissal. Dismissal is generally reserved for serious misconduct or repeated offences.

Dismissal for a first offence is rare and typically applies only in cases of severe misconduct that renders continued employment intolerable, such as gross dishonesty, wilful property damage, endangering safety, physical assault, and gross insubordination, among others.

When considering dismissal, employers should weigh the seriousness of the misconduct alongside the employee's personal and mitigating circumstances (such as length of service and disciplinary record), nature of the job, and context of the offence. Consistency in applying disciplinary actions, both in similar cases and among employees involved in the same incident, is essential to ensure fairness.

Fair or unfair

The *Code* provides that the following should be considered when determining whether a dismissal for misconduct is unfair:

- Did the employee contravene a workplace rule or standard?
- Was the rule valid and reasonable?
- Was the employee aware of, or could reasonably have been expected to know about the rule?
- Was the rule consistently applied by the employer?
- Was dismissal an appropriate sanction for the offence?

Importance of fair procedures

Many employers often refer to "immediate dismissals" or similar actions. However, under South African labour law, there is no such thing as a valid on-the-spot "you're fired" dismissal.

To ensure fair procedure in dismissal cases, employers should follow a process that includes the following:

- **Investigation:** Investigate to determine whether there are valid grounds for dismissal. This process does not need to be overly formal but should be thorough enough to gather all relevant facts and evidence to support the decision.
- **Notification:** Inform the employee of the allegations by way of a written notice to attend a hearing and explain this to the employee in clear, understandable language and terms.
- **Opportunity to respond:** Allow the employee sufficient time to prepare for the hearing; the opportunity to state their side of the case and respond to the allegations; and the offered option to have assistance or representation, such as their workplace trade union representative (shop steward) or a colleague, to support them during the process.
- **Decision communication:** Once the inquiry is complete, communicate the decision clearly and in writing, outlining the reasons behind it. Also remind the employee of his/her right to refer the matter to the Commission for Conciliation, Mediation and Arbitration (CCMA).

Employers should ensure their actions align with the guidelines in Schedule 8 of the *LRA*, balancing operational needs with employee rights. By following the principles outlined in the *Code*, both employers and employees can navigate dismissals with integrity and fairness.

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

The Protein Research Foundation (PRF), Oil and Protein Seeds Development Trust (OPDT), and Oilseeds Advisory Committee (OAC) are inviting you to attend the Soybean Symposium scheduled for:

Tuesday, 29 July 2025 – CSIR International Convention Centre, Pretoria
Thursday, 31 July 2025 – Nampo Park, Bothaville

Soybean Symposium 29 and 31 July 2025

PROGRAMME (PRELIMINARY)

09:00 - 09:30	**Opening**
09:30 - 10:15	**Brazilian Soybean Industry** Dr Leandro Eugenio Cardamone Diniz – Embrapa
10:15 - 11:00	**Future of the South African Soybean Industry and Global Competitiveness** Prof Ferdi Meyer – BFAP
11:00 - 11:30	**Tea/coffee**
11:30 - 12:30	**New Cultivars and Technology Impact on Soybean Production in South Africa** The panel discussion will be facilitated by Dr Lukeshni Chetty Panel members will consist of representatives of GDM Seeds/Don Mario, Bayer, AST, and Corteva
12:30 - 13:30	**Lunch**
13:30 - 14:00	**Progress in *Sclerotinia* Management and Control in South Africa** Dr Lisa Rothmann – University of the Free State
14:00 - 14:30	**Optimising *Rhizobia* and Seed Treatments to Improve Yields** Mrs Nadine Loubser – MBFi
14:30 - 15:15	**Improved Technology used in Brazil that is Increasing Soybean Production Efficiency** Dr Leandro Eugenio Cardamone Diniz – Embrapa
15:15 - 15:30	**Closing**
15:30	**Networking**

For more information or to register, send an email to Yvette Papadimitropoulos at admin@proteinresearch.net.

LOADER PROMOTION*

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- 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
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- Lift capacity, from 1920kg up to 2490kg
- Mechanical joystick control
- 4 Models on offer

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- 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)	✓	✓	✓

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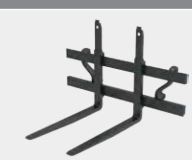

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