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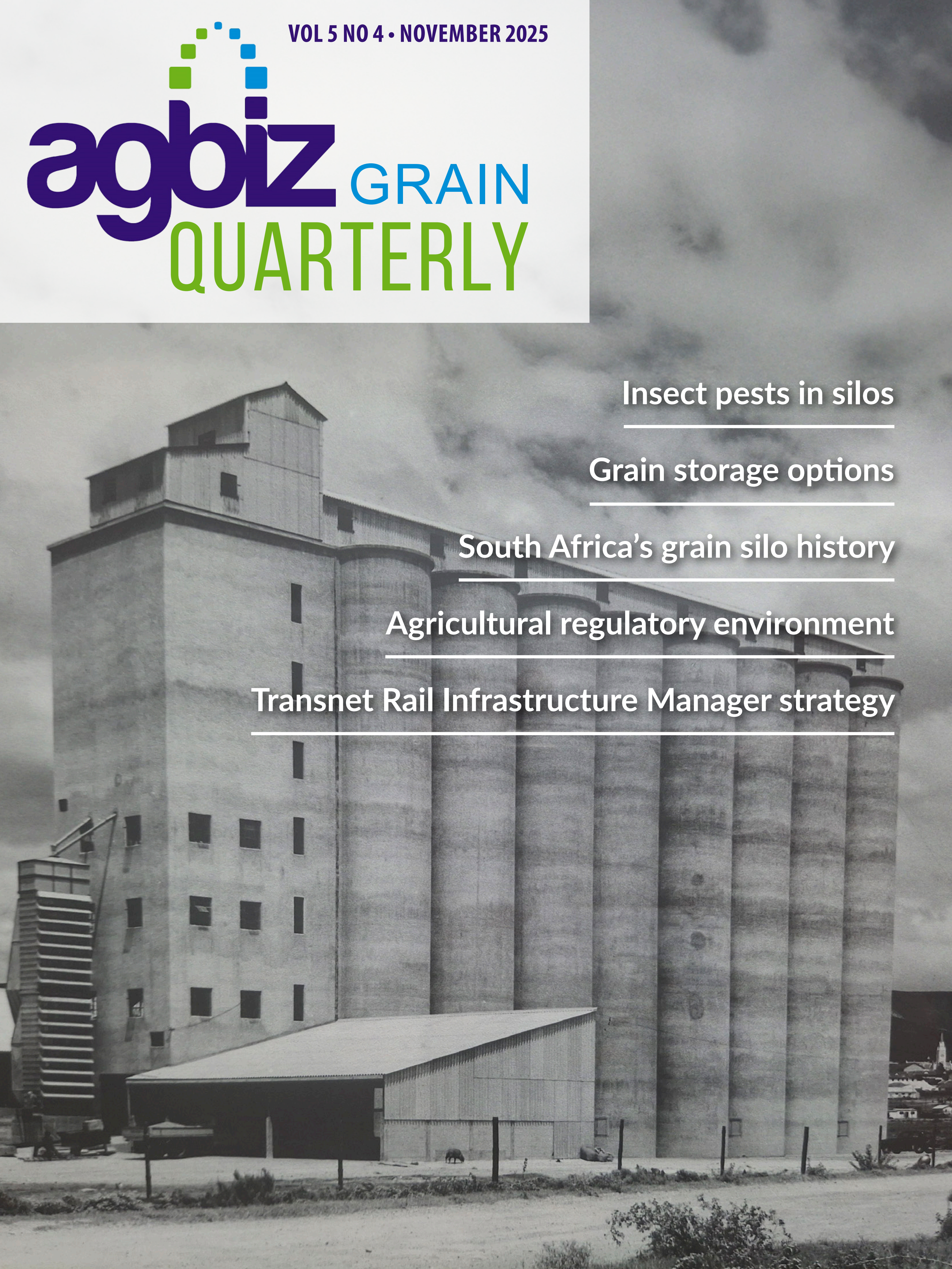

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(Photograph courtesy of Overberg Agri)

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Grain handling:
A story spanning 60 years

By Kallie Schoeman, agripreneur

It was June 1960, and the maize was ready for harvest. Maize pickers were recruited from surrounding areas, reaching as far as the former homelands of Lebowa and KwaNdebele. Early each morning, while frost still blanketed the fields, the pickers began their work – each with a grain sack in hand, gathering the maize cobs one by one. Once filled, the sacks were loaded by hand onto wagons and taken to the threshing floor.

A Nigel 21 threshing machine stood waiting to separate the grain from the stalks and husks. It was powered by a McCormick Farmall tractor, using a belt and pulley system to drive the machine's internal mechanism (the threshing cylinder). The tractor operator manually fed each full sack into the machine, where the maize was processed. The stalks emerged on one side, later used as fuel for the stoves in our home. The husks were blown into a heap, creating a wonderful playground for us children, while the leaves became winter feed for the cattle.

Once the maize had been threshed it fell into grain sacks, each of which was weighed and sewn shut with thick thread using a long needle. Every sack had to weigh exactly 202 pounds (91,6kg), comprising 200 pounds of maize and two pounds for the sack itself. The filled sacks were then loaded by hand onto a trailer or six-tonne truck and transported to the local cooperative. There, the sacks were counted to confirm the load's total weight and stacked neatly into pyramid-shaped piles, which were then covered with tarpaulins.

This was what grain handling looked like in those early days, long before the era of modern grain silos.

Rise of a new landmark

I still remember what an extraordinary event it was when the Eloff silos were built by the Delmas Cooperative alongside the railway line in Eloff. A grand celebration was held to mark this event. Because the soil around Delmas contains large amounts of dolomite, which is considered unstable for heavy structures, it was unsuitable for building silos of this size. As a result, the project was undertaken nearly 12km from town.

At the time, around 90% of South Africa's grain was transported by rail, which explains why so many silos were constructed along railway lines. Grain was delivered to these silos for storage, sometimes for months, before being loaded into special rail cars for transport to millers, animal feed manufacturers, and export harbours across the country.

This point in time

Today, when we look at South Africa's grain industry and its modern storage infrastructure, we have every reason to be proud of how far we've come. The contributions of industry organisations and the role of Agbiz Grain as a platform, voice, and facilitator cannot be overstated. Thanks to their collective efforts, our country has the capacity to store nearly 20 million tonnes of grain and oilseeds this year, cementing South Africa's position as the food basket of sub-Saharan Africa. My hope is that Agbiz Grain will continue to build on this strong foundation for generations to come.

Kallie Schoeman was born on 18 May 1954 and matriculated from Delmas High School in 1971. Since 1978, he has expanded the Schoeman family enterprise to more than ten times its original size. This remarkable growth was driven by the consolidation of crop and livestock operations, as well as the establishment of new ventures, including pecan nut production in the Northern Cape, the management of grain handling facilities in Delmas, and the development of the Agron fertiliser plant, now known as Trifert. For more information, send him an email at kallie@witklip.co.za

AGBIZ GRAIN GAZETTE

US grain storage remains tight

Farmers in the United States (US) are again heading into harvest with big grain crops and limited space to put them. Strong production and large carryover stocks have already weighed on prices, and another record crop is set to add to the pile. Slowing export demand and high transportation and storage costs compound the challenge, leaving little room for relief in the months ahead. The latest US Department of Agriculture (USDA) September *Grain Stocks* and September *World Agricultural Supply and Demand Estimates* (WASDE) reports highlight how abundant production and trade uncertainty are likely to disrupt markets and prolong pressure on farm profitability into 2026.

USDA projects maize production for 2025/26 at a record 16,8 billion bushels, supported by slightly higher harvested acreage that offsets a modest drop in yield. This would far exceed last year's 14,87 billion bushels, underscoring how large this harvest is expected to be. Even with exports projected to rise by 175 million bushels, going from 2,8 billion last year to 2,975 billion this year, ending stocks are still expected to remain near 2,1 billion bushels, a level that continues to weigh on market prices.

Behind those numbers lies a growing logistical strain. Total US grain storage capacity increased only slightly in 2024, up 35 million bushels (0,1%) from 2023. Combined on-farm and off-farm capacity as of 1 December 2024, totalled 25,5 billion bushels, virtually unchanged from the year before.

When transportation slows, storage becomes the pressure valve that keeps the system from seizing up. US storage capacity is estimated at 25,48 billion bushels, which leaves roughly 2,4 billion bushels less space than needed to hold total production and existing stocks. This shortfall is based on combined maize, soya bean, wheat, sorghum, barley, and oat production, along with beginning stocks reported in the USDA's September WASDE.

That means the system is effectively operating without a buffer, and any delay in grain movement or regional bottleneck can quickly lead to storage overflow. – *The American Farm Bureau Federation*

Seed of hope for barley producers

A new R2 billion malting facility, set to purchase 70 000 tonnes of barley next year, sparked lively debate during a panel discussion at the 2025 NAMPO Cape. This major investment could signal a turning point for South Africa's barley industry, which has faced significant challenges in recent years.

Johan Lusse, general manager of grain and grain services at Overberg Agri, noted that the company has been involved in the barley value chain for more than four decades. Despite difficult times, Overberg Agri has no intention of exiting the industry. "Barley must be carefully stored in silos to preserve its quality," Lusse explained, adding that honesty and clear communication are essential in this niche industry.

Barley is typically stored for around a year before use, during which germination poses the greatest threat, because it could render the grain unusable. "This risk is one of the main reasons producers often opt to plant wheat or canola instead," Lusse said.

Jeremy Antier, managing director of Soufflet Malt South Africa, provided more insight into the new malting facility under construction in Johannesburg. The facility will process locally grown barley for clients such as Heineken. If all goes according to plan, the first 70 000 tonnes of barley will be purchased next year, with the goal of producing 100 000 tonnes of malt annually by 2027. – *Susan Marais, Plaas Media*

Traders call for greater market transparency

In a bid to enhance market transparency, the South African Cereals and Oilseeds Trade Association (Sacota) has urged the Johannesburg Stock Exchange (JSE) and the Financial Sector Conduct Authority (FSCA) to introduce a trader position report – commonly known as a Commitments of Traders (COT) report.

"Excessive, unjustified, or unexplained market volatility is harmful," says Dr André van der Vyver, executive director of Sacota. He emphasised that access to reliable information is one of the most effective ways to curb or prevent such volatility. The proposed COT report would be a valuable source of this information.

Other data such as grain stock levels and distribution figures are also vital, but stock numbers alone do not tell the full story. Timely and cost-effective access to these stocks is just as important. When market participants have insight into the activities of different trader categories, they tend to act with greater caution and responsibility in their own decisions.

Sacota remains committed to advancing transparency in grain trading on the JSE. "We will therefore continue doing our homework and taking further steps to help make this a reality," concluded Dr Van der Vyver. – *Izak Hofmeyr, Plaas Media*

LDC acquires Bunge Global operations

Global agribusiness giant Louis Dreyfus Co (LDC) has concluded its agreement to acquire Viterra's former grains and oilseeds businesses in Hungary and Poland from Bunge Global.

As part of the European Commission's approval of Bunge's US$8,2billion merger with Viterra on 2 July, the company was required to divest the entirety of Vittera's oilseed businesses in Hungary and Poland and logistical assets linked to those operations, *World Grain* wrote on 2 September. Financial terms of the agreement between LDC and Bunge were not disclosed.

"The transaction reflects the group's strategic plans to further reinforce its core merchandising capabilities – in this case, for European grains and oilseeds origination, processing and distribution," said LDC's CEO, Michael Gelchie.
– Oils & Fats International

Rwanda to establish grain handling hubs

Rwanda has announced plans to establish large-scale grain handling hubs with the capacity to process and store more than 200 000 tonnes of maize, rice, and beans, as part of an ambitious strategy to cut post-harvest losses to below 5% by 2029, down from 13,8% in 2023.

This initiative, part of the Enhancing Post-Harvest Management for Grains in Rwanda project, seeks to transform the agricultural sector by improving storage, processing, and market access for farmers.

The government is constructing four major grain handling hubs, each capable of processing 25 000 tonnes of maize and 18 000 tonnes of rice annually, totalling 100 000 tonnes of maize and 72 000 tonnes of rice. The facilities will focus on removing impurities, reducing moisture to prevent mould, and ensuring compliance with food safety standards.

Modern equipment, including ten high-capacity maize shellers processing 20 tonnes per hour and ten modular silos with six-tonne capacities, will further enhance storage and processing efficiency. *– Milling Middle East & Africa*

AGDA celebrates five impactful years

The Agricultural Development Agency (AGDA) recently celebrated five years of impact with a call for collaboration, inclusion, and technology-driven growth in agriculture. AGDA marked its fifth anniversary with a member and stakeholder engagement presented under the theme "Cultivating Innovation and Partnerships in Practice: Building Shared Agricultural Futures". The gathering brought together government leaders, industry experts, and agribusiness stakeholders to reflect on the sector's progress and chart new pathways for inclusive growth and innovation.

AGDA is a facilitator, aggregator, and integrator, representing 45 000 farmers, 50 agribusinesses, 26 financiers, and seven commodity organisations, a testament to its expanding footprint and influence across South Africa's agricultural value chain. Opening the event, Kallie Schoeman delivered an insightful reflection on AGDA's transformative journey since its inception, setting the tone for a day of meaningful dialogue.
– Agbiz Newsletter

Agricultural conditions remain uneven – Acac

Mere days after president Cyril Ramaphosa declared an economic emergency in South Africa, the Agricultural Conditions Assessment Committee of South Africa (Acac) reported that while the country's agricultural conditions remained uneven, it is leaning more towards favourable growth for most industries.

Acac, under the stewardship of the National Department of Agriculture (NDA), met on 13 October for the third time this year. Acac comprises various industry and commodity associations (Agbiz, Agri SA, Grain SA, Afma, Sati, Fruit SA, Hortgro, Potatoes SA, SA Wine, among others), research organisations such as the Bureau for Food and Agricultural Policy (BFAP), and other statistics users such as the SA Reserve Bank and Stats SA.

Acac deliberated, among others, on the statistical matters and methodology for collecting agricultural statistics and on stress-testing the quality of that data, which supports the calculation of the agricultural sector's quarterly gross domestic product (AgGDP).

The NDA is currently undertaking a benchmarking exercise to review the current methodologies applied in calculating the AgGDP. Furthermore, there will be regular reviews of the data and methods, with technical support from industry stakeholders where necessary. *– Susan Marais, Plaas Media*

South Africa's grain silo history: A journey of profound heights and depths

By Carin Venter, Plaas Media

Grain storage has always been central to food security. From ancient methods designed to prevent spoilage to the massive silos that now dot South Africa's landscape, the evolution of storage systems tells a story of innovation.

From bags to bulk

Following the Anglo-Boer War of 1899 to 1902, South Africa's grain production was modest. Bulk handling systems had not yet been introduced, and grain was transported and stored in bags. At the beginning of the 20th century a few milling companies offered limited facilities for storing raw grain and flour. Due to production constraints and the lack of adequate storage infrastructure, the country relied heavily on imported grain, especially wheat.

The formation of the Union of South Africa in 1910 marked a turning point. Commercial agriculture began to expand, with a notable surge in grain production, especially maize. Until the 1940s, however, grain continued to be packed in bag stacks, typically covered with large tarpaulins for protection.

Towards modernisation

After World War II, grain production in South Africa grew rapidly, especially in the western regions. Yet, the shortage and high cost of hessian grain bags exposed the inefficiencies of the bagged storage system. This challenge underscored the need for silos that could enable bulk handling, greater control and flexibility, and limit losses caused by weather, poor temperature control, spoilage, and pests.

Recognising this need, the South African government initiated the development of a national network of large, centralised storage facilities. The first step was the construction of port and inland grain elevators, designed to modernise grain handling and transition the industry from bags to bulk systems.

In the 1930's, cooperatives with silo infrastructure were compensated for storage and handling facilities, acting as intermediaries between producers and the marketing boards. (Photograph: Overberg Agri)

Completed in 1924, the Cape Town and Durban port grain elevators were the country's first major grain-handling structures, built under the direction of the South African Railways and Harbours (SAR&H), bearing in mind the opportunities it would create for exporting grain to other markets.

Institutional foundations

The establishment of the Maize Board and Wheat Board in the 1930s under the *Marketing Act, 1937 (Act 26 of 1937)*, further formalised the grain industry. These boards oversaw grain production and marketing in the country, purchasing grain from producers at predetermined prices.

Cooperatives with silo infrastructure were compensated for storage and handling services, acting as intermediaries between producers and the marketing boards. They received grain from producers, stored it securely, and dispatched it according to the boards' instructions to millers and other end users.

Prompted by producers, traders and government, the construction of grain silos increased significantly during the late 1940s and early 1950s. In 1952, the government introduced a long-term loan scheme – initially valued at R10 million – administered through the Land and Agricultural Development Bank of South Africa (Land Bank).

The scheme provided financial support to cooperatives, millers (including private millers), traders, and entrepreneurs for the construction of grain silos and bulk storage facilities. The implementation of the scheme and approval of silo construction permits were managed by the Grain Silo Committee, comprising representatives of the Department of

Rising yields led to the adoption of bunker storage and silobags as practical alternatives to constructing new silos. (Photograph: Silostrat)

Agricultural Economics and Marketing, the Maize Board, Wheat Board, Sorghum Board, and Oilseeds Board.

The quality question

Individual grain cooperatives across the country applied to the Land Bank for subsidised loans to construct silos, investing substantial sums as long-term assets for their members. In doing so, they accepted the risk of low returns on investment while contributing to post-World War II job creation through the establishment of widespread operational silos requiring a local workforce.

The silo infrastructure programme expanded rapidly after the 1960s, paving the way for technological advancements such as in-silo and in-bin drying methods, including aeration, which is an essential storage management technique to preserve grain quality and minimise spoilage caused by insects and microbial activity.

Under the *Road Transportation Act, 1977 (Act 74 of 1977)*, road transport services required permits, creating logistical challenges. To address this, the South African Railways constructed grain silos along major railway lines to facilitate bulk handling and export. These facilities became known within the grain industry as 'B-silos'. The national railway system operated efficiently at the time. The silo design enabled producers to deliver grain directly to it, from where it was transported mostly by rail to millers.

Rolling with the punches

Between the 1950s and 1990s, South Africa made significant progress in developing grain storage techniques. These included advances in pest and rodent prevention, temperature and humidity control, moisture management, and silo cleaning practices.

In the early 1980s, the Maize Board, Wheat Board, and government introduced a land conversion scheme aimed at converting marginal maize fields in the western parts of the country into grazing for livestock. Although this scheme reduced the total area planted to maize, yield improvements largely offset the decline in hectares, keeping total production stable. In many towns across these regions, such as Vryburg and Kameel, large concrete silos became redundant as a result of the land conversion scheme. Meanwhile, in areas such as Mpumalanga, rising yields led to the adoption of bunker storage and silobags as practical alternatives to constructing new silos.

The liberalisation of South Africa's grain market began with the *Marketing of Agricultural Products Act, 1996 (Act 47 of 1996)*, which came into effect in 1997. It replaced the *Marketing Act, 1968 (Act 59 of 1968)*, effectively deregulating the sector and allowing the market forces of supply and demand (free-market system) to determine prices. The change marked the end of marketing schemes and boards.

The free-market system

By the early 2000s, Spoornet's rail services had begun to deteriorate, posing serious challenges for agricultural companies that had strategically built silos near railway lines for efficient grain transport. As rail infrastructure declined, many businesses were forced to invest heavily in upgrading their outloading systems to accommodate road transport, significantly increasing logistical costs.

The dissolution of the Maize Board in 1994 and the Wheat Board in 1995 signalled the end of the control board era. The *Co-operatives Act, 2005 (Act 14 of 2005)*, which governed boards and cooperatives, also came to an end, and most agricultural cooperatives became private companies. Under this free-market system, agricultural businesses and millers now had to buy and store their own grain.

Following deregulation, the South African Futures Exchange (Safex) was established to provide a transparent commodity trading platform where grain prices are determined by supply and demand. Safex introduced futures contracts for grains, providing a mechanism for price discovery and risk management for producers and traders, which became the benchmark for spot market prices.

Today, operating as the JSE Commodity Derivatives Market, Safex does not store grain itself but provides a regulated platform for trading standardised contracts, which represent physical grain stored in JSE-registered silos. This system allows for the hedging of price risk, price transparency, and improved liquidity by enabling participants to buy and sell grain supported by good collateral management of the underlying commodity indicated on the silo receipt.

Irrigation areas used to rely solely on flood irrigation, where fields were watered manually. The 1980s marked a turning point when South Africa began importing centre-pivot systems from the United States. This increased grain production under irrigation, especially along the

Orange and Vaal Rivers. As production expanded, the demand for silos grew, prompting cooperatives to construct silos even after Land Bank loans were no longer subsidised.

The shift from small-scale to high-volume systems, combined with advances in grain storage techniques between the 1950s and 90s, paved the way for modern in-silo and bin drying practices. In 1994, South Africa introduced large-scale continuous tower dryers (tall, vertical systems designed to remove moisture efficiently) for commercial operations. Although these early dryers had relatively low capacity, technological advancements have since led to the adoption of high-capacity dryers from Europe for enhanced moisture control.

Grain drying is energy-intensive, requiring gas, diesel, or electricity, but it is a worthwhile investment. Wet grain can only be stored briefly, while properly dried grain can be stored for extended periods. Many silos in the eastern Free State and eastern Gauteng now use artificial dryers and aeration systems to ensure uniform moisture levels.

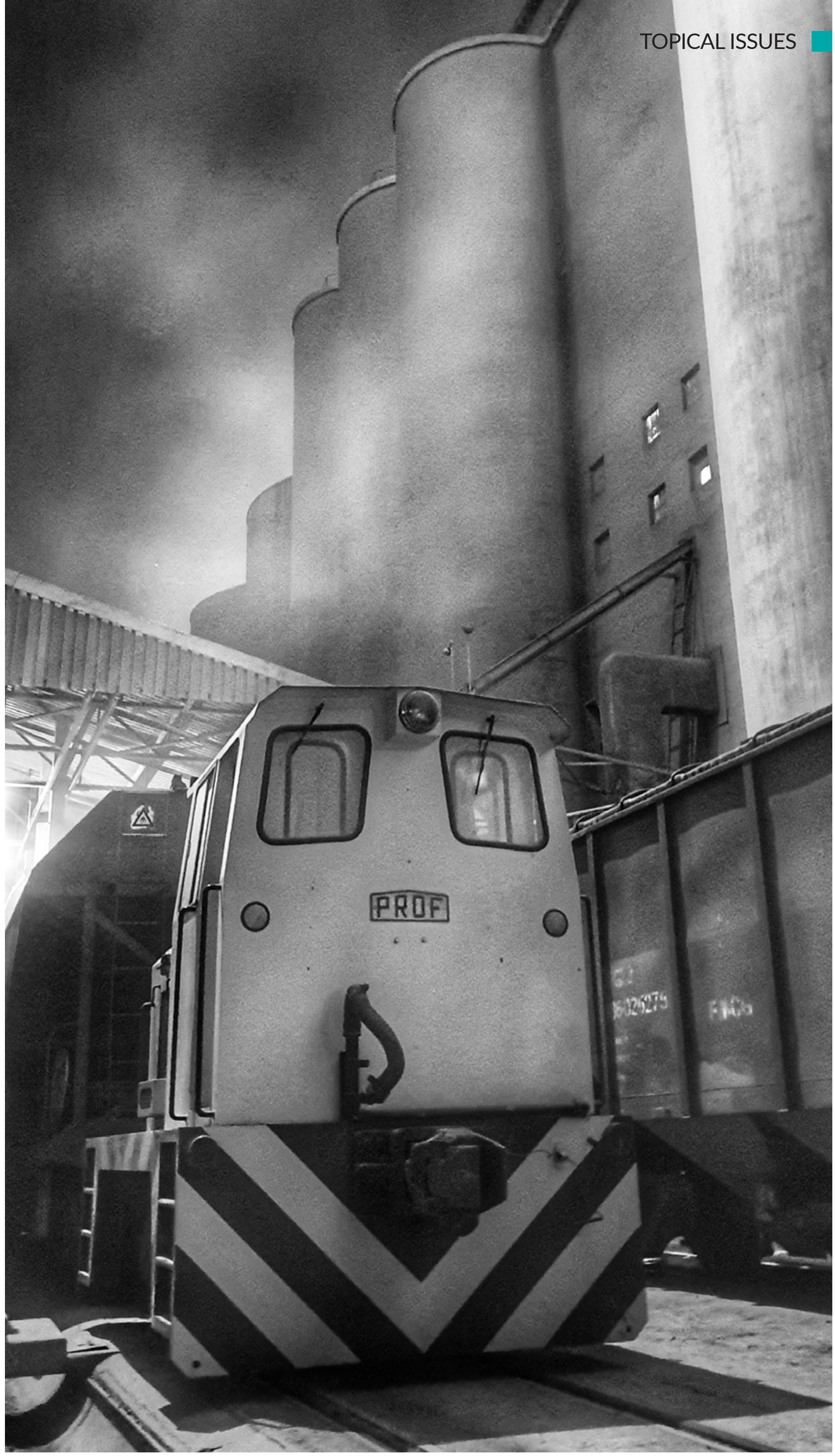
Ideally, grain should dry naturally in the field until it reaches an acceptable moisture level before harvest. However, to take advantage of early market opportunities, some producers harvest ahead of schedule.

Current situation

With regard to permanent and bulk grain storage, new silos continue to be built, often adjacent to mills. Concrete silos remain the most durable long-term solution in South Africa, typically ranging in capacity from 40 000 to 200 000 tonnes. These structures are designed and constructed by specialist companies in accordance with strict engineering standards, and a structural engineering certificate can be issued upon completion if required.

Modern agricultural and industrial operations also make use of steel silos, bunkers, and silobags. Because of the high cost of concrete silos, an alternative silobag system, developed in Argentina and Brazil, was introduced to South Africa in the early 2000s.

Around the same time, many agricultural businesses began using bunker storage, where grain is stored on sloped, tarpaulin-lined ground and covered with additional sheeting.



South African Railways constructed so-called B-silos along major railway lines to facilitate bulk handling and export. (Photograph: VKB)

Today, concrete silos remain the preferred option for long-term grain storage, while bunkers and silobags provide additional capacity during surplus years or in areas where yield have increase and additional capacity is needed at existing sites.

For more information, contact Tom Meintjes, former managing director of GWK, at 082 377 4277.

A challenging year for grain and oilseeds

By Susan Marais, Plaas Media

It has been a turbulent year for South Africa's grain and oilseeds industry, traders included. Misaligned crop estimates, local quality concerns, frustrations with the Johannesburg Stock Exchange (JSE), and the ripple effects of the United States (US) president Donald Trump's trade tariffs on global markets were among the many challenges the sector faced in 2025.

These issues were unpacked by Dr Konrad Keyser, chairperson of the South African Cereals and Oilseeds Trade Association (Sacota), during the association's annual general meeting, held on 18 September at the Centurion Residential Estate and Country Club in Pretoria.

Membership and representation

Sacota currently represents 34 members, broadly divided into three categories:

- International traders with offices in South Africa.
- Local traders, many of whom now operate across borders.
- Associate members such as financial institutions that provide services to grain traders.

New members that joined during the previous financial year include Chester Africa (international), Perdigon (local), and associate members Steinweg Bridge and Land Bank. Since 1 July this year, Invictus Trading and Nu-Pro Commodities have also come on board.

Dr Keyser stated that broadening representation within the trading community remains a key priority for Sacota. The organisation remains focussed on expanding its membership.

Estimate and quality concerns

One of the toughest aspects this year was grappling with crop estimates that turned out to be far off the mark. "Whether we looked at the official Crop Estimates Committee (CEC) figures or our own projections, we were all caught off guard," Dr Keyser admitted. "We still don't quite understand what went wrong."

The soya bean and maize harvests ended up significantly larger than most forecasts anticipated. While this initially appeared positive, subsequent quality issues – particularly in white maize – quickly tempered expectations. Early-season drought conditions were followed by excessive late rains, which affected grain size and overall consistency, especially in white maize.

Only 64% of this year's white maize met Grade 1 quality standards, a figure Dr Keyser described as "probably the lowest on record". International buyers also raised concerns regarding quality, particularly regarding yellow maize exports to the Far East. "This has been a shock to our system," he said.

Between May and August, South Africa exported just over 200 000 tonnes of maize via deep-sea channels – four shipments of yellow maize and two of white maize. Yet by August, imports totalling roughly 78 000 tonnes had already begun arriving in the Cape. "Interestingly, the imported yellow maize was at least equal in quality, if not better, than our domestic crop," Dr Keyser noted. "We were in the unusual situation of exporting and importing almost simultaneously."

Wheat under pressure

South Africa's wheat production remains barely sufficient to meet half the local demand. "Africa is heavily dependent on wheat imports, and that dependence is expected to keep growing," Dr Keyser explained, referencing data presented at the International Grains Council meeting.

Domestically, wheat is becoming increasingly uncompetitive compared to summer crops such as maize and soya bean. In the Western Cape, many producers are switching to canola, while in the northern regions, wheat margins simply no longer justify production. "The local wheat industry is struggling to survive. We will likely have to import more in the years ahead."

Ongoing frustration with the JSE

Dr Keyser's most pointed remarks were directed at the JSE's Commodities Division. "Working with the JSE on new initiatives has been disappointing. We've been requesting a Commitment of Traders (CoT) report since 2010, which is standard practice in other developed markets. All we've received are explanations of why it supposedly cannot be done."

With algorithmic and institutional trading now dominating market activity, Dr Keyser argued that greater transparency is long overdue. "This is 2025. The markets have evolved. We need this data to function effectively."

Sacota also engaged with the JSE on developing a basis futures contract that would enable targeted trading at silo level. However, the project was suspended due to alleged anti-competitive concerns. "We're now exploring alternative ways to make this product a reality."

Transnet's partial deregulation

Another key development has been the partial deregulation of Transnet's rail operations. Under the new structure, Transnet will retain ownership of core infrastructure through the newly established Transnet Rail Infrastructure Manager (TRIM), while private operators will be permitted to manage selected routes. The rail network has been divided into A-lines (strategic routes such as Durban and Saldanha) and B-lines (branch routes feeding into the main network).

"The issue," Dr Keyser explained, "is that the B-lines are being neglected. Without them, it is impossible to move grain efficiently from production areas to the ports."

To address this, Sacota and its members are developing a proposal for the cooperative management of these feeder lines to ensure export logistics remain viable. "TRIM is waiting for us to come back with a practical plan."

Strengthening partnerships

Despite these challenges, Sacota's relationships, both locally and internationally, have strengthened significantly over the past year.

The association remains an active member of the International Grain Trade Coalition (IGTC) alongside counterparts from Argentina, Brazil, the US, Canada, Europe, Ukraine, and Australia. "These global connections are invaluable," said Dr Keyser. "They allow us to share data, anticipate policy changes, and align on phytosanitary and trade matters."

Back home, Sacota has made notable progress in rebuilding trust with the National Department of Agriculture (NDA). "It is almost impossible to trade, whether locally or abroad, without departmental support. Over the past year, our collaboration has improved markedly."

He noted the department's assistance with silo certification, laboratory testing, and the synchronisation of GMO imports, which are all critical steps that helped South Africa maintain compliance during the 2024/25 season.

Digitalisation has also been a key focus. The association is actively promoting the ePhyto and eCert systems. These are online platforms introduced by the NDA to streamline applications for phytosanitary export and import permits. Sacota is collaborating with the developers of these systems to further simplify trade procedures such as applications, particularly for key markets such as China and Indonesia.

Looking ahead

While 2025 has been marked by volatility and frustration, Dr Keyser remains cautiously optimistic. "The year tested us on every front, from logistics and market accuracy to quality and policy. But it also strengthened Sacota's networks and reminded us of the industry's resilience.

"Our members are problem solvers by nature. If we can maintain strong collaboration between traders, government and logistics partners, we'll be ready for whatever 2026 brings."

For more information, send an email to info@sacota.co.za or view Sacota's annual report at *www.sacota.co.za/sacota-agm-2025/*

Grain storage options abound

By Izak Hofmeyr, Plaas Media

Each year, as harvesters sweep across the fields and trucks queue at depots, the same question arises: Where will all this grain go? For decades, the answer was straightforward – into silos. Those towering landmarks across the countryside have long symbolised both food security and commercial stability.

But times have changed. Advances in technology, coupled with changes in ownership structures, production systems, logistics, and financing, have prompted the industry to rethink its approach. Today, a variety of alternatives – from polyethylene grain bags to bulk bunkers and even 'grain dams' – are available. Each option offers advantages, economic considerations, and potential drawbacks.

Silos: The benchmark

Traditional tower silos remain the benchmark for grain storage. Constructed from concrete or corrugated steel, they can last for decades with proper maintenance and provide excellent control over temperature, aeration, and pest management.

Operational costs for silos are generally competitive when compared with other storage methods. However, their high initial capital investment means that they make the most sense for those taking a long-term view of grain storage.

Grain bags: The 'bomb squad'

Silobags can be considered the 'bomb squad' of the grain handling and storage industry, especially during seasons of surplus when extra storage capacity is needed. They also provide flexible solutions for segregating grain with specific characteristics or unique market requirements.

These long, white polyethylene tubes of roughly 60m long and 3m wide can each hold approximately 180 tonnes of grain. The capital costs of silobag systems are generally lower than those of traditional silos and cover the purchase of tractors, chaser bins, a bagger, and an extractor. Some silobag depots also include small holding bins, which add to the capital outlay.

However, because the bags are replaced annually, operational costs tend to be higher than those associated with silos.

Bunkers: Bulk storage at scale

First introduced in Australia and later adopted in South Africa, bunker systems have become a key component of the country's grain storage landscape. Their appeal lies in lower initial capital costs compared to silos, possibility of relocation, and reduced operational expenses. Bunker depots also provide high inloading and outloading capacity, which is an important advantage as on-farm harvest volumes rise.

Grain dams: The emergency option

A grain dam consists of a steel or wire structure covered with plastic sheeting. While it can be used for medium- to long-term grain storage, its main purpose is to enhance logistics efficiency by providing additional buffer capacity when needed. Grain dams require relatively low initial capital investment compared to other storage methods, but their operational costs are a disadvantage over the medium or long term.

The future of storage solutions

Innovation in grain storage management is rapidly accelerating. Remote sensors now enable continuous monitoring of temperature, humidity, and carbon dioxide levels within sealed structures and bags. Early warning alerts help prevent spoilage before it becomes visible, while AI-driven analytics are beginning to optimise aeration and fumigation schedules, reducing energy consumption and chemical use.

Manufacturers are also exploring UV-stabilised and recyclable films, and solar-powered fans are increasingly integrated into small steel silos and bunker systems. Energy reliability and cost remain challenges in South Africa and such low-power, intelligent technologies could transform grain storage practices. The shift is underway from static to responsive systems: facilities that sense, adapt, and communicate.

Environmental concerns are also driving interest in biodegradable bag materials and the recycling of bunker liners. The next generation of storage solutions will merge digital precision with sustainability goals.

Distinct purposes

Each storage method serves a distinct role. Grain dams provide buffer capacity, silobags accommodate surplus during bumper harvests, bunkers extend capacity alongside silos at existing depots, and silos ensure cost-effective and safe storage over the long term.

Ultimately, sound management practices remain the cornerstone of safe handling and storage – from accurate grading and site hygiene to rodent control, regular inspections, and effective fumigation. These measures are an essential part of maintaining grain quality, supporting food security and contributing to economic growth and stability in rural areas.

Contact Dr Charl van der Merwe at 067 179 4379 for more information.

Silobags and bunkers are popular methods of extending storage capacity. (Photograph: BKB Grainco)

Photograph: AFGRI.

The case for preventive silo maintenance

By Koos du Pisanie, Plaas Media

In the latter half of the last century, hundreds of freestanding concrete silos were built across South Africa. In the decades that followed, some of the specialised expertise required to construct and maintain them was gradually lost. Today, many of these silos are between 50 and 70 years old and are nearing, or in some cases exceeding, their intended lifespan.

The reality is that only a handful of experts in South Africa still possess the knowledge to build and maintain concrete silos. One of them is Carl Geldenhuys, director of Stugua Consulting (Pty) Ltd. Geldenhuys notes that in the United States, any concrete silo older than 40 to 50 years is deemed to have reached the end of its service life and must undergo a thorough structural assessment before continued use is permitted.

Cracks and structural stress

According to Geldenhuys, the biggest issue affecting older silos is the calcification of the concrete. Over time, this process weakens the material, leading to the formation of cracks and, in some cases, the detachment of sections of concrete. This exposes the underlying reinforcing steel. Once exposed, the steel begins to corrode, further undermining the structure's strength. Moisture and salts accelerate this corrosion. As rust expands, it causes spalling which progressively erodes the silo's structural integrity.

Cracking can also result from temperature fluctuations, foundation movement, or an inadequate concrete mix. If left unrepaired, these cracks allow moisture and pests to enter, compromising grain quality and the stability of the silo.

Groundwater challenges

Hardus Dupper, chief engineer at AFGRI Grain Management, echoes these concerns. He adds that older concrete silos also face persistent issues with groundwater management. "The original underground drainage systems have deteriorated over time. Unfortunately, the structural design of these older silos does not allow for those systems to be serviced or repaired."

Expert maintenance combined with sufficient funding is the only viable solution for extending the lifespan of South Africa's grain silos. "Once a structure is damaged beyond a certain point, restoring it to a safe, serviceable condition becomes extremely costly, difficult, or even impossible," says Dupper. He stresses the importance of professional inspections and continuous monitoring to detect problems early.

Geldenhuys agrees, highlighting that regular inspections of the interior and exterior walls, the roof, and general silo maintenance – as outlined in Section 11.2 of the *Construction Regulations, 2014* under the *Occupational Health and Safety Act, 1993 (Act 85 of 1993)* – are legally required but rarely fully implemented.

In terms of Section 11.2 an owner of a structure must ensure that (a) inspections of that structure are carried out periodically by competent persons in order to render the structure safe for continued use; (b) that the inspections contemplated in paragraph (a) are carried out at least once every six months for the first two years and thereafter annually; and (c) the structure is maintained in such a manner that it remains safe for continued use.

Strategic silo maintenance plan

Each silo complex should have a tailored maintenance plan, which can be benchmarked against other plans:

- **Daily:** Check ventilation, filters, and grain flow during loading/unloading.
- **Monthly:** Inspect for cracks, moisture, rust, and uneven flow.
- **Semi-annually:** Clean interior walls, test aeration pads and vibrators.
- **Annually:** Conduct structural inspection; repaint or reseal exterior surfaces.

Additionally, conducting a pressure test is a practical way to assess the air- and moisture-tightness of a silo.

Building regulations

According to Geldenhuys, South Africa has never had an internationally recognised design code for freestanding silos. He recalls that in the 1960s, the late Jock Henny, in collaboration with Noordwes Koöperasie and Christensen Construction in Lichtenburg, designed and built several silo tubes.

Henny developed a design code to guide their construction. He determined that silo tube walls cracking more than 1mm were considered 'under-designed', while those cracking less than 1mm were 'over-designed'. This approach allowed him to establish an optimal balance, which ultimately became the basis for a practical design code.

Dupper notes that, while no codes are dedicated specifically to silo design, silos, like any other structure, must be designed by qualified professionals or teams in accordance with existing design codes and regulations. He emphasises that this does not grant unlimited design freedom; strict standards still apply, particularly for concrete and steel structures.

"There are also other regulations, such as construction regulations, that must be observed. The former South African Bureau of Standards (SABS) codes have been replaced with South African National Standards (SANS) codes, which are now integrated with other relevant standards. These must be considered when building silos," he explains.

Concrete grain silos can remain functional for decades if properly designed, inspected, and maintained. The main risks of moisture, temperature fluctuations, cracks, and dust can be effectively managed through sound engineering, adequate ventilation, and skilled preventative maintenance.

Prioritising preventative maintenance over repairs is crucial for silo safety and for preserving grain quality during long-term storage. According to Dupper, old or damaged silo tubes can be repaired, but the costs often make such efforts economically unviable. As a result, owners frequently turn to alternative storage solutions, such as steel silos, grain bunkers, or silobags.

For more information, contact Carl Geldenhuys at 082 450 8177 or Hardus Dupper at 084 245 2342.

Influence of commodity type and temperature on the population growth of *Trogoderma granarium* Everts and *Trogoderma variabile* Ballion

By Georgia V Baliota, William R Morrison III, Michael J Domingue, and Christos G Athanassiou

The khapra beetle, *Trogoderma granarium* Everts (Coleoptera: Dermestidae), is an important stored product insect that can infest more than 100 commodities (Hagstrum and Subramanyam, 2009; Athanassiou *et al*., 2019). It can rapidly reach high population densities that can be devastating for the commodity, while it is also considered a major threat to global food security, since it is a quarantine species (Athanassiou *et al*., 2019). In addition, this species often easily outcompetes other major stored product insects, such as the rice weevil, *Sitophilus oryzae* (L) (Coleoptera: Curculionidae) and the lesser grain borer, *Rhyzopertha dominica* (F) (Coleoptera: Bostrychidae) (Kavallieratos *et al*., 2017).

The warehouse beetle, *Trogoderma variabile* Ballion, is closely related to *T. granarium* and is considered an equally significant pest of stored grains and related products (Partida and Strong, 1975; Hagstrum and Subramanyam, 2006). This species is widespread in the Nearctic, and it is recorded as one of the most commonly found beetle species in a series of surveys in the United States (Wright and Morton, 1995; Campbell and Mullen, 2004; Gerken and Campbell, 2019).

Population growth of stored product insects is strongly influenced by interactions between abiotic and biotic factors, particularly temperature and commodity, within storage environments (Sarwar and Sattar, 2007; McKay *et al*., 2017; Morrison *et al*., 2020). In the case of the population growth of *T. granarium* and *T. variabile*, Lampiri *et al*. (2021) found that temperature played a key role when both species were reared on wheat, but it was much less important when the same species were reared on rice. Similarly, Kavallieratos *et al*. (2017) found that increasing temperature from 25 to 30 or 35°C provided enhanced population growth of *T. granarium*, with extremely high larval densities in a single gram of grain.

As a next step to the work by Lampiri *et al*. (2021) on the topic of comparative development of *T. granarium* and *T. variabile*, here we tested, in parallel, the population growth of these two species over a wide range of temperatures on wheat and rice. This approach allows for a direct comparison of their developmental responses and damage potential under realistic storage scenarios, helping to close an important gap in stored product pest management research.

Results

Population growth on wheat and rice

Regarding progeny production counts, all main effects and interactions were found to be significant, regardless of the developmental stage of the individuals (*Table 1*).

The adult progeny production for *T. granarium* on wheat was highest at 37°C, significantly exceeding the very low production observed at 25 or 40°C (*Figure 1*). However, post-hoc comparisons showed no significant differences in progeny numbers between 30 and 35°C. In contrast, *T. variabile* appeared to produce no adult progeny on either commodity at any temperature (*Figure 1*). As the ten parental adults were not removed, they were likely included in the final progeny counts. The authors state that this did not significantly affect the results, as adults of both species are short-lived and the trials extended

Table 1: Summary of ANOVA parameters for progeny production (merged numbers of adults and immatures) on wheat or rice infested by either *T. granarium* or *T. variabile*, at six temperatures (error df = 192).

Source		Adults		Pupae		Larvae	
	df	F	p	F	p	F	p
Species	1	39,3	<0,001	51,8	<0,001	66	<0,001
Commodity	1	31,1	<0,001	48,6	<0,001	82,2	<0,001
Species*Commodity	1	33,9	<0,001	47,7	<0,001	57,9	<0,001
Temperature	5	2,6	<0,05	8,5	<0,001	14,2	<0,001
Species*Temperature	5	3,6	<0,01	8,7	<0,001	9,6	<0,001
Commodity*Temperature	5	4,2	<0,001	8,5	<0,001	8,9	<0,001
Species*Commodity*Temperature	5	5,1	<0,001	8,5	<0,001	9,5	<0,001

beyond their typical lifespan. However, it does introduce some uncertainty in determining whether the recovered adults were surviving parents or actual progeny.

When only ten or fewer adults were found, such as at 40°C on wheat for both species, and for *T. variabile* on rice (*Figure 1*), it was unclear whether any adult progeny had been produced by the end of the trial. In some cases, fewer than ten adults recovered, which is likely due to cannibalism, as the parental adults may have been consumed by emerging larvae. This was observed primarily in *T. variabile* on wheat, and in both species on rice (*Figure 1*).

Figure 1: Adult progeny production (mean number of adults per vial ± SE) of *T. granarium* and *T. variabile* on wheat or rice after 80 days. Within each species and commodity, means followed by the same letter are not significantly different according to the Tukey-Kramer (HSD) test at α < 0,05. Capital letters represent comparisons within *T. granarium*, while lower-case letters represent comparisons within *T. variabile*.

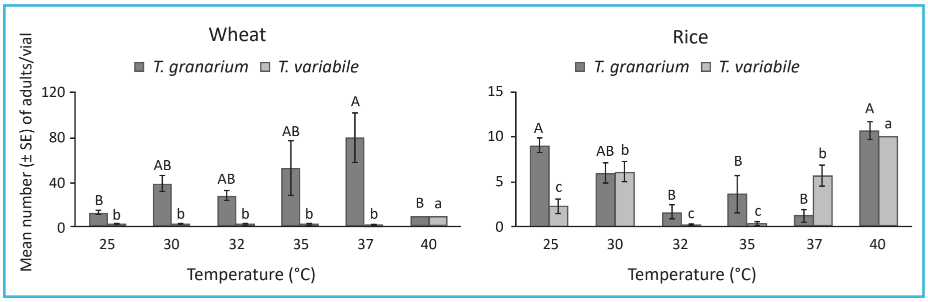


Figure 2: Pupae produced (± SE) for *T. granarium* and *T. variabile* on wheat or rice at 80 days. Within each species and commodity, means followed by the same letter are not significantly different according to the Tukey-Kramer (HSD) test at α < 0,05. Capital letters represent comparisons within *T. granarium*, while lower-case letters represent comparisons within *T. variabile*.

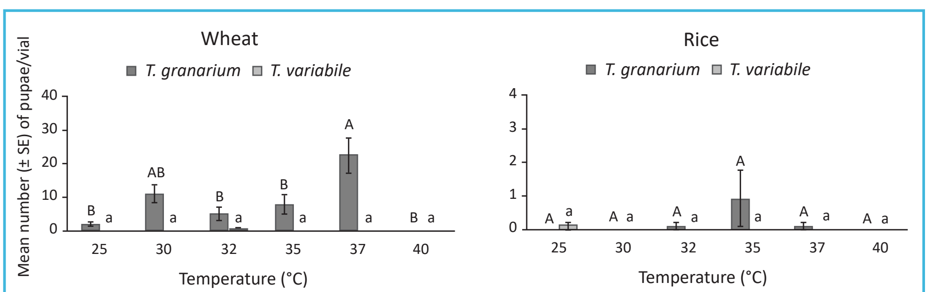
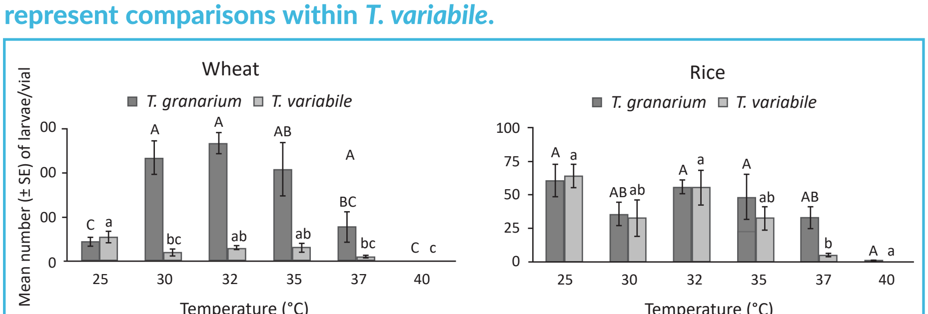


Figure 3: Population growth (mean number of larvae per vial ± SE) of *T. granarium* and *T. variabile* on wheat or rice at 80 days. Within each species and commodity, means followed by the same letter are not significantly different according to the Tukey-Kramer (HSD) test at α < 0,05. Capital letters represent comparisons within *T. granarium*, while lower-case letters represent comparisons within *T. variabile*.



Pupal production on wheat in *T. granarium* followed a similar pattern to adult progeny, with the highest number observed at 37°C, significantly greater than at most other temperatures, and none produced at 40°C (*Figure 2*). In contrast, *T. variabile* produced almost no pupae, with a few observed only at 32°C.

Different larval growth patterns were observed within temperatures and species on wheat (*Figure 3*). More than 400 larvae per vial of *T. granarium* were found at 30, 32 and 35°C, while significantly fewer than 200 larvae were found at 40, 37 and 25°C (158 and 91 larvae/vial, respectively). On the other hand, *T. variabile* had the highest larval production at 25°C (112 larvae/vial) on wheat, with fewer larvae at 35, 32 and 30°C (67, 65, and 44 larvae/vial, respectively).

The highest larval production for both species was observed at 25 and 32°C (60 and 56 larvae/vial of *T. granarium* and 66 and 55 larvae/vial of *T. variabile*, respectively). However, *T. granarium* did have more progeny than *T. variabile* at 37°C (33 and 5 larvae/vial, respectively). Moreover, both species produced no larvae at 40°C, regardless of the commodity tested.

Grain quality parameters

All main effects and interactions were statistically significant at α < 0,05 (*Table 2*). In general, more frass was generated on wheat than rice, following a similar pattern to that of the larval progeny. In wheat, *T. granarium* produced significantly more frass at 32°C (3,8g/vial), compared with the other temperatures. However, the amount of frass produced by *T. variabile* was considerably lower and did not differ significantly across temperatures from 25 to 32°C (0,6 to 0,8g/vial).

In the case of rice, frass did not exceed 0,3g/vial, regardless of species and temperature. Frass production by *T. granarium* on rice remained consistent across temperatures, with the exception of 40°C, where it declined markedly. *T. variabile* exhibited a gradual reduction in frass production with increasing temperature on the same commodity.

Table 2: ANOVA parameters for grain quality parameters on wheat or rice infested by either *T. granarium* or *T. variabile*, at six temperatures (error df = 192).

Source		Frass		IDK_n		IDK_{wt}	
	df	F	p	F	p	F	p
Species	1	112,2	<0,001	78,4	<0,001	49,8	<0,001
Commodity	1	256,6	<0,001	603,5	<0,001	557	<0,001
Species*Commodity	1	102	<0,001	59,5	<0,001	47,6	<0,001
Temperature	5	36	<0,001	51,5	<0,001	50,7	<0,001
Species*Temperature	5	18,7	<0,001	7,7	<0,001	6,8	<0,001
Commodity*Temperature	5	28,3	<0,001	43,3	<0,001	47,1	<0,001
Species*Commodity*Temperature	5	16,2	<0,001	7	<0,001	6,4	<0,001

Discussion

Our results support the previous findings by Lampiri *et al.* (2021) that underline the clear preference of both species for wheat, as compared to rice. However, these 'non-preferred' commodities can be important in the case of the distribution of invasive species, such as *T. granarium*, where low population densities can remain undetected during international transport or at ports of entry (Kavallieratos *et al.*, 2017). Nevertheless, we found that the preference for wheat as a commodity is far greater for *T. granarium*.

In contrast, for *T. variabile*, in some of the combinations tested, the species was able to produce comparable progeny numbers in both commodities. Hence, *T. granarium* infestations pose a significantly greater threat to wheat than to rice. At the same time, rice can serve as a vehicle for hitchhiking, posing a potential risk in facilities where multiple grains are stored in adjacent areas, such as in the case of entry ports.

Recent studies reinforce the impact of high-temperature exposure on stored-product insects and emphasise substrate-dependent responses (Abdel-Hady *et al.*, 2021; Lü *et al.*, 2023). For instance, Abdel-Hady *et al.* (2021) reported that short-term thermal shocks significantly reduced survival and delayed recovery in the red flour beetle, *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae) and the rice weevil, *Sitophilus oryzae* (L) (Coleoptera: Curculionidae), with effects dependent on both temperature and exposure time.

We observed that both *Trogoderma* species were able to survive and reproduce at 37°C, but their survival dropped markedly at 40°C, with progeny production and associated damage indicators (IDK_n, IDK_{wt}, and frass) approaching zero. This suggests that population growth is not feasible at or above 40°C under the tested conditions.

It is well established that exposure to 50°C is typically lethal to most insect species within a few hours, which is why heat-treatment protocols often target 45°C for extended periods (Fields and White, 2002). However, significantly higher temperatures and longer exposure times may be needed for effective control of *T. granarium*, as its diapausing larvae are highly heat-tolerant, with estimated LT_{99} values of 288h at 45°C, 6h at 50°C, 1,1h at 55°C, and 1h at 60°C (Wilches *et al.*, 2019).

Our findings provide a critical reference point for refining disinfestation strategies. Although 40°C may suppress reproduction, it is unlikely to guarantee full mortality, particularly in heterogeneous storage environments where heat distribution can vary. Therefore, practical heat treatments should aim for higher temperatures (e.g., 45 to 50°C) combined with sufficient exposure times to account for potential survival of heat-tolerant life stages.

These findings are particularly relevant for quarantine applications and small-volume treatments, such as those in shipping containers, where heat can be more uniformly applied. Moreover, special attention should be paid to temperature monitoring, as even small cooler zones within the treatment area may allow insect survival and risk reinfestation. Thus, careful design and validation of heat-treatment protocols are essential, especially in scenarios where applied temperatures are close to 40°C.

The marginal survival and suppressed reproduction observed in other stored-product species at this temperature may not apply to *T. granarium* and *T. variabile*, highlighting the need for more rigorous thermal control approaches (Wilches *et al.*, 2019; Athanassiou *et al.*, 2019).

This study examined the combined influence of commodity type (whole kernels of soft wheat and paddy rice) and temperature on the population growth of larvae and adults of *T. granarium* and *T. variabile*. By simulating controlled environments and analysing critical parameters such as progeny production, grain quality and frass output, we evaluated how these factors interact to shape the growth dynamics and damage potential of these pests. Our findings provide essential insights into the reproductive strategies and survival mechanisms of these two *Trogoderma* species, offering valuable data for developing effective pest management strategies and reducing post-harvest losses.

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From risk to regulation:
Managing flammable storage compliance in South Africa

By Christal-Lize Muller, Plaas Media

Flammable storage and the legal requirement for a certificate of compliance (CoC) were central themes during the second session of the 11th virtual Agbiz SHEQ workshop, presented by Jacques Pretorius, training facilitator at V&V Training and Bee-Safe Programme Development and Training (Pty) Ltd.

Building on his earlier session on hazardous substance transport, Pretorius turned his focus to compliance in the storage of flammable goods, addressing critical aspects such as documentation, penalties, audits, and training.

He defined a flammable good as any material/substance that, under specific adverse conditions, can cause a fire or explosion leading to injury, death, damage, or environmental contamination. Unlike general dangerous goods, which include oxidisers, poisons, or radioactive materials, flammable storage specifically concerns materials/substances for which fire is the primary hazard.

Given the potential risks, a valid CoC is a legal necessity and must be maintained at all times. However, many businesses face challenges in obtaining one, often due to limited understanding of the legislation or uncertainty about how to meet regulatory requirements. The real challenge lies not only in knowing the rules but in understanding how to apply them effectively.

Legal framework for compliance

Pretorius explained that under *General Safety Regulation 4* (GSR 4) of the *Occupational Health and Safety Act, 1993 (Act 85 of 1993)*, or *OHS Act*, employers are legally required to establish and maintain compliant storage areas for flammable substances in the interest of health and safety. While GSR 4 mandates the need for a CoC, it does not specify the full application process.

In addition to the *OHS Act*, other legal frameworks and municipal bylaws apply, adding layers of complexity to compliance. These requirements can vary by municipality and industry, making navigation challenging. However, some common standards do exist. For instance, International Organization for Standardization (ISO) certifications are widely recognised across multiple industries – not only construction. In many cases, obtaining ISO certification can streamline or even expedite CoC approval, as the standards closely align. Pretorius emphasised that although there are multiple routes to achieving compliance, a solid understanding of both national regulations and local bylaws is essential.

Common compliance requirements

Other sections of legislation and local bylaws make summarising these requirements difficult, but several shared requirements typically apply.

Fire department oversight: Regardless of municipal bylaws, compliance of flammable storage facilities and the CoCs it entails are managed and regulated by the local fire brigade. The CoC is granted by the appointed Fire Chief, who ensures all safety conditions are met before approval. Legal approval from the fire department is mandatory, and all flammable storage activities within their jurisdiction must be reported. When municipal processes experience delays, fire departments are generally cooperative and willing to assist.

Construction approvals: Construction plans must also be reviewed and approved by a municipal engineer, who signs off on plans and conducts inspections during key project stages. However, limited engineer availability often leads to delays. These bottlenecks can cause setbacks – particularly when late inspections reveal minor issues that require rework, even if other aspects are ready.

Structural and safety standards: Materials used in constructing flammable storage facilities must be fire-resistant


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and capable of maintaining structural integrity for at least two hours of continuous burning. Private building engineers or designers can plan for these requirements.

Doors must open outwards, and ventilation is required wherever there is even a minor risk of fume accumulation. Inward-opening doors can trap occupants during panic situations, as pressure from inside prevents the door from being pulled open.

Grain silos with outdated venting systems remain particularly hazardous, contributing to fatal dust explosions. Systems should aim to eliminate fuel buildup, whether through extraction or controlled dilution. However, in dust-heavy environments, adding oxygen can heighten the risk, making thorough understanding of the specific substance critical.

Additional requirements include:

- Clearly labelled, dedicated storage areas for all flammable liquids.
- A complete set of 16-point safety data sheets (SDSes) kept close by for quick reference.
- Strict access control measures, including protocols for waste disposal and prevention of ignition sources.
- Prominent signage, with firefighting equipment, first aid kits, eye wash stations, and deluge showers located nearby as required.

Safety and compliance essentials

Pretorius noted that, in addition to municipal bylaw requirements, industry best practice dictates that safety documentation be prepared by qualified personnel and retained for a minimum of three years, unless a longer period is mandated by law.

Key components include:

- **Risk assessments:** Essential for the storage, use, loading, and offloading of chemicals, including vehicle parking during these operations. Risk assessments identify potential hazards and provide strategies to manage them at every stage.
- **Relevant appointments:** Proper safety appointments are critical. Who is the designated first aider, and is a backup available? Where are the nearest firefighters? Appointments should not be limited to managers – trained personnel can be assigned to specific safety tasks. Ensure that designated individuals are available when needed and all roles are clearly documented.
- **Incident reports:** Legally, three types of events must be investigated: incidents, where injury or damage has occurred; near misses, where an event occurred but no injury or damage resulted; undesired circumstances, where no event has occurred yet, but a potential hazard exists. Pretorius warns: "If no incidents are being reported, your employees may not be paying attention. There's always room for improvement."
- **Awareness programmes:** Safety is a shared responsibility. Employees must understand the systems in place through toolbox talks, safety meetings, training, and posters. Documentation is required, which the relevant authorities will assess to evaluate safety, but internal awareness is equally important.
- **Inspection checklists:** Every area and system should have an inspection checklist. Hazards cause harm, but risk considers the likelihood of harm. Regular inspections identify high-risk areas and provide data for improvement.
- **Emergency drills:** Under the *OHS Act*, evacuation drills must be conducted every six months. Document findings to enable continuous improvement, establish assembly points, verify emergency contacts, and account for high-risk areas such as flammable storage.
- **Evacuation procedures:** Clearly written and accessible evacuation steps are essential. These procedures are vital during emergencies and may be scrutinised in legal proceedings.
- **Training records:** Maintain records of all internal and external training. This is not just about compliance; it demonstrates that employees are equipped to manage safety responsibilities effectively.
- **Emergency response:** Clearly document who to contact, their location, and expected response times. This information should be readily accessible and rehearsed regularly.
- **Maintenance records:** Document even minor maintenance tasks, including the responsible personnel. These records reflect a proactive safety culture and are important for both internal audits and legal protection.

Penalisation and training

Penalisation refers to the fines and other measures government uses to enforce compliance. Endangering people or the environment can result in severe penalties or legal orders against a business. These may include recurring daily fines for ongoing non-compliance, once-off fines for specific violations, stop-work orders, and in extreme cases involving hazardous exposure, court summons or sentencing.

Non-compliance is generally viewed as negligence on the part of the business owner, regardless of whether they were aware of the issue. It remains the owner's responsibility to ensure that operations are safe and compliant. Therefore, they must actively seek out the necessary knowledge and guidance if it is lacking.

Pretorius further emphasised the importance of training employees to promote consistent reporting and strict adherence to company policies. "An informed worker is a safe worker," he said. Recommended training includes incident investigation, first aid and firefighting, stacking and storage, safety representative training, risk assessment, hazardous chemical handling, working at heights, and machine licensing.

Audit and compliance

Meeting audit requirements is crucial to demonstrating compliance. However, auditors often come from outside the specific industry and assess operations based on general standards rather than contextual realities. This makes internal audits and regular reviews of previously flagged issues or known weak points essential.

Such proactive checks not only ensure consistency but also foster a culture of accountability and regulatory adherence. Auditors are trained in compliance – their role is not to understand or evaluate a company's reasoning. During audits, there is little room for explanation: You either meet the standard, or you do not. Maintaining clear visual indicators of safety and well-organised documentation carry significant weight.

For more information, contact Jacques Pretorius at 011 914 3911 or jpretorius.vvtraining@gmail.com

TRIM presents their strategy to the grain industry

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

The South African Cereals and Oilseeds Trade Association (Sacota), Agbiz and Agbiz Grain co-hosted Moshe Motlahi, chief executive of the newly established Transnet Rail Infrastructure Manager (TRIM), on 22 July this year, to understand what TRIM's strategy for the grain industry will be.

Towards the end of last year, as part of its efforts to deregulate the rail industry, government gave permission to Transnet to split the 'old' Transnet Freight Rail (TFR) into two entities, namely TRIM and the remainder. The 'remainder', mainly locomotives and wagons, will still be referred to as TFR, but will function as an independent 'network operator'. The 'new' TFR will in future compete with private network operators that will be licensed to use the rail infrastructure.

Private entities seeking to provide network operator services must obtain a licence from TRIM. The initial application window has already closed, with submissions due by 27 February this year. A total of 25 applications were received. Out of these applications 11 private train operators were provisionally approved at the end of August, after clearing the safety, technical and financial tests.

The names of these private train operators have not been made public at this stage. However, Grindrod announced that they are included in the group of 11 selected operators. We also know there is a 'group of operators supported by a global shipping line'.

Division of rail network

Discussions regarding tariffs are still ongoing as this requires buy-in from industry and approval from the Interim Rail Economic Regulatory Capacity (IRERC). However, the part of the rail deregulation that the grain industry is most interested in is the decision by TRIM to divide the rail network into an A- and B-network. The A-network will be the core main lines of the rail network – such as the KwaZulu-Natal (KZN) container line from Gauteng to Durban and the mineral line to Richards Bay. Most of the rural branch lines that service the grain silos fall in the B-network.

The A-network will for the most part remain fully under control of TRIM with slots – meaning the number of trains that can run per day or week on a given route – being allocated to private network operators, including the 'new' TFR, at a fee. This will be maintained and upgraded, as necessary, by TRIM. However, at present TRIM does not have the funds or capacity to maintain the B-network lines. It also does not see this as part of its core strategy. TRIM has therefore already indicated that it is open to industry proposals.

Service and maintenance

For the grain industry to benefit from the deregulated environment, two things need to happen, and to illustrate this, we use as an example the five branch lines in the Eastern Free State (*Figure 1*). In an export year the bulk of export grains are sourced in this area (featuring 27 grain silos) and, in theory, a substantial percentage of this grain could cost-effectively be transported by rail to Durban.

1 Firstly, a licensed network operator must show interest in allocating several locomotives and wagons to service these five branch lines. For this to be a viable proposition, traders and storage operators also need to make some kind of commitment to generate business for the network operator. The grain, or more precisely the loaded wagons, must then be gathered in Bethlehem or Harrismith where they will, as one complete train, utilise one of the slots secured by the

Figure 1: Branch lines in the Eastern Free State.

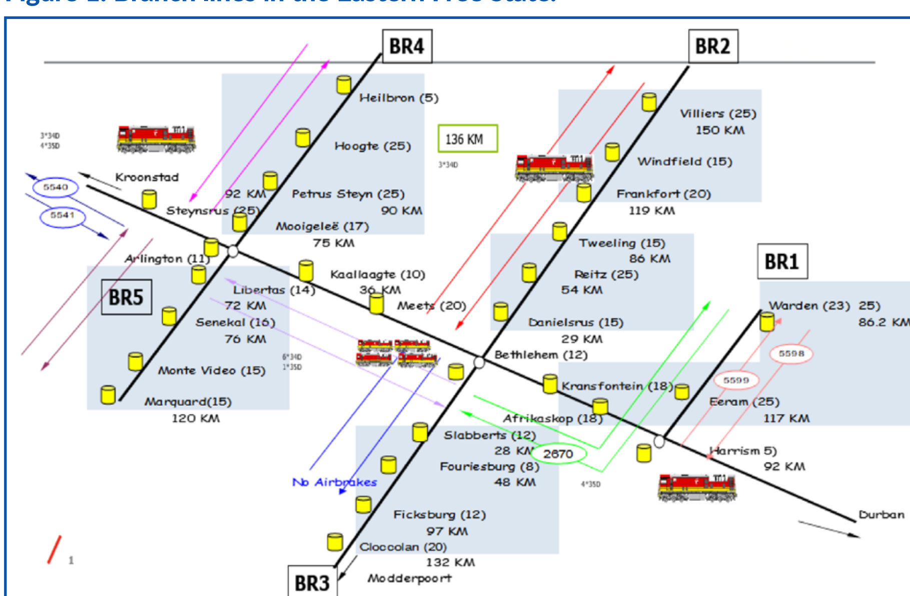
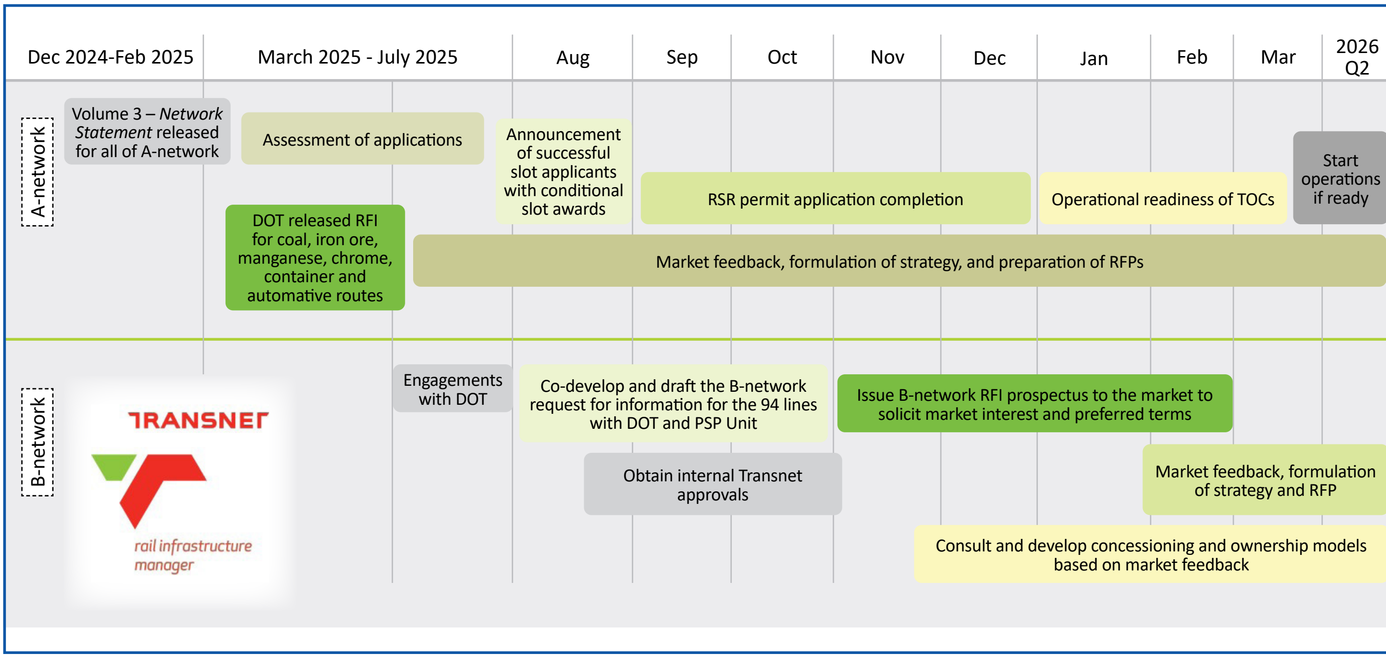


Figure 2: TRIM estimated timelines.



The Network Statement *will be published annually for available slots; existing contracts will be treated as per Chapter 2 of the* Economic Regulation of Transport Act, 2024 (Act 6 of 2024), *or the* ERT Act; *B-network will be treated according to Section 6.14 of the NRP.*

network operator on the KZN container corridor to Durban.

2 Secondly, another commitment is required: that of one or more private entities willing to maintain these branch lines. This is apart from storage operators that have to maintain their own sidings. Core to the deregulation of TFR is that in future the maintenance of branch rail lines versus utilisation of the lines will be seen as separate services or businesses. When it comes to B-network lines, a network operator may show interest in only using a small sub-section of one line (like a tourist line) or maintaining a line for a specific purpose, for example to transport forest logs to a nearby sawmill. The same entity might wish to perform both functions.

What to expect going forward

Given the relative low volumes of grain transported (compared, for example, to minerals), the seasonality of the grain export season, and the variability from year to year, it is unlikely that any of Sacota's members have the risk appetite to embark on a venture of securing one or more branch lines for their exclusive use.

It is more feasible that Sacota members (traders), together with a network operator and Agbiz Grain members (storage operators) form a consortium to engage with TRIM. The TRIM licensees' announcement is an important step, as without knowledge of who the successful licensees are, and what their strategy will be, not much progress can be made.

Once the network operators are known, there will be approximately two months to formulate a consortium strategy before TRIM announces an RFI (request for interest) from the market. For each region or each set of branch lines, or single line, there is likely to be a consortium with a unique set of traders, silo operators and network operators that may be interested. The blueprint may be more or less the same, but the details will differ.

At this stage, any talk of what will happen beyond compiling an RFI, meaning January to April 2026, is very vague. Sacota members, though, do understand that if there is a surplus crop next year, the ideal time to commence with exports is end April/beginning May 2026. We trust that the necessary arrangements will then be in place. If not, another perfect opportunity of exporting grain by rail might be missed.

In conclusion

Why is the revival of the rail such an important economic driver for the grain industry? The three years before last year's drought have shown that the Port of Durban can export about 350 000 tonnes of grain per month. Of this, rail export capacity is approximately 175 000 tonnes per month or 50%, meaning the basic rail infrastructure is in place, although a portion of it may require maintenance. Towards the tail-end of the export programme, rail volumes dropped to approximately 10 000 to 12 000 tonnes per month or roughly 6% of rail export capacity.

Globally, rail is much cheaper than road. In South Africa the cost of rail is approximately two-thirds of the cost of road transport. These savings often determine whether the country remains competitive in the international grain export market. To unlock this potential, it is essential to revive strategic rail corridors and supply lines.

For enquiries, send an email to Dr André van der Vyver, executive director of Sacota, at andre.vandervyver@sacota.co.za, or Juan-Pierre Kotzé, manager: research and projects at Sacota, at info@sacota.co.za

Understanding hazardous substance transport

By Christal-Lize Muller, Plaas Media

Managing the transport of hazardous substances remains a complex challenge across various industries, including the grain handling and storage sector. In South Africa, strict regulations govern the transportation of dangerous goods.

During the 11th virtual SHEQ Workshop hosted by Agbiz and Agbiz Grain, Jacques Pretorius, training facilitator at V&V Training and Bee-Safe Programme Development and Training (Pty) Ltd, shared valuable insights into environmental legislation related to chemical safety.

Pretorius began by emphasising the importance of understanding how the law defines a chemical. He addressed a common misconception that chemicals only refer to dangerous substances such as acids, poisons, explosives, or flammable liquids. In reality, everything – including water – is a chemical. The key distinction lies in whether a substance is hazardous, meaning it has the potential to cause harm. A chemical hazard specifically causes harm through a negative reaction. For example, petrol becomes hazardous when ignited.

The industry frequently deals with toxic substances such as pesticides, as well as flammable liquids and fuels like petrol and diesel. In South Africa, all legally traded chemicals must have a United Nations (UN) number, a requirement that plays a key role in the safe transport of hazardous goods.

Pretorius also highlighted the importance of having access to a material safety data sheet (MSDS) or safety data sheet (SDS) for every chemical used or transported. These documents, obtainable directly from suppliers, are essential resources as they outline proper storage guidelines in accordance with the certificate of compliance (CoC), first aid procedures in case of exposure, and firefighting measures to be taken in an emergency.

Legal reference

The transportation of dangerous goods in South Africa is regulated under the *National Road Traffic Act, 1996 (Act 93 of 1996)*, enacted by parliament and administered in partnership with the South African Bureau of Standards (SABS). This legislation aligns national requirements with international trade obligations, ensuring consistency as South Africa remains a major participant in the global exchange of raw and processed materials.

Under the *Act*, dangerous goods are defined as any commodities, substances, or materials listed in *SABS 0228 – The Identification and Classification of Dangerous Substances and Goods*. In its updated, harmonised form, this standard is published as *SANS 10228 – The Identification and Classification of Dangerous Goods for Transport by Road and Rail Modes* under the South African National Standardisation System.

SANS 10228 identifies and classifies all listed dangerous goods and substances, providing key information such as the UN number, correct shipping name, assigned hazard class, and other relevant details pertaining to the substance.

Importance of the UN number

Pretorius highlighted the vital role of the UN number, particularly in emergency situations. Whether chemicals are manufactured on-site, purchased, or resold, they are typically transported by road, making accurate identification essential.

In many emergencies, first responders such as police, firefighters, or paramedics may not immediately know which substances they are dealing with.The UN number, listed on the MSDS or SDS, enables quick identification of the chemical involved. This information guides critical decisions during emergency response, such as firefighting methods, spill containment, medical treatment, and environmental risk assessment in the event of leaks/spills or contamination.

Dangerous goods transporters

The transport of dangerous goods involves three primary parties:

- **Consignor:** The distributor offering dangerous goods in quantities exceeding the exempt limit for transport in a vehicle. The consignor initiates the shipment and is responsible for ensuring full compliance with all applicable legal and safety requirements.
- **Operator (transporter):** The individual or company responsible for physically transporting the goods. The operator must be properly registered and qualified to carry dangerous goods. While the law provides some flexibility in defining the operator, liability typically rests with the most qualified individual involved in the transport chain. The consignor must also verify that the operator is legally compliant and authorised to handle the specific class of dangerous goods.
- **Consignee:** The recipient of the goods. The consignee's responsibilities depend on the nature of the goods received. For example, when liquids are delivered, the consignee must have the appropriate infrastructure – such as silos, tanks, or specialised storage systems – to safely receive and store the substances.

Vehicle requirements

Pretorius explained that transporting dangerous goods 'above exempt quantities' is defined in *SANS 1023 – Transportation of Dangerous Goods: Operational Requirements for Road Vehicles*. Table C1 of this standard lists all substances classified as dangerous goods. Two key sections apply:

- Section 7.1 – single load: One type of dangerous good.
- Section 7.2 – mixed load: Multiple types of dangerous goods transported on one vehicle.

To determine whether a load qualifies as transportation of dangerous goods, a calculation must be performed using the formula: A (result [total load units]) = Q (quantity loaded) × F (hazard factor from Column 7 of Table C1).

The quantity (Q) varies depending on factors such as whether the material is solid or liquid, whether it's measured in kilograms or litres, and the vehicle's registration and operational capacity. Not every vehicle can transport every product. For example, while both milk and acid are liquids, they require entirely different containment systems. Each must be handled and transported using a vehicle specifically designed for that product.

The hazard factor (F) reflects the level of risk associated with a substance. Acid, for instance, has a much higher hazard factor than milk due to its potential to cause harm or environmental damage. A milk spill poses minimal risk, whereas an acid spill can be dangerous and destructive.

The hazard factor (F) is taken from Column 7 of Table C1, and when multiplied by the loaded quantity (Q), it gives the result A. If A exceeds 1 000 units, the consignment qualifies as the transportation of dangerous goods, and the vehicle used must be registered with the Department of Transport (DoT) accordingly.

Vehicle registration and placards

Vehicle registration for the transport of dangerous goods is governed by municipal bylaws, which may differ between jurisdictions. Generally, the following documentation is required: certificate of roadworthiness, valid vehicle licence and licence disc, and operator card.

In addition to registration, vehicles must comply with specific safety and signage requirements, including:

- Clearly visible hazard signage and placards indicating the type of goods and emergency contact numbers.
- A driver who holds a valid professional driver's permit (PDP) and is certified to transport dangerous goods.

In accordance with *SANS 10232-1 – Transport of Dangerous Goods: Emergency Information Systems – Part 1*, vehicles must display three placards on the cargo containment area and a danger warning diamond on the front. Additional signage may be required depending on the risk classification of the goods being transported.

Placards on vehicles transporting dangerous goods must present essential information in a clear, standardised format. This includes:

- **UN number:** Identifies the specific substance or mixed loads (when carrying more than three types of substances).
- **Operator number:** A 24/7 contact number for the driver or company representative.
- **Specialist number:** A contact number for an external expert, such as a manufacturer or chemical consultant, to assist emergency responders.
- **Hazard classification diamond:** Indicates the class of dangerous goods (Classes 1 to 9) as defined in the MSDS.

Driver requirements

Operators must ensure that drivers transporting dangerous goods undergo annual training from a provider accredited by the Transport Education Training Authority (TETA). This training must be tailored to the type of vehicle used and the specific dangerous goods being transported.

Designated space, route planning

According to Pretorius, the designated space is a clearly marked orange area inside the vehicle cab, labelled **'DOCUMENTS'** in bold. Constructed from fireproof material, it must hold all critical paperwork required by emergency services, including:

- **Tremcard:** A one-page, red-bordered document providing essential chemical information for paramedics and firefighters.
- **Dangerous goods declaration (DGD):** Details the goods being transported, including quantities, driver and vehicle information, and delivery instructions.
- **Route plan:** Enables authorities to verify that the vehicle is following the correct route.
- **Other documents (if applicable):** These may include a Container Packing Certificate (*SANS 10231 – Transport of Dangerous Goods: Operational Requirements for Road Vehicles*) and a Nominally Empty Packing Certificate (*SANS 10406 – Transport of Dangerous Goods: Reprocessing of Previously Certified Packaging*).

Operators are responsible for assessing risks associated with the load and carefully planning the route. Route planning must account for high-risk areas, such as schools, hospitals, densely populated zones, agricultural areas, major roads, highways, and intersections.

Risk assessments

Hazards and risks associated with the storage and transport of dangerous substances must be thoroughly assessed. All related documentation should be retained for a minimum of three years, in accordance with the General Administrative Regulations (GAR) under the *Occupational Health and Safety Act, 1993 (Act 85 of 1993)*.

Spillage incidents

Pretorius highlighted the importance of understanding what constitutes an incident: any unplanned disruption in operations that poses a real risk to health, safety, or the environment.

Key considerations include:

- **Emergency preparedness:** Even unlikely incidents require a response plan. Risk assessments should consider worst-case scenarios, such as a silo collapse.
- **Emergency contacts and containment:** Identify who can assist during an emergency. Who is the manufacturer? Who handles firefighting? How far are they, and are they reliable?
- **Barricading and demarcation:** Determine how affected areas will be cordoned off and what signage will be used. Planning must ensure rapid implementation.
- **Spill containment:** Understand the substances involved. For instance, powders or silicone-based products may be needed to absorb liquids. The MSDS provides guidance under the 'Accidental Release Measures' section.
- **Fire hazards:** Identify potential sources such as lightning, static, exposed wiring, and trip hazards. For transport, regularly inspect vehicle cables to prevent fire-related incidents.
- **Personal protective equipment (PPE):** PPE is the final line of defence and should not be relied upon as the sole safety measure. Conduct thorough risk assessments, implement control measures, and use PPE only as required.

Pretorius added that, according to *SANS 10231*, all incidents involving vehicles transporting dangerous goods must be reported to the DoT within 30 days. Reports should follow the format specified in Annexure D of *SANS 10231*.

For more information, contact Jacques Pretorius at 011 914 3911 or jpretorius.vvtraining@gmail.com

Latest developments in the agricultural regulatory environment

By Annelize Crosby, head of legal intelligence, Agbiz

There are various developments on the regulatory front that can potentially affect the agricultural sector. It is important to take note of these developments and to plan accordingly. It is also important for stakeholders in the sector to utilise all opportunities to comment on proposals to change policy and legislation.

Section 25 of the *Constitution*

Mzwanele Manyi from the MK Party has given notice of his intention to introduce a private member's bill to amend Section 25 of the *Constitution of the Republic of South Africa, 1996* (the *Constitution*) to provide for expropriation without any compensation. The purpose of the bill is to enable expropriation of land without compensation for a public purpose or in the public interest through the enactment of a law of general application and to push back the restitution cut-off date to 6 April 1652. The bill seeks to recognise land as a collective national heritage held in state custodianship.

Input is required from the National Department of Agriculture. The relevant parliamentary committee (land reform and rural development) will have to discuss the inputs from the department as well as other interested and affected parties. When a member initiating the bill briefs the committee, they must inform the committee of the date on which they published the bill and the explanatory memorandum attached to it. The member must also state if they received any public inputs, which must be presented to the committee. These inputs would inform the members' discussion.

This process requires a motion of desirability. If rejected, the bill must be immediately reported on. If the motion of desirability is adopted, then the committee can proceed to deliberate on the details of registration. The portfolio committee will have an informal discussion on the principle and subject of the bill, including a briefing by the member and consideration of the public comments received when deciding on the motion of desirability. Only if the motion of desirability is passed, will the bill proceed.

Fundamental human rights

Agbiz has submitted written comments on the bill. In its comments, it makes the point that Section 25 guarantees a fundamental human right, which is protected in terms of international human rights instruments such as the United Nations' *Universal Declaration of Human Rights*, the *European Convention on Human Rights*, and the *African Charter on Human and Peoples' Rights*. Fundamental human rights are enshrined for a good reason – to protect individuals from government excesses that impact on their fundamental rights and to protect basic freedoms.

There is international recognition of such protection of human rights (including the right to property), and watering down any fundamental human right becomes a slippery slope with potentially calamitous, intended and unintended, consequences.

Most countries' constitutions require compensation, whether full compensation (Denmark, Norway, Russia, Kenya, the Seychelles, and Lesotho), fair compensation where a balancing test applies (Poland, United States, Japan, Egypt, Namibia, the Congo, and Mozambique), equitable compensation (France, Madagascar, Tanzania, and Rwanda), or adequate compensation (Botswana, Malta, Uganda and Zambia). Agbiz also cautioned against innumerable unintended consequences for food security, for investment confidence in the agricultural sector, and the economy as a whole.

It is also important to note a potential test case for the payment of no compensation which will be heard in February 2026. This is the case of Business Venture Investments 900 and the City of Ekurhuleni, where the latter in 2019, under the *1975 Expropriation Act*, took property for housing purposes and offered R0 compensation because, according to them, the taking was in the public interest, and the landowner suffered no damages.

It is vital that South African courts provide clarity on how the constitutional requirements regarding just and equitable compensation will find application in cases of land expropriation and how public interest is to be interpreted in a case such as this.

Changes to *Act 36 of 1947*

The National Department of Agriculture hosted a two-day colloquium on agro-chemicals on 21 and 22 September in Stellenbosch. The colloquium was attended by academics, government officials, researchers, farmworker representatives, growers' organisations, and industry associations. Many presentations were made over the two days and there were calls for the banning of certain agricultural remedies, stricter control, and legislative changes.

The aim of the colloquium included:

- Clarifying the responsibilities of pesticide producers, agricultural producers, and various government departments in managing pesticides.
- Gaining insights from international bodies and the Human Rights Commission on balancing rights, obligations, and constitutional requirements.
- Developing concrete proposals for updating the pesticide regulatory framework.

A draft report was developed following the colloquium and stakeholders were requested to provide inputs. Indications are that the department is considering legislative solutions to some of the issues raised at the colloquium. The issues raised include environmental and health concerns, calls for the banning of pesticides that are harmful and already banned in other countries, incorporating the so-called precautionary principle into the legislation, and hazard-based approach to regulating pesticides.

Agbiz will continue engaging with government on this matter, as will a number of growers' organisations and industry associations.

NDC and carbon budget regulations

The Department of Forestry, Fisheries and the Environment recently published the draft second nationally determined contribution (NDC) for South Africa as well as the draft national greenhouse gas (GHG) carbon budget and mitigation plan regulations, which include the declaration of the list of GHGs and activities for public comment. The NDCs are commitments that countries make to reduce their GHG emissions as part of climate change mitigation.

The carbon budget regulations will empower the minister to establish a list of GHGs and activities contributing to climate change, allocate carbon budgets to significant emitters, and mandate the submission of GHG mitigation plans. The draft regulations will establish a mandatory carbon budgeting system for high-emitting sectors and activities. It will apply to data providers whose emissions of listed GHGs exceed 30 000 tonnes of CO_2-equivalent annually. Listed activities include food and beverage manufacturing.

The submission and implementation of mitigation plans will be required to describe the actions to be implemented to reduce GHG emissions, and to ensure that the emissions remain within allocated carbon budgets. The first commitment period is set to run from 1 January 2026 to 31 December 2030.

Draft technical guidelines explaining how those regulations will work in practice were also published. The draft technical guidelines are the 'how-to' manual. They unpack the methodologies for allocating budgets, detail validation and verification procedures, and provide step-by-step templates for registration, monitoring, and annual progress reports.

Agbiz has submitted comments on both the NDC and the draft regulations.

For more information, send an email to Annelize Crosby at annelize@agbiz.co.za

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Points to ponder

By Jannie de Villiers

Burn your yokes

Before making plans and setting new goals for 2026, it is worth pausing to reflect on 2025. If you've spent this past year simply ploughing through, this message might resonate with you. Perhaps you find yourself thinking that there has to be more to life than this.

Many of us just keep our heads down, ploughing the same field day after day, rarely lifting our eyes to the corner post that gives us direction. Too often, our diaries, inboxes, and phones dictate the pace and direction of our days and clutter up our schedules.

Called to a new mission

I'm reminded of Elisha (1 Kings 19). He was ploughing his father's fields with oxen, last in line among 12 teams. Every day he ate dust for breakfast, lunch, and dinner. His daily view was the backsides of oxen, surrounded by the smell of soil and manure. It sounds a lot like a hard day in South African agriculture! Yet Elisha was diligent and fully committed to his work.

Then one day, everything changed. He was called to a new mission. He discovered that you don't need to understand everything completely in order to obey immediately. He faced a life-defining decision: continue ploughing or follow God's calling. (Perhaps 2026 holds a similar decision for you. Maybe it's time to change your work or maybe God is calling you to change your destiny.)

At Christmas, we're reminded why God sent His Son to the world: to save us from ploughing through this sinful life until our last breath. He came to save us and to help us understand why we were placed on earth. Elisha responded to God's calling for his life by stopping his ploughing, burning his yokes, and sacrificing his oxen.

Consider your calling

What 'yokes' might you need to burn in 2025 to follow your true calling in 2026? Perhaps it's time to let go of an addictive habit, end a toxic relationship, or re-evaluate priorities that steal your joy and time from your family.

> Excellence often means doing the right thing when no one is watching and persevering when the climb gets steep.

It's said that the second Friday of January is known as 'quitters' day' – the day when most New Year's resolutions come to an end. During these slower days of December, take time to pause and reflect on your calling. List the things that stand in your way and think creatively about how you can 'burn your yokes' so you can follow your calling without quitting.

Thasunda Brown Duckett, the CEO of leading American investment firm TIAA, once said that we should manage our lives like a balanced portfolio. There are seasons when you need to be 'overweight' in family life – such as when a teenager is struggling, or when work needs extra focus to launch a major project. The key is to keep adjusting and rebalancing the weights. But she warns that being consistently overweight in one area, such as work, can lead to an unbalanced life with serious consequences.

This is a tough exercise that requires courage. Excellence often means doing the right thing when no one is watching and persevering when the climb gets steep. If you hope to climb the high mountains in 2026, you may need to remove a few stones from your backpack. There are many tools available to help you simplify your priorities and focus on what you are called for.

And for those spending time at the beach, remember, to be carried by the current, you need only be still. You can choose to burn a few yokes and make 2026 a more focused, fulfilling year or you can choose to drift and do nothing.

Merry Christmas!

For enquiries, send an email to Jannie de Villiers at Jannie@devilliersfamily.co.za

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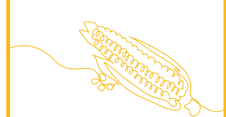
230 ml **IMIGO®** per 100 kg seed (8–10 weeks control of Russian aphid). 	290 ml **IMIGO®** per 100 kg seed (broad spectrum protection). 	12 months against grain borers, weevils, moths, and beetles. 

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