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PULA IMVULA

GROWING FOOD • PEOPLE • PROSPERITY

GRAIN SA MAGAZINE FOR DEVELOPING FARMERS

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POTATOES AND MAIZE
make a great team – 4

PANNAR®

PULA IMVULA

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A Word From...

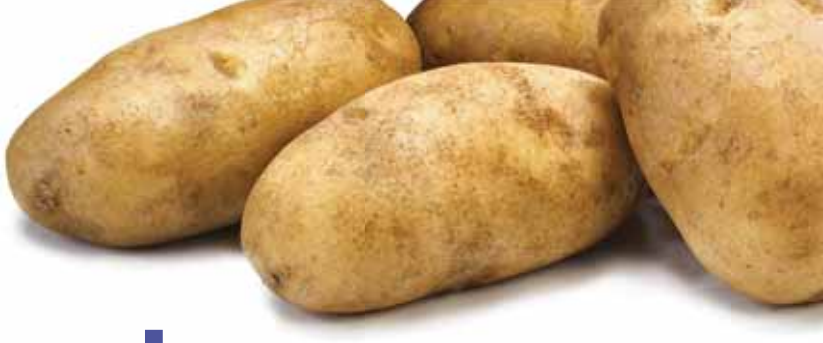
André Brink

IT IS A GREAT COMPLIMENT FOR ANY FARMER TO GET RECOGNITION FROM THE INDUSTRY, SO IT IS TRULY AN HONOUR TO HAVE BEEN CHOSEN AS THE 2022 GRAIN SA/SYNGENTA GRAIN PRODUCER OF THE YEAR. IT HAS GIVEN ME A LOT OF EXPOSURE IN THE AGRICULTURAL INDUSTRY.

Many people called to congratulate me and some have even contacted me to ask for advice. This has given me a great opportunity to give back to the industry. Therefore, I would also like to share some advice with the readers of *Pula Imvula* – things that have contributed to my success as a farmer.

- Plan ahead – failing to plan, is planning to fail!
- Know what is going on with your farming operation's finances. Your books have to be accurate to keep your farm profitable.
- Value the people who form part of your team. They are important, so take good care of them. The 'foot soldiers' contribute to your success.
- Check your soil's health. If your soil's immunity is good, it will handle any situation better – whether it is too much rain or too little, and even erosion.
- Get into a crop rotation system. It is beneficial to your soil and to your farming operation.
- Chemical soil analyses are important and corrections are expensive, so try to spread the cost over a few years.
- If you want to change something on the farm, try to find the solution where you can make the biggest impact with the smallest change.
- Leave things better than you found them: Make sure that when you are no longer around, your farming operation is in a better state than when you started it.

– André Brink is the 2022 Grain SA/Syngenta Grain Producer of the Year.



POTATOES and MAIZE make a great team

SOUTH AFRICANS CONSUME MORE THAN 1,8 MILLION TONS OF POTATOES PER YEAR AND THE POTATO MARKET IN SOUTH AFRICA IS INCREASING. ACCORDING TO POTATOES SA, SOUTH AFRICANS HAVE EATEN TWICE AS MANY POTATOES OVER THE PAST DECADE THAN IN THE PREVIOUS ONE.

Good agricultural management is crucial for successful potato production. As potato production is an intensive process, it is important to have a clear understanding of the crop's requirements and limitations for optimum and cost-effective production.

The input costs for potatoes are higher than for most crops and it is therefore essential that growers adhere to 'best practices' such as testing the soil, planting virus-free material, controlling pests and diseases and applying sufficient fertiliser. Avoid planting in clay soil as potatoes need sandy, close-textured soil in order to grow.

GROWING POTATOES

In the past, potato farming in South Africa was done mainly by smaller farmers. This has changed as a result of increased labour costs, which saw production being mechanised. Today, it is mainly large farming operations that produce potatoes. However, there are still small-scale potato farmers who use simple implements and grow potatoes to sell in their communities.

The best time to plant potatoes depends mainly on the region and conditions. Potatoes prefer cooler growing conditions and a good supply of moisture. They grow best in soils with good drainage.

- In frost-free areas, tubers can be planted from August until the following June.
- Where frost is experienced, like the Free State and Mpumalanga, growers have a shorter planting period.

Land preparation and the seed and cultivar choice are of the utmost importance. Potatoes are generally grown by planting portions of the root structure called seed potatoes or tubers. Seed potatoes aren't actually seeds – they are tubers that can be used to grow new potatoes. A seed potato is a potato that has grown young sprouting stems called 'eyes'.

Using potatoes from the market for planting is risky and may introduce diseases to the soil. Potato diseases are mainly caused by bacteria and fungi and cause soft, rotten spots on potatoes. The main carrier of bacterial diseases is usually an infected tuber. Having viruses in the tubers will result in a lower yield. The best prevention strategy is to purchase certified, healthy seed potatoes from a reputable supplier. Always grow resistant varieties and certified seed potatoes in tandem with crop rotation.

Grain SA executive member for region 19, Jaco Breytenbach, grows potatoes as part of a five-year crop rotation cycle where maize is planted in year 1, followed by sugar beans or soybeans, then maize again, after which the ground has to lie fallow for a year to store water for potatoes to be planted in year 5. 'And remember, you cannot plant potatoes in the same field two years running.'

How long do potatoes take to grow?

Different aspects are important at different times in the growth cycle (**Figure 1**). At tuber initiation, any drought stress will reduce the yield. In the tuber bulking stage, it's vitally important to keep the leaves healthy and maintain adequate moisture levels.

Young shoots start to appear anytime from one week to three weeks after planting. The total growth period ranges from about 110 to 150 days from planting. Potatoes can be harvested when they are young or mature. Mature, full-size potatoes are known as maincrop potatoes and are often cured and stored for later use. Small, round, immature potatoes are called new potatoes. It is best to harvest your potatoes on a warm, dry day when it has not rained. If you are harvesting new potatoes, they may be ready by day 60.

HIGH INCOME, HIGH RISK

Jaco Breytenbach

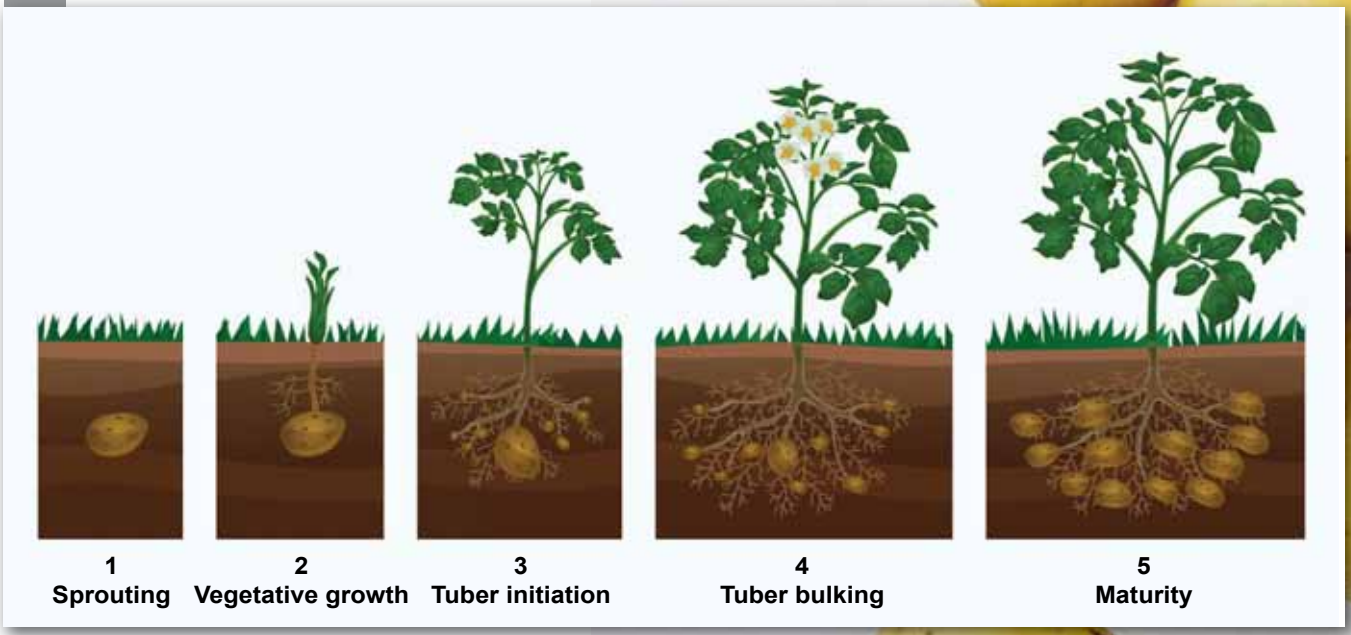
Breytenbach cautions that due to its high fertiliser requirement and the cost of seed potatoes, it is a very expensive crop to grow. 'If you do not adhere to the best practices, it will cost you dearly. You have to stick to an effective spray programme and good management is key,' he advises.

Apart from being labour intensive, potato production has other factors which makes it a high-risk crop. Other factors limiting production and profitability are high production costs, pests and diseases, insufficient irrigation, climatic conditions and expensive equipment. 'Because it is a perishable product which cannot be stored for a long time, you can also lose money if the market is full,' Jaco explains.

Some of the most common pests that affect potato production are aphids, wireworms and cutworms. The Colorado potato beetle can eat large amounts of potato leaves while growing into bigger pink blobs. If this pest isn't dealt with, it can destroy a whole potato plant. Crop rotation can prevent these pests, so never plant potatoes in the same field as the year before. Planting potatoes in the same field year after year diminishes the soil health and can cause a build-up of nematodes and diseases.

Breytenbach believes the potato is one of the best crop rotation crops, and says that maize and potatoes make a great 'team'. Potatoes require high nitrogen rates and the nitrogen input on his farm is about ten times higher for potatoes than for maize, and phos-

1 ***Potato growth stages.***



phate and potassium are about four times higher. He explains that because the potato has a weak root system, these nutrients have to be available to ensure a healthy plant. 'Much of the excess is then available for the maize crop the following season, which leads to a magnificent yield.'

PLANTING POTATOES ON A SMALLER SCALE

Small-scale farmers who plant potatoes for their own use or to sell in their communities can manage harvesting with hand tools such as trowels. Planting done by hand means handling the tubers/sprouts with extreme care. Using spades and shovels can result in chopped-up tubers, so garden forks or hands are recommended.

To make potato production viable for smaller-scale farmers, Breytenbach suggests that harvested potatoes are not washed. 'Unwashed potatoes last longer and there are informal markets looking for unwashed potatoes. Mozambique vendors buy unwashed potatoes in bulk.' Farmers can pack their potatoes in plastic or paper bags, and sell it in the informal sector.

Here are some helpful tips for growing potatoes:

- Prepare your field correctly – this includes improving the soil health and composting.
- Prepare furrows about 15 cm deep and space them evenly. Apply fertiliser before planting.
- Make sure that the seeds are adequately covered after planting.
- Scout for pests and diseases regularly.

SOURCES

- *https://regenz.co.za/resources/farming-potatoes-in-south-africa/*
- *https://www.adama.com/south-africa/en/potato-farming/potato-farming-in-south-africa*
- *https://www.farmersweekly.co.za/crops/vegetables/planting-and-harvesting-potatoes/*
- *https://www.kzndard.gov.za/images/Documents/researchandtechnologydevelopment/publications/Research_and_Technology_Bulletins/Potato-production-for-Kwazulu-natal.pdf*
- *https://www.potatoes.co.za/*

LOUISE KUNZ, ASSISTANT EDITOR

Register for VAT and save on input costs

THE AGRICULTURAL SECTOR CONTINUES TO BE A SHINING SECTOR IN THE SOUTH AFRICAN ECONOMY. STATS SA'S PUBLISHED GDP DATA IN EARLY DECEMBER 2022, SHOWED GROWTH OF ABOUT 1,6% IN PRODUCTIVITY AGAINST A MARKET CONSENSUS OF ABOUT 0,4%.

Growth four times higher than expected was largely driven by an increased economic output from the agricultural and farming sector, which enjoyed bumper crops and increased the turnover due to higher commodity prices.

The flipside of the coin is the increased pressure presented by production input costs hikes – estimated at about a 50% increase year on year between mid-2021 and 2022. Farmers are forced to look at every aspect of the farming enterprise to ensure efficiency and secure some savings that can bump up on their bottom line.

Input or value added tax (VAT) is the VAT paid on production inputs and the standard 15% VAT can be claimed back from SARS when inputs are used in the production of taxable supplies. In other cases, a registered VAT vendor qualifies for zero-rate VAT inputs, like fertiliser, seeds and crop protection products. Zero-rated inputs are those typically used in the production process that are charged at a zero rate to registered vendors (farmers) but in the normal cause of business are charged at the standard 15% in the case of non-registered vendors. It is compulsory for a farmer to register for VAT if:

- The value of taxable supplies made in any consecutive twelve month period exceeded or is likely to exceed R1 million; or
- where in terms of a written contractual obligation, the value of taxable supplies to be made in a twelve-month period will exceed R1 million.

VAT registration technically implies that the farming enterprise becomes a SARS vendor responsible for the collection and payment of VAT on behalf of SARS. Therefore qualifying inputs cost 15% less in essence, which is a significant reduction in input costs compared to a non-registered VAT vendor.

VAT REGISTRATION CATEGORIES

The second dispensation relates to the registration category allowing farming enterprise to register under a **Category D** (six-monthly) tax period provided that the enterprise solely consists of agricultural, pastoral or farming activities – and the total turnover does not exceed R1,5 million per consecutive period of twelve months.

Where the value of taxable supplies exceeds R1,5 million but is below R30 million in any consecutive period of twelve months, the commissioner will allocate either a **Category A** or **B** tax period to the vendor (which is a two-monthly tax period).

This implies that VAT returns must be made bi-annually for Category D registered enterprises or bi-monthly for Category A or B registered enterprises.

MORE ABOUT VAT

VAT calculation

The VAT calculation works in such a way that one must determine the VAT charged (output tax) and calculate the amount of input tax the vendor is entitled to deduct. Pay the difference between the output tax and input tax or claim a refund where the input tax exceeds the output tax for a particular period.

VAT returns must be made on or before the last business day of the month following the month in which the tax period for the enterprise ends. Late payments of VAT may attract penalties and interest.

Zero rate

Any farming enterprise looking to acquire goods at a zero rate must comply with the following requirements:

- SARS must be satisfied that the entity is indeed a farming enterprise.
- The farming enterprise must be in possession of a valid Notice of Registration (VAT201) and the aforementioned authorisation.
- SARS should have issued an authorisation on the VAT Notice of Registration (section 7 for farming, section 9 for diesel rebate), indicating that the goods may be supplied to the enterprise at zero rate.
- A valid tax invoice must be issued for the supply of such goods including the VAT numbers and addresses of the supplier and the farming enterprise.

Tax invoice

A valid tax invoice contains the following:

- The words 'Tax invoice', VAT invoice', or 'Invoice'.
- Name, address and VAT registration number of the supplier.

- Name, address and where the recipient is registered for VAT, the recipient's VAT registration number.
- Serial number and date of the invoice.
- Accurate description of the goods and/or services (indicating where applicable that the goods are second-hand goods).
- Quantity or volume of goods or services supplied.
- Value of the supply, the amount of tax charged and the consideration of supply (value and the tax).

OBLIGATIONS OF VAT-REGISTERED ENTERPRISE

VAT registration places certain obligations and record keeping duties on approved farming enterprise. These include ensuring that:

- VAT is collected on taxable supplies.
- VAT is included in all prices advertised or quoted.
- Tax invoices are issued for supplies made, where required.
- Returns are submitted and payments are made on time.
- Documentation is obtained and retained to evidence the liability for VAT.

Proper accounting records and documents are the important compliance aspects of how the whole VAT system operates. These documents form an audit trail which SARS uses to verify compliance with the law. The farming enterprise is required to retain these records for a period of five years. This is key as SARS has the right to cancel the authorisation for any enterprise found in breach.

This includes cases where a farming enterprise defaults on its obligation to submit VAT returns or pay VAT, ceases the farming activities as approved in the VAT Notice of Registration, or utilised the Notice of Registration (with the authorisation) for purposes other than these approved for the farming enterprise concerned. ■

DR SANDILE NGCAMPHALALA,
FARMER DEVELOPMENT LEAD: GRAIN SA

WORDS OF WISDOM

'Agriculture is the backbone of Africa – not only for food, but also for development.'

~ SIMON ABIRIGA
a farmer from the Yumbe district in Uganda

SOYBEANS: Late harvesting CAN CAUSE LOSSES

IF FARMERS WANT TO INCREASE THEIR PROFIT AND REDUCE THEIR RISK, IT IS A GOOD IDEA TO CONSIDER HARVESTING SOYBEANS AS EARLY AS POSSIBLE TO PREVENT SHATTERING. SHATTER LOSSES DUE TO BRITTLE PODS INCREASE AS THE MOISTURE LEVELS OF PODS AND GRAIN DROPS. THEREFORE BE ON TIME WITH THE HARVESTING OF THE SOYBEANS.

The sound of soybeans shattering and no harvester in the field can break a farmer. Farmers understand that if soybeans shatter, a large portion of the yield is lost. Yes, sheep can eat these pips but the money is not available to go to the bank.

There are not only losses due to the brittle pods but the plant growth can also contribute to losses. Some plants and cultivars are known to produce pods very low on the soil. If the harvester table cannot harvest low enough, many soybeans are left behind. This makes it important to use the correct harvester header and to plant the correct cultivar.

Overestimation of the capacity of a harvester will result in large portions of the crop not harvested. However, harvesting low enough is easier said than done. Large stones in a field and very uneven fields can cause extensive damage to a harvester. Make sure that your harvester is insured for stone damage.

HEADERS

A flex header or flex draper is needed to harvest the low-growing and low-podded soybeans. This header will be able to follow the soil contours. This headers is a floating, multi-section flexible header with a split reel that allows the entire header frame, cutter bar and reel to follow the ground contours as a unit.

A flex draper header makes use of draper 'belts' that carry the crop to the feeder house. It feeds much smoother and allows farmers to cut a little later at night, due to the even feeding. Using the belt is also known to reduce soybean losses as the soybean plant is handled gently and the seeds don't get lost in front of the harvester.

At the end of the year the soybean profit will determine a farm-

1 ***The cost and field capacities of a 240 kW harvester*.***

Harvester cost			
Harvester cost per hour	**Harvester**	**Harvester**	**Harvester**
Total fixed cost	R2 312,46	R2 312,46	R2 312,46
Repair and maintenance cost	R550	R550	R550
Fuel cost @ R24,77 per litre	R1 070,06	R1 070,06	R1 070,06
Total variable cost	R1 620,06	R1 620,06	R1 620,06
Total harvester cost/hour	**R3 941,52**	**R3 941,52**	**R3 941,52**
Harvester header cost/hour			
Header	**Maize**	**Wheat/soybean flex**	**Sunflower**
Header used	8 row 0,91 m	9 m	8,1 m
Average new header price	R1 205 715	R870 543,45	R793 380
Total fixed cost	R508,90	R367,44	R334,87
Repair and maintenance cost	R120,57	R87,05	R79,34
Total header cost/hour	**R629,47**	**R454,49**	**R414,21**
Total harvester and header cost/hour	**R4 570,99**	**R4 396,01**	**R4 355,73**
Working speed (km/h)	6	6	6
Working width (m)	7,2	9	8,1
Field efficiency	0,75	0,75	0,75
Hectare harvested/day (10 hours)	32,4	40,5	36,45
Hour/hectares needed	0,309	0,247	0,274
Total cost per hectares	**R1 410,80**	**R1 085,43**	**R1 194,98**
Diesel/ha (litre)	13,33	10,67	11,85
Diesel/ha (R)	330,27	264,21	293,57
Repair and maintenance/ha (R)	206,97	157,30	172,66

** The 240 kW harvester costs R5 500 000 and can harvest maize, wheat, soybean and sunflower.*

er's bank balance. Farmers must calculate the yield in the tank when deciding which header to buy. Comparing the crop loss against the header price will determine this.

TIME IS MONEY

The time of day when a farmer starts to harvest is critical. As the soybean plant can absorb the dew moisture it gets sticky and loses its brittleness. This makes it difficult for the harvester to harvest. In the morning and evening it is typical for harvesters to break the cutter bare or the plants will get stuck around the threshing drum. This will have an effect on how many hectares can be harvested per day.

A rule of thumb is that a harvester with a 9-metre header over time will harvest between 20 hectares and 42 hectares per day – don't expect it to be more. In order to harvest on time, a farmer needs 1,5 eight-row harvesters to keep up with one eight-row planter. It is important to understand that it is better to have surplus harvester capacity. This will help to increase the profitability.

COSTS

Harvesting a crop is an expensive action. In **Table 1** the cost of maize, soybean and sunflower harvesting is shown.

At a speed of 6 km/h, 32 hectares of maize, 40 hectares of wheat or soybean and 36 hectares of sunflower can be harvested. As soon as the hours per day are reduced, the harvested hectares are also less. In the case of soybean, harvesting for ten hours per day is challenging. So do your calculations accordingly.

To be able to harvest for ten hours per day, repair and maintenance as well as services must be done according to the specifications provided by the manufacturer. Read the manuals and stick to it. If something breaks (and it probably will) make sure that the spares most likely to be needed are available. Prevention is better than downtime – especially in soybean harvesting, so service the equipment before the harvesting begins. It will save time.

Remember, a combine harvester normally works with an unloading wagon. The size of the wagon will be determined by the harvester. However, a farmer must remember that this unloading wagon needs an extra tractor and extra fuel. For a 240 kW harvester the diesel needed for the unloading wagon can easily reach 10 litres per hectare. Remember to add these costs to your calculations.

Also keep in mind that these unloading wagons are heavy and cause compaction. ■

PIETMAN BOTHA, INDEPENDENT AGRICULTURAL CONSULTANT

SA Graan/Grain photo competiton – Karien Martinson, June 2021

Downward trend in groundnut production

THE 2021/2022 GROUNDNUT PRODUCTION SEASON WAS NOT WITHOUT CHALLENGES. WET CONDITIONS IN CRITICAL PHASES OF A GROUNDNUT'S GROWING PERIOD CAUSED A LOT OF DAMAGE TO PRODUCTION AND MADE THE HARVESTING OF GROUNDNUTS VERY DIFFICULT. THESE FACTORS HAVE NEGATIVELY AFFECTED THE PROFITABILITY OF GROUNDNUTS.

It must also be taken into account that a crop such as soybeans is easier harvested, and that the soybean price formation is more transparent than that of groundnuts. Therefore, in the first intentions to plant released by the Crop Estimate Committee (CEC) for the 2022/2023 season, there was a 20,5% decrease in intended groundnut hectares.

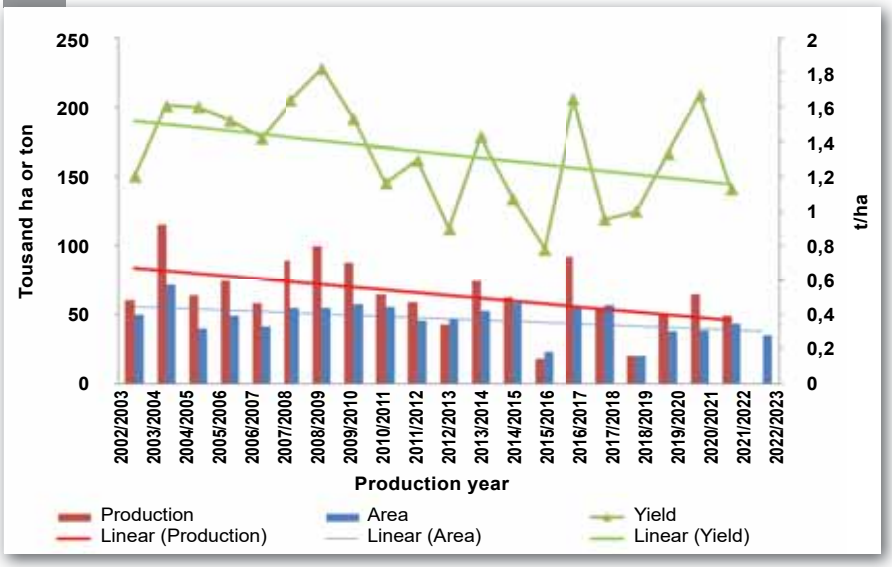
Table 1 shows the production overview for groundnuts in the 2021/2022 production season. The trend where groundnut hectares are decreasing is not a new phenomenon. South Africa was once a major producer of groundnuts and planted a record number of 393 000 hectares in the 1969/1970 production season. From the 2002/2003 season, hectares planted, production and yield are on a downward trend.

On the international stage (**Table 2**), groundnuts is experiencing loss of hectares planted due to profitability and the simplicity of competitive crops. International parity prices are currently at very high levels due to smaller expected groundnut production and lower international supplies.

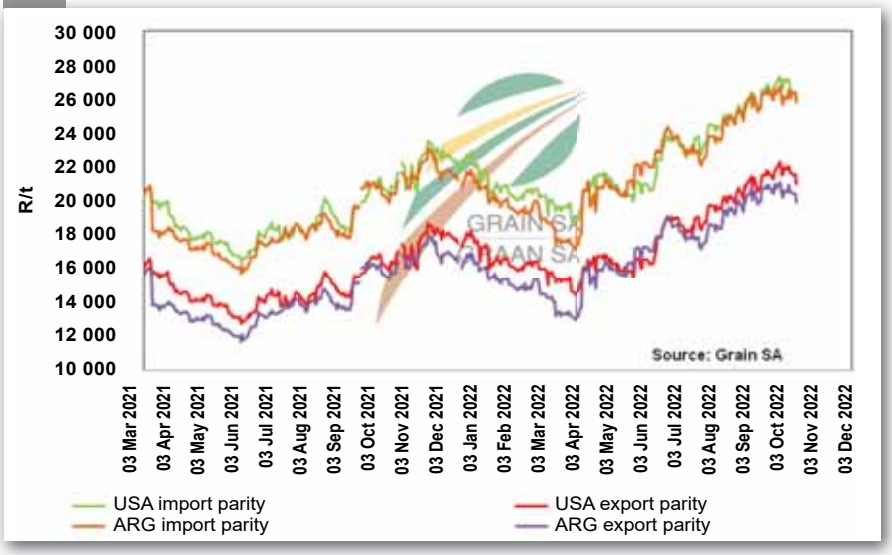
CONCLUSION

- Groundnut production, locally and internationally, is on a downward trend.
- Lower domestic production should lead to farmers' prices moving away from export parity. Lower international stocks are expected and thus prices in the international market will be supported.
- South Africa is currently a net importer of groundnuts, due to insufficient production to meet local demand because other crops outcompete groundnuts. ■

1 ***Groundnuts: area planted and production.***



2 ***Producer parity prices for the 2021/2022 production season (shelled and sorted).***



** ARG – Agricultural Research Centre*

1 ***Production overview for groundnuts, 2021/2022 production season.***

	2020/2021	2021/2022	5-yr average	10-yr average
Total area planted (ha)	38 550	43 400	41 680	43 348
Total produced (t)	64 300	49 000	56 566	54 450
Average yield (t/ha)	1,67	1,13	1,33	1,22

2 ***International groundnut production and stocks.***

Production season	2018/2019	2019/2020	2020/2021	2021/2022
Beginning stocks	2,08	1,84	2,11	2,35
Production	31,8	33,13	34,43	33,41
Ending stocks	1,84	2,11	2,35	1,91

CHRISTIAAN VERCUEIL, JUNIOR AGRICULTURAL ECONOMIST, GRAIN SA

LIVESTOCK FARMERS, *be part of the solution*

THE GOVERNMENT, IN COLLABORATION WITH THE RED MEAT INDUSTRY, HAS BEEN DEVELOPING A LIVESTOCK IDENTIFICATION AND TRACEABILITY SYSTEM FOR THE PAST FEW YEARS. IT ENCOMPASSES THE ENTIRE INDUSTRY, FROM EMERGING TO COMMERCIAL PRODUCERS.

The Ruminant Veterinary Association of South Africa (RuVASA) advised livestock farmers to get ready to comply with the imminent livestock identification and traceability system.

This livestock identification and traceability system aims to:

- Improve livestock disease control programmes.
- Reduce the disruption of livestock marketing following disease outbreaks.
- Meet sanitary requirements of high-value export markets.
- Improve the competitiveness of the livestock sector.
- Increase equity for all players in the value chain.
- Improve confidence in South African livestock products.
- Accelerate access to accurate information to solve livestock theft cases.
- Improve the quality of livestock data.
- Improve the quality and reliability of genetic selection programmes.

REGISTRATION

The aim is to phase in the system in stages:

- **Phase 1** will be the registration of commercial producers (producers with a VAT number).
- **Phase 2** will be the registration of all livestock owners per province.
- **Phase 3** will be the registration of all other role-players in the value chain.

Only commercial livestock producers will be allowed to register on the system for the first three weeks, after which the system will open to livestock owners and small farmers. It will take producers approximately five to eight minutes to register, and the system can handle up to 4 500 registrations at a time.

Photo: Karen van Zyl

Photo: Tiani Claassen

DOCUMENTS

Farmers should have the following documents ready for when registration opens:

1. Proof of address as the system will work on a FICA basis.
2. Company registration, trust registration, or ID document.
3. Brand registration certificate.
4. GPS coordinates of the farm.
5. Registration number of property with a land surveyor.
6. Your vet's information – if you use one.
7. Average number of animals on the farm – all sexes and ages. ■

Source: https://rpobulletin.co.za/?p=3527

PLANT BIOTECH CROPS integrated with IPM

PRODUCERS HAVE ALWAYS BEEN AT THE FOREFRONT OF THE BATTLE TO MANAGE INSECTS, DISEASES, WEEDS AND OTHER PESTS. FORTUNATELY, PEST CONTROL STRATEGIES HAVE CONTINUED TO EVOLVE OVER THE YEARS TO BECOME MORE EFFECTIVE.

The widespread use of and overreliance on chemical control in the mid to late 1900s, led to the first cases of insect resistance against pesticides. This demonstrated that a single approach to pest control relying only on pesticides, was not a silver bullet. Following these unsustainable trends, the thinking around pest control began to shift in a direction of how best to manage pests optimally, rather than eliminating them. This gave rise to a more comprehensive pest management approach, a concept widely known today as integrated pest management (IPM).

According to the Food and Agriculture Organisation (FAO) of the United Nations, IPM is defined as consideration of all available pest control techniques and other appropriate measures that discourage the development of pest populations, while minimising risks to human health and the environment.

It is generally accepted that the basis of an IPM approach is the use of preventive crop protection practices, which rely on an understanding of the environment, crop, pest and natural enemy biology, with the use of optimised farming practices to manage pests. Today's IPM toolkit comprises the development and use of a wide range of useful technologies and products for pest control, including the cultivation of plant biotech crops with inherent traits for improved pest and weed control.

BIOTECH CROPS AS A PEST MANAGEMENT TOOL

Due to their superior performance and benefits, the most widely adopted biotech crops globally include crops with input traits such as herbicide tolerance (HT) and insect resistance (IR), that have become an integral tool for complementing and enhancing IPM practices in agriculture over the last two decades.

The uptake and utilisation of these two plant biotech traits in South Africa have followed a similar trend, with single and stacked combinations of IR and HT traits being the preferred choice for local maize, cotton and soybean producers.

Insect-resistant traits that are commercially available in the market today include mostly insecticidal proteins derived from the soil bacterium, *Bacillus thuringiensis* (Bt). These Bt insecticidal proteins are toxic to specific lepidopteran pests such as maize stalk borer *(Busseola fusca)* and African cotton bollworm *(Helicoverpa armigera)*.

The main advantage of IR biotech crops over other insect control measures is that they are continuously available within the plant to provide accurate and timely delivery of the active ingredient for more effective control against targeted insects.

The most widely adopted HT crops to date include those with traits that confer resistance to glyphosate. HT biotech crops allow for specific herbicide applications to be sprayed over crops for weed control, without injury to the crops. In this way HT crops provide an additional mode of action within an integrated weed management (IWM) programme. Herbicide-tolerant crops offer producers some distinct benefits by allowing a simplified approach to weed control that is effective, flexible, compatible with reduced tillage practices and with fewer applications of herbicides.

Both IR and HT crop technologies offer producers a vital tool in the fight against weeds and insect pests, with reduced environmental impact and better use of limited resources. . It provides a more convenient, flexible and integrated pest control strategy for growers.

RESISTANCE DEVELOPMENT

All producers are challenged with the simple fact that every insect control method has a limited lifespan because all insects and weeds inevitably fight back by adapting and developing resistance. Resistance development is an ongoing concern in all crop production systems – from conventional to biotech to organic. This requires that producers adopt insect management practices as part of their IPM strategy to delay the onset of resistance, ensuring that any method of eliminating pests, including the deployment of biotech crops, remains effective long into the future.

The development of resistance in IR crops is based on the same principles as the development of resistance to insecticides. Dealing with resistance in IR crops is very different, however, because the insecticidal protein is always present.

It is therefore not possible to alternate the mode of action during the season as is recommended for insecticide applications. Also, despite the valuable performance of IR crops in controlling targeted pests, it may occasionally be necessary to supplement with insecticide applications. Under these circumstances, and where insecticides are needed for non-targeted pests, standard insect resistance management (IRM) practices for insecticides should also be maintained.

To ensure the durability and long-term effectiveness of IR trait technology, it is essential that producers include some unique strategies for resistance management that are tailored to their specific growing conditions and the pest pressures that they face.

STRATEGIES FOR RESISTANCE MANAGEMENT

Two key strategies to address IR in biotech crops include:

- The mandatory planting of a conventional crop refuge (no IR trait) alongside the biotech field to support a population of susceptible insects that have not been exposed to selection pressure from the IR protein; and
- The use of stacked traits that combine multiple insecticidal proteins within a single plant, offering different modes of action against the same pest.

Both of these strategies work to prevent and delay the build-up of pest immunity against these insect-resistant trait technologies.

It is well known that herbicide resistance in key weed species is

largely attributed to overreliance on a single weed control strategy – that is the continuous application of herbicides with the same mode of action. As the cultivation of herbicide-tolerant crops goes hand in hand with the application of herbicides such as glyphosate, the use of diverse weed control strategies is crucial for reducing weed resistance and ensuring the long-term sustainability of HT crops.

The primary goal of resistance management plans for HT crops, therefore, should be to combine as many weed management practices as possible that include crop rotations, multiple herbicidal modes of action, responsible use of herbicides giving special attention to label requirements (dosage rates and timing), integration with local farming conditions and good agricultural practices.

Regardless of the deployment of biotech crops, diversity is key for IWM. Therefore, the goal for weed control should always be to combine as many weed management practices as possible to sufficiently reduce selection pressure for the development of resistance.

PROMOTING RESPONSIBLE MANAGEMENT AND USE OF BIOTECH CROP PROTECTION TOOLS

The addition of a single technology such as biotech crops to augment the IPM toolkit of growers, is not an all-encompassing solution to pest control. Instead, the view towards implementation of IPM should always be to balance the use of one technology with other complementary approaches and avoid relying only on one solution for pest control.

While the introduction of biotech crops has proven its value and demonstrated benefits as a crop protection tool, its future durability and effectiveness are largely dependent on its responsible use – with compliance to IRM being non-negotiable. However, there is no one-size-fits-all plan when it comes to IRM, as insect pressures, farming systems and practices differ from one producer to the next and from region to region. To compensate for these differences, it is important that growers of biotech crops are equipped with adequate knowledge and understanding of the technology and how it works. It also needs to be integrated with good on-farm agricultural practices.

STAYING AHEAD OF RESISTANCE

As stakeholders in the agricultural value chain, we all have a responsibility to invest in knowledge sharing and training of our growers on responsible use of biotech crops as well as other innovative pest control solutions that form part of the IPM toolkit. In this way we remain several steps ahead of resistance, ensuring that benefits to sustainable agriculture and food security continue to be realised. ■

CHANTEL ARENDSE, LEAD FOR PLANT BIOTECHNOLOGY, CROPLIFE SA. FIRST PUBLISHED IN SA GRAAN/GRAIN, MARCH 2022.

SA Graan Grain

Single and stacked combinations of IR and HT traits are the preferred choice for local maize producers.

SEED-BORNE PATHOGENS CAN INFECT SEEDS DURING SEED PRODUCTION, BE TRANSMITTED FROM SEED TO SEEDLING AND CAN INFECT THE FULL-GROWN PLANT. SEEDS ARE A HIGHLY EFFECTIVE WAY OF TRANSPORTING CERTAIN PLANT PATHOGENS OVER LONG DISTANCES.

The following can be expected when producers plant infected seeds: reduced germination, increased seedling mortality, stunted growth and plant diseases – all culminating in reduced yields. Most seed-borne pathogens are also soil-borne, so planting infected seeds can introduce new soil-borne pathogens in uninfected soils. It is therefore imperative for producers to plant and/or seed companies to supply healthy seeds. Although two of the bacterial diseases of maize that will be discussed here have not yet been reported in South Africa, it is important to know of them as they could be imported into the country. This also highlights the importance of using certified disease-free seed.

MAIN SEED-BORNE BACTERIAL DISEASES OF MAIZE

Stewart's bacterial wilt

Pantoea stewartii subsp. *stewartii (Erwinia stewartii)* is the bacterium that causes Stewart's wilt in maize. The disease is widespread in the USA, but yet to be reported in South Africa. The bacterium is seed-borne, although the seed to seedling transmission rate is low. The bacterium overwinters in seed, soil or maize stalks and is vectored by the maize flea beetle, *Chaetocnema pulicaria*. Two phases of the disease exist and are linked to the insect vector. For the first phase, symptoms of the disease are observed soon after the emergence of the maize plant and external symptoms include bleached leaf streaks that may run the length of the leaf (**Photo 1**).

Internal symptoms are discolouration of vascular tissues, oozing of the bacteria from the cut surface of a stem cross-section and discolouration and decay of the crown. When the disease is severe, seedlings will wilt and die. The second phase of Stewart's wilt is a leaf blight that occurs after tasselling. Although plants are usually not killed by this phase, significant leaf area can be damaged, predisposing the plants to stalk rot. Weather conditions that would favour the survival of the maize flea beetle will favour the survival of the Stewart's wilt bacterium. High temperatures of greater than 35°C will favour the multiplication of the population of the flea beetle and thus the risk of Stewart's wilt will also be high.

Goss's bacterial wilt and blight

The disease is caused by *Clavibacter michiganensis* subsp. *Nebraskensis*, a gram-positive bacterium that is seed-borne and also common in the USA, but not in South Africa. Although the seed transmission rate appears to be slow, the bacterium can overwinter in maize crop residues that become the most important source of the inoculum. The disease can be distinguished from other diseases firstly by the development of dark green to black discontinuous water-soaked spots (freckles) (**Photo 2)** near the edges of expanding lesions. The second identifiable characteristic is the creation of an exudate or 'ooze', which when dried may glisten and appear shiny

1

Stewart's bacterial wilt symptoms on maize leaf.
Photo: Dr Jim Stack, Kansas State University, USA

on the leave surface (**Photo 3**). The bacteria can infect the vascular system (**Photo 4**), causing a systemic wilt phase characterised by discolouration of the water-conducting elements and ultimately a slimy stalk rot that results in wilting and plant death.

Bacterial stalk and top rot; stem rot

Erwinia chrysanthemi pv. *zeae (Dickeya zeae)* is the causative agent of bacterial stalk and top rot of maize. The disease is widespread in South Africa, particularly under irrigation in hot, dry environments. The bacterium is carried on seed, however, there is no evidence of seedling transmission. The bacterium can survive on maize debris and is spread by water; it can therefore be a serious problem in particularly hot areas with heavy rainfall and/or overhead irrigation. The disease is severe under conditions of high temperature and humidity.

Symptoms are mostly found in mid-season when maize plants suddenly wilt and lodge or the whorl and growth point die and wilt. The most distinctive symptom of Erwinia infection is the foul smell of diseased, slimy plant parts. Initial disease symptoms include premature withering and drying up of the tips of the uppermost leaves, soon followed by the lower leaves. The rot may extend from the base upwards (basal rot) or from the top downwards (top rot). The stalk typically twists and falls over (Photo 5). However, the plant may remain green for several weeks since the vascular tissue is not destroyed.

HOW TO CONTROL SEED-BORNE DISEASES

Use of uninfected seeds

The use of uninfected seeds is considered the most appropriate way of controlling bacterial diseases of maize. Infested seeds can be responsible for the re-emergence of plant diseases, movement of pathogens across international borders and/or introduction of diseases in new areas. Seed-borne bacterial diseases continue to be a serious problem worldwide. They may cause significant economic losses since – unlike for seed-borne fungi – strategies for management of bacterial diseases are inadequate.

Quarantine

This process involves the prevention of the movement of pathogenic

with pathogen-free seeds

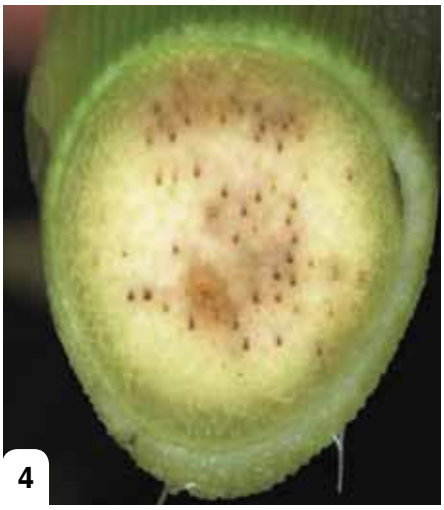


Photo 2, 3 and 4: Typical symptoms of Goss's bacterial wilt and blight.

Photos: Tamra Jackson, Institute of Agriculture and Natural Resources, University of Nebraska–Lincoln

Typical symptoms of Erwinia stalk rot.

bacteria from infested to non-infested areas by restricting the transfer of seeds, plants and plant products. In this case, both international and domestic transfer are controlled by plant quarantine regulations. It is imperative to detect, isolate and identify these bacterial pathogens by following specific detection techniques in order to avoid the introduction of these pathogens into new areas.

Cultural and farming practices

The inoculum source must be destroyed for successful disease control. Seeds should be produced in disease-free areas or areas where pathogens of major concern are unable to establish or maintain themselves during periods of seed development. Also, inspection of seed production plots or crops raised for seed production is an important step in producing clean and healthy seeds. Diseased plants at the time of inspection should be destroyed in order to reduce inoculum in the field. In cases where the disease incidence is very high, the entire crop should be rejected for seed.

IMPORTANCE OF PLANTING PATHOGEN-FREE SEEDS

Seed is a crucial input for agricultural production. Nonetheless some producers (particularly small scale and/or subsistence) choose to produce their own seeds with the intention of saving costs on the annual purchase of seeds. Most smallholder producers depend on this informal seed system, consisting of producers involved in selection, production and dissemination of seeds. The problem with this system is that there is no seed health testing and therefore the seed quality is not always good. Seed-producing producers multiply their seeds on the farm without frequent seed renewal (a process known as seed recycling) and this may lead to low seed quality.

Planting of infected seeds will lead to reduced germination, increased seedling mortality, stunted growth and plant diseases, all resulting in reduced yields and consequently less profit. To resolve this, uninfected seeds are recommended to maize producers. These seeds have improved traits such as better yield, pest resistance, drought tolerance, herbicide tolerance and they are pathogen-free. Maize producers are strongly advised to buy seeds from reputable companies or producers that are involved in breeding, varietal registration, seed multiplication, quality control and seed dissemination.

Producers are welcome to contact Dr Henry Njom with any bacterial disease enquiries at 018 299 6225. ■

DRS HENRY NJOM, BELINDA JANSE VAN RENSBURG AND BRADLEY FLETT, ARC-GRAIN CROPS, POTCHEFSTROOM.
FIRST PUBLISHED IN SA GRAAN/GRAIN, MARCH 2022.

HAVE YOU HEARD?

A NEW FEDERATION FOR FARMERS

The South African Farmers Development Association and five black farmer commodity organisations – the African Game Ranchers Association (Agra), African Poultry Producers (APP), the Deciduous Fruit Development Chamber (DFDC), National Emerging Red Producers' Organisation (Nerpo), and the South African Grain Farmers' Association (Sagra) – quit as members of the African Farmers' Association of South Africa (AFASA) at this organisation's congress in October 2022. Together they formed a new federation called the Black Agricultural Commodities Federation (BACF) with sugarcane farmer, Lindiwe (Lee) Hlubi as the chairperson and Dr Moshe Swartz, formerly from DALRRD, as CEO. The resignation came moments after the annual congress of which Safda was a main sponsor.

FREE STATE REGION NOW HAS TWO MANAGERS

Jacques Roux, one of the mentors of Grain SA's Farmer Development programme has been appointed as regional development manager to help manage the responsibilities in the Free State. Jacques is well-known to the farmers in the Free State area and has been working under the guidance of **Johan Kriel**, who has now officially retired but will continue as a contractor to Phahama Grain Phakama assisting as regional development manager in the Farmer Development Programme.

The Free State will in future function as two separate regions for more efficient management – Jacques will be responsible for the farmers in the eastern Free State and 'Ntate Johan' as he is known, for those in the western Free State.

Jacques Roux **Johan Kriel**

YOUNG WRITERS RECEIVE RECOGNITION

Christiaan Vercueil, a junior agricultural economist at Grain SA, who is a regular contributor to *Pula Imvula*, was one of the writers who received recognition in a competition for young writers sponsored by Hollard. He co-wrote an article about the importance of maize exports with another junior economist at Grain SA, Heleen Viljoen. This article received the third prize. Heleen and Christiaan each entered an individual article as well – and both were placed in the top 5.

The young prize winners are Masiziba Ruth Hadebe (an agricultural economics student), Michelle Marais from the Russell-Stone Group, Heleen Viljoen, Rachel du Preez (a soil scientist from NWK in Lichtenburg) and Christiaan Vercueil.

WHO IS YOUR HERO IN AGRICULTURE?

Grain SA and John Deere launched a brand-new series for *SA Graan/Grain* readers where readers get the opportunity to put their hero in the spotlight and win a cash prize themselves.

A 'My Hero' winner can be a local producer; perhaps your grandfather or father; a worker on the farm who helped raise you; a teacher, lecturer or perhaps your mother or grandmother who not only handled the household, but also put her shoulder to the wheel to keep the farm's administration on track. Here is an opportunity to offer the unsung heroes who have ignited a passion for agriculture in you their moment of glory and to give them recognition in a special way.

Scan the QR code and read more on *SA Graan/Grain's* website, *https://sagrainmag.co.za/my-hero-series/*.

My HERO
Time to shine

Corner Post

BY LOUISE KUNZ, ASSISTANT EDITOR

DESPITE DIFFICULTIES AND THE VARIOUS CHALLENGES THAT COMMUNAL FARMING POSES, VINAH KHUPHUKILE MAZIBUKO (62), THE 2022 GRAIN SA/ABSA/JOHN DEERE FINANCIAL SUBSISTENCE FARMER OF THE YEAR, MANAGED TO TRANSFORM FROM PLANTING TO JUST PUT FOOD ON THE TABLE INTO A FARMER WORKING FOR PROFIT.

Vinah lives on communal land in the Madolobeni village in the Estcourt region, where she is a community caregiver for the Department of Health. She became aware of the importance of agriculture when she was in her twenties and saw how families in the area where she lived, planted and grew food from seed to survive. Although she started farming on a small scale nearly 40 years ago, it was only after joining Grain SA, attending study groups and doing various training courses, that her agricultural knowledge really developed.

On her plot of land in KwaZulu-Natal, she has changed to no-till practices and plants maize and dry beans in a crop rotation cycle. Her home has become the 'agricultural hub' of the village and she is keen to share her knowledge with others. She is also teaching community members about the advantages of no-till farming practices.

In the Mazibuko's family operation everything is done by hand. Vinah is always thinking ahead of how to grow her small farming operation – whether it is through the building of a new structure or an additional business opportunity such as chicken farming. Her husband, Nsiyane Mazibuko, is the handyman who builds and fixes what is needed. Their two sons are a great support to them and one of their grandsons, Senzo, has become Vinah's right hand and is keen to follow in his grandmother's footsteps. He is at her side, learning from his granny as much as possible. The Mazibuko's also own cattle, goats and a few chickens.

VINAH'S STORY

WHAT HAS MADE YOU A SUCCESSFUL FARMER?

If you want to be a successful farmer, you need to love farming – and I love farming! You have to enjoy what you are doing, with no anxiety or anger. I also follow the agricultural practices I have learned in the training courses and stick to the advice I have been given by Grain SA.

HOW MUCH MAIZE DO YOU PLANT?

In the 2019/2020 season, I planted about 1,6 hectares of maize and harvested nearly 4,5 tons. Last season I planted 2 hectares and I realised a yield of 9 tons, of which 8 tons was sold on the commercial market to a grain broker in Winterton, while the other was for my own use and livestock feed.

WHAT ARE SOME OF THE CHALLENGES YOU FACE AS A FARMER?

Apart from finances, transport is a big problem and climate change also has a huge impact. We do not have enough clean water for spraying the crops, but our biggest challenge is the cattle in the community that graze where we have planted – even in the fenced areas. We had to erect crop cages to protect our crops.

WHAT IS YOUR DREAM FOR THE FUTURE?

I want to grow as a farmer and increase my field of maize to be able to sell more. I also want to venture into poultry farming to subsidise the crops and cattle.

3 TIPS FROM A WINNER

1. Love what you do.
2. Work hard.
3. Expand your knowledge.

FARM FACTS

Farm: Communal land
Nearest town: Loskop
Region: KwaZulu-Natal
Size: Plot of land for planting, cattle graze on open communal land
Type: Mixed (plants maize and dry beans, owns some livestock)

GRAIN SA'S CONTRIBUTION

- Member of the Siyalima Siyaphambile Study Group
- Joined Grain SA in 2015
- Part of Grain SA's Beyond Abundance Project

Training courses completed:

- Introduction to maize production
- Introduction to dry bean production
- Nutrition: Different food groups
- Nixtamalization
- Mycotoxins: Safe storage of maize

A mentor's view:

Graeme Engelbrecht, Grain SA's regional development manager at the Dundee office, says Vinah has progressed well over the years. She has attended many courses to improve her agricultural knowledge. She is a very hardworking farmer, who has gained respect from her community.

Farmers face challenges in planting time

ALTHOUGH THE FARMERS WERE ABLE TO DO A LOT OF PLANTING AND IN SOME AREAS OVER 80% OF THE CROPS WERE PLANTED BY MID-DECEMBER – THERE WERE CERTAINLY A FEW CHALLENGES ALONG THE WAY.

Some of Grain SA's regional offices reported the following:

Louwsburg: Jurie Mentz, regional development manager, reports that December has been even wetter than the previous season. He says the smaller farmers are making plans, as it has been difficult to get tractors and equipment into some fields. There are even farmers who have even resorted to farming the 'old-fashioned' way by inspanning their oxen to get into the fields, while other smaller growers have started planting by hand just to get the seeds in the ground at the right time. The more commercial large-scale farmers were forced to wait for drier weather to get into their fields.

Kokstad: Luke Collier, the regional development manager at this office, says farmers in his area measured 126 mm on 9 and 10 December, with more smaller rainstorms following that. The farmers have struggled to cope with the high input costs this season and many were sadly forced to scale down their activities. Hail is a major risk factor in eastern Griqualand, but crop insurance is very expensive for developing farmers.

Free State: Johan Kriel, regional development manager who now oversees the western Free State region, reports that although the season has been very wet, at least 70% of the developing farmers in his region have finished planting their crops. Bloemfontein has not been too wet but to the south, from Winburg to Senekal, Paul Roux and Bethlehem, there is not a stream that is not now a strong flowing river.

At the same time, farms to the north as far as Deneysville are also experiencing many thunderstorms. The biggest risk in the region is hail and there has already been some damage. One farmer had to replant 600 hectares of soybeans. Fortunately, he had crop insurance which has helped him with the replanting costs – although the insurance only paid out for 40% of the damages because the crop was still young.

Ntate Johan says getting all the required spraying done has been a problem and farmers have to continuously scout their fields to monitor for fungus issues, which may develop due to the extreme wet conditions.

Mbombela: Jerry Mthombothi, regional development manager at the Mbombela office, reports a lot of rain too, particularly in the Highveld regions. While at least 80% of his participating farmers have got the biggest part of their planting done, there are those who cannot even reach their arable lands yet.

The farmers that Jerry advises have planted maize, groundnuts, soybean and drybeans. The team there has been very busy with tasks such as offering technical support, helping to calibrate planters and boom sprayers for planting, fertilisation and spraying programmes.

Jerry also spends a lot of time helping farmer groups to source inputs, buying in bulk and negotiating discounts. Input suppliers are often keen to assist farmers who are developing a good track record and who have reliable mentorship and extension service support from the likes of Grain SA.

AT GRASS ROOTS

In the Gert Sibande District Municipality of Mpumalanga, farmers were keen to help with the offloading of the fertiliser delivery for the Dundonald and Sijamekuthukeni farmers.

Seven members of the Badplaas Study Group received 16 bags of fertiliser from the office of the Elukwatini Department of Agriculture at the end of November last year.

In December, Grain SA helped to calibrate a planter which was dropping too many pips. This would have caused a too high population.

Early in November, inputs (seed and chemicals) were delivered to the Siyacathula Study Group farmers in Mpumalanga.

Face-to-face networking opportunities

STUDY GROUP meetings are an important face-to-face contact opportunity between the farmers and Grain SA's mentors. They are not only teaching opportunities but also times to troubleshoot and network with other farmers.

Despite peak summer planting activities, the following meetings still took place during November and December:

- **Dundee**: 37 meetings where the focus was on the delivery of inputs. Teaching included discussions on safe storage of chemicals and correct application thereof. Assistance in the calibration of planters and sprayers was also provided.
- **Kokstad**: 21 meetings where crop development, cultivar selection, row width and plant population in maize production were on the menu. The teams went to the lands to check the soil and crop progress.
- **Louwsburg**: 25 meetings where the delivery of seed, Roundup and chemicals took place. Farmers are eager to start planting. They are thankful for the help with sourcing inputs and for Grain SA's logistical assistance as transport is difficult for them.
- **Maclear**: 29 meetings where the team delivered chemicals to the Ikamvalethu and Lower Tsitsana Study Groups. Safe storage and chemical use were discussed.
- **Mthatha**: 11 meetings where planting was the main topic of discussion. The Lujecweni farmers had almost finished planting their 70 hectares. The Dalibhunga Study Group had also almost completed their planting.
- **Mbombela**: 36 meetings where farmers were advised to plant the correct plant population and apply the correct amounts of fertilisers. The team also helped with the calibrating of planters and sprayers.

Members of the Lijahasisu Study Group from Hereford West in KwaZulu-Natal collected their fertilisers.

At Louwsburg 201 bags of fertiliser were offloaded and distributed to 48 farmers who form part of the Beyond Abundance Project.

Planter calibration was discussed at the Inkalane Study Group meeting near Badplaas in Mpumalanga.

Farm visits are a PRIORITY

GRAIN SA is partnering with several stakeholders this season and is involved in rolling out projects with AB InBev, Department of Rural Development and Land Reform (DRDLR) recapitalisation, the Maize Trust, the South African Cultivar and Technology Agency (SACTA) and Standard Bank. To this end several farm visits were made to advanced farmers who are part of Grain SA's Farmer Development Programme:

- 90 visits to 15 farmers in the Dundee area.
- 36 visits to 11 farmers in the Kokstad region.
- 81 visits to 24 farmers in the Ladybrand/Bloemfontein district.
- 14 visits to 7 farmers in the Lichtenburg vicinity.
- 54 visits to 15 farmers in the Louwsburg area.

Some of the highlights of farm and field visits during 2022.

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Farm: *Brookside Farming, Harry Gwala Agri*
Area: *Kokstad, KwaZulu-Natal*
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