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PULA IMVULA

GROWING FOOD • PEOPLE • PROSPERITY

GRAIN SA MAGAZINE FOR DEVELOPING FARMERS



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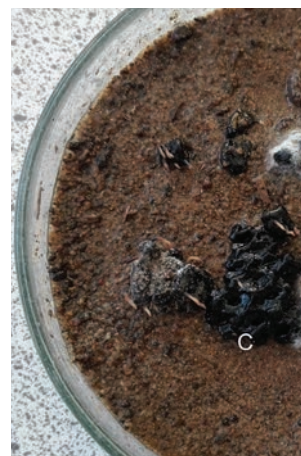
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A WORD FROM...

Jane McPherson

IT'S THE NEW YEAR! THIS CAN BE VERY EXCITING TO YOU, OR YOU MAY FEEL TIRED AT THE PROSPECT OF FACING ALL THE CHALLENGES OF A NEW YEAR. EITHER WAY, WE MOVE FORWARD INTO THE NEW PERIOD OF LIFE THAT HAS BEEN GIVEN TO US AS A GIFT – THE GREATEST GIFT OF ALL, LIFE ITSELF.

These days, many of us are totally overwhelmed by all the information, news, warnings, and reports and we are not sure what to do with all of it. About climate change and global warming. Some experts say it is for real, while others say this is not true. I certainly don't know whether or not it is true. The fact is, however, that we have experienced droughts and heat as never before. Do we need to be despondent? I don't believe so. We can only do what we can do – limit the water you use, limit the refuse you produce, farm wisely, live carefully – and be a good caretaker of the earth. Each one of us can only do a little, but all those little bits make a huge difference if there are enough of us doing the little, we can.

Our country has been ravaged by theft and corruption and many feel hopeless about the situation. Again, each one of us has a responsibility to be a good and upstanding South African citizen. If each one of us is law abiding, creative and productive, we can build our country again. We need to take responsibility for our own lives and our own futures – we can do it, little by little!

As a farmer, you are making a huge contribution to the lives of many people – South Africans have food because of you. Whatever you produce is helping to make our country a good place to live in.

Let us embrace 2020 and make this a good year. Please read below:

IRISH BLESSING

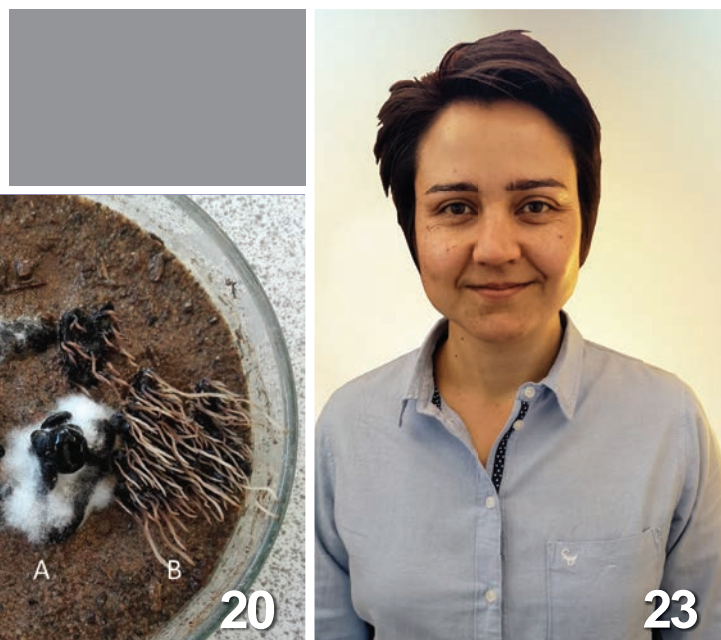
*May the road rise to meet you,
May the wind be always at your back,
May the sun shine warm upon your face,
The rains fall soft upon your fields.
And until we meet again,
May God hold you in the palm of His hand. ■*

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2020

– a year to get your feet dirty

FARMERS NEED TO MAKE AN EFFORT TO GET OUT INTO THE FIELD DURING THE GROWING SEASON. SOMETIMES WE PUT THIS OFF AS THERE ARE MANY OTHER THINGS ON THE GO. BUT THE FACT OF THE MATTER IS THAT EARLY DETECTION OF DISEASES AND PESTS COULD MEAN THE DIFFERENCE BETWEEN MAKING A TOTAL LOSS OR HAVING A SUCCESSFUL YEAR.

Getting your feet dirty in your fields once in a while can be incredibly valuable and may possibly save you from a disaster which may be brewing silently in the leaves of your maize. All growing organisms are susceptible to pests and diseases. All they need is favourable climatic conditions to start their damaging take-over of your crop.

Diseases are caused primarily due to adverse climatic conditions such as too much rainfall, heat and humidity. Too much moisture is not always a good thing; it can lead to fungal and bacterial outbreaks on the leaves and stems of the plant which will consequently lead to decreased production. Fortunately, there are products on the markets which can improve the plants resilience and protect it from diseases.



Scout for anything that looks out of the ordinary.



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Thus, it is essential to be on the lookout for the early signs in order to take action. Fungal diseases and bacterial diseases are relatively common but can however be controlled if treated correctly. Viruses also occasionally occur and there are many of them, so it is good to know what you are looking for when scouting your lands. We will briefly discuss a few different diseases from each of these causes and what their symptoms and cures are.

FUNGAL DISEASES

Maize rust

This disease is found worldwide but is most commonly found in areas with high humidity and temperate climates. The rust is most noticeable when the maize plant is reaching tasseling, there are however signs that can be picked up earlier such as small orangey brown, slightly protruding spots on the leaves which will get more prominent as the plant grows. This is a common disease and can be treated with a variety of products, one of the newer popular chemicals being used is *Abacus*.



Getting your feet dirty in your fields once in a while can be incredibly valuable and may possibly save you from a disaster which may be brewing silently in the leaves of your maize.



Grey leaf spot

This disease will also commonly occur in subtropical and temperate areas with high humidity. Noticeable long lesions will be evident that are grey brown in colour. Within the lesion there will be small spots. This disease will cause leaf loss and later, poor grain-fill.

Stalk rot

Stalk rot develops in hot, humid environments, especially when these conditions are over a prolonged period of time. Maize plants that have this disease will dry prematurely and the stalks will split open. You will also notice dark grey and black discolouration on the lower levels of the stalk. It is important to treat this problem as soon as possible in order to prevent grain loss due to the early drying of the plant.

BACTERIAL DISEASES

Bacterial stalk rot

This is a bacterial pathogen which occurs in areas with high temperatures and high relative humidity. This disease will quickly spread through a plant and kill it. Plants that are infected with the pathogen will have a dark colour at the base of the stalk; much like fungal stalk rot and the plant will usually die shortly after tasseling.

Stewarts Wilt

It is believed that this pathogen is transported by maize flea beetles, therefore make sure that you are using a good pesticide to prevent the disease in your crops. Once a plant is infected you will notice yellowish lesions that run the length of the leaves. The infection will move into the stem and ultimately cause the growth to be stunted, thus wilting will occur, and the plant then dies.

VIRUSES

There are many viruses that can take hold of our maize crops; the best method in dealing with them is being prepared and planting good quality reputable seed from a known source. This will reduce

the risk of bringing in foreign seed that may have a genetic flaw or even carry a virus. Many viruses will often have very similar symptoms to fungal and bacterial diseases, thus it is important to get an expert's opinion when you notice something strange or unusual. Some viruses which occasionally occur in some African countries including South Africa are Mosaic virus, Streak virus, Maize stunt virus and Stripe virus.

The best practice when it comes to managing diseases in maize is observation and monitoring. If a disease is left unnoticed and unattended it can and will cause considerable damage. Pay attention to the climatic conditions. If your crops are forced to endure tough environmental conditions, then they may often break out in some sort of disease which will need your quick attention. If you pick up a lesion or outbreak on some of the leaves in your field and you are not sure what they are, then the first step should be to consult your chemical representative who will be able to advise and guide you on the best course of action to remedy the problem. Make a note of the situation for future reference as it is important that we learn from these situations. The next time you notice the same problem in your maize you will immediately know what to do. Keep your feet dirty. ■



Look closely for any signs of disease.

Marketing could *make* or *break* your business

MARKETING, SO IMPORTANT BUT STILL AN AREA WHICH MANY FARMERS STRUGGLE TO MANAGE. ON MANY AN OCCASION WE HAVE STATED THAT TO MANAGE A FARM IS DIFFICULT BECAUSE OF ALL THE RISKS INVOLVED. MARKETING MANAGEMENT AFFECTS THE FINAL FINANCIAL RESULTS OF YOUR BUSINESS, BECAUSE OF THE PRICES ACHIEVED FOR YOUR PRODUCTS. IT COULD BE THE MAKE OR BREAK OF THE SUCCESS OF YOUR BUSINESS.

In the days of controlled marketing, farmers were regarded only as the producers of products. Our farmers of today compete in a free-market system. Farmers are still driven by production, and judge themselves accordingly, but must now attend to the marketing of their products themselves as well. Thus, the responsibility of marketing is now the responsibility of the farmer himself. And, to be a market manager you must be knowledgeable regarding the marketing of your products.

Our farmers of today must realise that the consumer of today is changing his/her preferences when buying products. Many of today's consumers demand ethical food production because of environmental concerns. They want to know where their food comes from, whether the farmer produced it using environmentally friendly methods, whether the workers received a living wage, whether proper care was taken to ensure food security both in terms of quality and affordability. Farm-to-fork traceability will become a necessity, unfortunately something still lacking in South Africa, compared to many other countries.



Consistency of supply is fundamental to the marketing of any product.



RESEARCH

Do you know what today's consumers are eating? Research in America have shown dietary changes and we can be sure these trends will follow to South Africa. With meat lines the consumption of beef and lamb is down but chicken and turkey are up. The consumption of avocados is up, as well as mangoes. Whole milk consumption is down, yoghurt is up. Health reasons seem to be a major contributing factor towards these changes. Consumers demand healthier food. It is also true that the consumer buys his/her fruit or vegs according to how they look. Consumers find it very difficult to make the adjustment needed to buy a few ugly, but perfectly edible, apples, for example.

The physical aspect of marketing is also changing and as a marketer you need to note these aspects. A major important aspect is consistency. Retailers and customers demand a consistent supply to the market, through good times and bad times. Consistency of supply is fundamental to the marketing of any product.



Marius Greyling, Pula Imvula contributor. Send an email to mariusg@mcgacc.co.za

Consumers today demand clean, fresh, well sized, uniform in colour, shape and size, succulent and free of blemishes products. Harvesting at the correct time is one of the ways to enhance a products appearance. Good-looking products fetch higher prices. Great care should be taken when handling produce at all stages of harvesting, grading, packing and transport.

NEW TRENDS

A new trend developing amongst consumers is a demand for smaller packages of products for the convenience of easier handling and storing. By adding value and exploiting this trend you could enhance your marketing. Take one pocket of oranges weighing 7 kg and costing, say R20 on the market. Divide the contents of the pocket into seven attractive, see-through 1 kg packets and perhaps displaying your logo. Offer each one for R9,99. A possible income of R69,93 compared to R20. Not bad.

What will catch the eye of the buyer? Ask yourself – does my packaging attract attention and still protect the product inside? Are there equal-sized products inside? Do you ensure each degree of ripeness has its own packaging? Is there a bold sticker on each package or prepack to promote your brand?

QUALITY

Farmers will always first and foremost be a producer and production efficiency will always be a key determinant of profitability. As a farmer you yourself have control to a large extent over this. However, marketing will determine the price you get for your product and you must manage your marketing with a high degree of efficiency. Producing quality products will make life a little easier.

A general principle to apply regarding production and marketing – remember to never, ever produce any quantity of a product before the marketing of the product has not been secured. It is very, very important to be able to market your product when it is ready for marketing. Most products have a limited window for marketing.

If you want to learn about the marketing of your products, visit marketing venues such as a silo, livestock auctions, fresh produce markets, abattoirs, and so on. It is important to be familiar with the functioning of these marketing channels. Have you ever spent a day with the vendor to whom you supply vegetables?

Lastly, gather as much information as possible regarding the marketing of your products. Read, attend farmers days, visit other producers.

We have referred to marketing aspects in general. Bear in mind each product has its own unique requirements regarding marketing to be identified and applied. ■

A new *ANGLE* to top dressing

THE EXPRESSION 'TOP DRESSING OR SIDE DRESSING' REFERS TO THE GENERALLY ACCEPTED FARMING PRACTICE OF APPLYING EXTRA FERTILISATION TO A FIELD CROP AFTER EMERGENCE. THE MAIN NUTRIENT SUPPLIED IN ADDITION TO THE FERTILISER APPLIED BEFORE OR AT PLANTING WILL BE NITROGEN. ONLY NITROGEN OR A COMBINATION OF NITROGEN AND OTHER NUTRIENTS CAN BE APPLIED BY SIDE DRESSING ON TOP OF THE SOIL OR BY TYNES IN THE SOIL BETWEEN THE ROWS.

This application usually might occur only once after planting and emergence in dryland maize and other row crops. Usually several applications of nitrogen, in the form of dissolved urea, are given to high yielding maize crops under centre-pivot and other irrigation systems.

When the crop is too tall for the fertiliser to be applied by tractor, a proper 'top dressing' would be required if there are concerns of nitrogen leaching having occurred through excess rains or irrigation. The introduction of modern high reaching dedicated tractors and equipment have allowed farmers to apply the fertiliser at later growth stages if required.

Although this article concentrates on maize production, nutrient application can be done on all other grain row crops if required. The nutrients can be applied in granular or liquid form and might also form part of a package of soil applied nutrients as well as foliar spray on the plant leaves to apply the needed shortfall of micronutrients. This is usually decided after a comprehensive sampling of the leaves at certain growth stages.

It is essential to optimally fertilise lands to their practical potential as the costs of production to income are progressively becoming tighter.

MAIZE FERTILISATION IN GENERAL

It is assumed that you have had your soils properly tested and have done soil profiles on all lands to be planted to maize. If you have developed a relationship with a reliable fertiliser supplier you can work together over several crops to fine tune the application of enough main and micro nutrients to reach the attainable yield targets indicated by soil depth, existing soil fertility, planting date, cultivar choice and climate together with rainfall patterns occurring on your farm.

It is essential to optimally fertilise lands to their practical potential as the costs of production to income are progressively becoming tighter.

You can safely budget on a total of 25 kg of nitrogen per ton of maize produced per hectare. This allows for both vegetative growth and the grain fill required to achieve the targeted yield. Thus, a 3 t/ha yield target implies an application of a minimum of 75 kg of nitrogen at planting or split between planting and a side or top dressing. A 4 t/ha crop would require 100 kgs of nitrogen/ha. At the top end an 8 t/ha yield target would thus require 200 kg of nitrogen per hectare. These amounts

Written by a retired farmer



1 Planting guidelines.

| Nutrient | Nitrogen | Phosphate | Potassium |
|-------------------|----------|-----------|-----------|
| Grain only kg/ha | 15 | 3 | 3,5 |
| Whole plant kg/ha | 27 | 4,5 | 20 |

applied all at planting can cause seedling emergence damage and cannot be placed with or too close to the seed kernels being planted. It is advisable to do a side or top dressing in these cases. Remember we are considering, in the discussion above, just the nitrogen required in kg/ha, not the total mixture.

Please consult with your fertiliser supplier or production consultant as to the overall application of fertiliser mixes, whether in granular or liquid form, required for a determined yield target. There are many fertiliser mixes, some also including sulphur and lime (to reduce acidity), on the market.

At a minimum the nitrogen, phosphate and potassium applications in kg/ton of seed/ha shown below should be applied at planting or at planting and side dressing using the guidelines in **Table 1**.

Past experience has shown that many crops exhibiting nitrogen shortages in fact have a shortage of sulphur. This can be determined by observation and leaf analysis.

Side dressing with just urea or UAS which is a combination of urea and ammonium sulphate is highly recommended.

Some farmers have started the practice of applying a broadcast application of all the fertiliser requirements on the lands prior to planting. This can be combined with side placing of additional or a planned amount of nitrogen later. This practice avoids the possibility of not being able to apply the critical planned side dressing in very wet years.

TIMING OF THE APPLICATION OF SIDE OR TOP DRESSING

Maize takes up about half of its required nitrogen from the soil between the vegetative growth stages V8 to VT. These stages can occur between 32 days to 56 days after the seedlings have emerged. Please find or look at a chart of the growth phases if you have never seen one. The ideal period to apply the side dressing of nitrogen is thus a window of only about 24 to 30 days. If high rainfall on the crop after emergence is experienced more nitrogen than originally planned might have to be applied as soon as the tractors and equipment can work in the lands.

CONCLUSION

Careful planning for the optimum total fertilisation and especially nitrogen requirements of your crop must be undertaken prior to the planting season. The correct use of the combination of tractors and side dressing equipment that you already own will determine the best path for success. ■

Can you afford not to practise CROP ROTATION?

GROWING THE SAME CROP YEAR AFTER YEAR IS CALLED MONO-CROPPING. CROP ROTATION IS A PLANNED, SYSTEMATIC APPROACH WHERE DIFFERENT CROPS ARE GROWN IN A SEQUENCE WHICH CHANGES YEAR TO YEAR AND SEASON TO SEASON. IT WAS ONCE QUITE NORMAL FOR PRODUCERS TO PLANT THE SAME CROP EVERY YEAR. SOME OF THE MOTIVATION WOULD HAVE BEEN EASE OF MARKET-ING OR LACK OF PROPER EQUIPMENT TO DIVERSIFY.

There has been a huge shift away from mono-cropping as farmers have grown more concerned about soil health and reducing their dependence on costly fertiliser programmes and chemicals to control weeds, pests and diseases. Grain SA actively promotes crop rotation in its Development Programme.

Crop rotation systems can differ from two to four or more years. A longer crop rotation interval is more effective than a short one. Following the exact same rotation year in and year out is also not beneficial in the long term i.e. to plant maize – sunflowers – maize – sunflowers... is not crop rotation. Variety is the name of this game and it may play out from year to year or even from season to season with the same year (i.e. double cropping).

Crop rotation is not a one-size-fits-all formula. Each farmer needs to consider their own unique needs and circumstances – input finance, farm size, equipment available, environmental conditions and market opportunities. The rotation plan needs to contribute to a sustainable farming operation.



Jenny Mathews, Pula Imvula contributor. Send an email to jenjonmat@gmail.com

ADVANTAGES OF CROP ROTATION

Increased soil fertility

Every different crop has a different nutrient interaction with the soil in which it grows and each type releases and absorbs different nutrients. Prolonged planting of one crop year on year leads to a depletion of specific nutrients in the soil because that plant keeps on extracting the same nutrients from the soil. Crop rotation addresses deficiencies or excesses of nutrients in the soil and contributes towards increasing soil fertility. Different crops contribute to replenishing nutrients that have been depleted while absorbing other nutrients that are in abundance.

Increased crop yield

Healthy soils have a variety of nutrients readily available to the plants and stimulate growth. If a land seems to be producing less than it has been known to previously, farmers are advised to monitor soil health and introduce a crop rotation system.

Increased nutrient levels in the soil

Soils need to be rejuvenated and regenerated and heavy fertilisation programmes are not the best way. We have learned that soils have the ability



Crop rotation can build soil structure and reduce soil erosion.

to rectify themselves. This is achieved through crop rotation and even through the practice of fallowing, if the farmer can afford to rest the field for a season. This is not an option available to many, so farmers need to be willing to diversify their farming activities for the sake of soil health.

By planting a crop like a legume e.g. groundnuts, different bean crops, chick peas or lentils, it is possible to increase nitrogen (N) in the soil. A legume is known to be a nitrogen fixing plant which means it has the ability to draw N from the atmosphere and carry this to the root nodules which fix (inject) nitrogen into the soil. Soybeans can fix up to 200 kg of nitrogen per hectare in one year. Farmers must learn which type of plant to grow for which benefit, so as to continuously ensure that fertility levels are built up over time.

By alternating crops between deep-rooted broad-leaved plants e.g. legumes, sunflowers to shallow-rooted grass species e.g. maize, sorghum, one is facilitating the 'mining' of nutrients and moisture from different depths.

Improved soil structure

Healthy soil structure is critical for crop development as it affects seed germination and the way the roots grow, as well as how easily water, air and nutrients are made available to the plants. Crop rotation can help to improve soil structure, but it depends on the type of crops rotated, so learn which are deep or shallow rooted plants and rotate accordingly. This contributes towards loosening the sub-surface of the soil and improves soil structure by supplying a higher content of organic matter and providing habitat for more diverse soil organisms.

There is also increased aeration, water retention and drainage. Soils with good structure enable the quick and effective absorption of water so the moisture is not lost to run-off or evaporation. Some of the water is greedily taken up by the plants but the remainder is held deep in the soil, like a groundwater reservoir system, and saved for dry periods when plants need to dig deeper to find moisture.

Reduced soil erosion

Soil erosion is a widespread problem. It occurs when the top layer of soil is carried away by wind or if it flows away after a heavy storm. Different plants have different root systems, water requirements, different spacing and grow different canopies of shade. By growing one type of plant repeatedly, the soil will erode in places where plants have left it uncovered. When the surface of the soil is covered by plants or dry material, the problem is reduced. Different types of crops leave different levels of crop residue behind e.g. maize leaves a lot more material behind which is good for incorporating organic material into the soil and improves soil structure and encourages microbial activity which brings the soil to life. Crop residue is also important for reducing surface crusting and water run-off.

Reduced levels of pests and diseases

Crops from the same family have the same disease and insect problems. In other words, each different type of plant creates a specific habitat which tends to have the same pathogens or pests repeatedly concentrate around them. By repeatedly planting their crop of choice we are creating favourable conditions for the same pests every time and are literally inviting them to come and dine! By alternating the plant type in a field, one contributes to pest and disease control by breaking the life cycle of the pest in their preferred habitat. Crop rotation is recognised as one of the important methods of Integrated Pest Management which is a more environment friendly method of

pest management aiming to reduce widespread use of chemicals in agriculture.

Improved weed control

Crop rotation is a well-known traditional weed control technique. Different crops interact with the weed population by crowding them out of the field and competing for nutrients and other resources. A farmer will always have to manage the weeds in a field, but crop rotation does contribute to lowering weed population.

A CAUTIONARY NOTE

There are fewer disadvantages than advantages in crop rotation. However, it is important to plan the chemical programme. Different chemicals react differently on different crops e.g. sprays used on broad leaved crops will negatively impact grassy type crops like maize. Chemicals have different residual effects on a field – some chemicals stay active in the soil and impact the follow-up crop. For this reason, a crop rotation system is planned for the long term; and the chemicals to be used year on year are planned in consultation with experts. There are certainly products which can be used safely within planned crop rotation systems. ■



How legumes fix nitrogen.



Soybeans can fix up to 200 kg of nitrogen in the soil per year.

CANOLA

Challenges encountered and the way forward

EARLY RAINS IN THE SOUTHERN CAPE AND OVERBERG ENABLED FARMERS TO PRACTICE EFFECTIVE WEED CONTROL WHICH LED TO EXCELLENT CROP ESTABLISHMENT ACROSS THE REGION. IN SOME CASES, THE CROP DENSITY WAS SO DENSE THAT FARMERS FEARED THERE WERE TOO MANY PLANTS PER SQUARE METRE.

Unfortunately, these favourable conditions were followed by an extremely hot and dry July and August. Most of the canola was in full-bloom during August which shortened the production cycle drastically and resulted in flower burn and eventual weaning (**Photo 1**). Dry and warm conditions continued to prevail through to the seed-fill stage eliminating the idea of a record canola yield for the Southern Cape and Overberg.

The Swartland was not as fortunate as the Overberg and Southern Cape with regards to rainfall at the beginning of the season. Conditions during seedling establishment was tough but luckily a shift in rainfall events occurred from 20 June which improved crop stands to such an extent that a record year for the Swartland was once again expected for the season. Unfortunately, record yield expectations were shattered when a heat wave ($>35^{\circ}\text{C}$) stroke most of the areas resulting in 5% to 8% flower weaning. Furthermore, temperatures were above average in September which dramatically decreased yield expectations for the area.

In spite of the poor conditions late in the season, canola producers still managed to amaze with above average yields this year. Yield averages of $>1,8$ t/ha were still achieved in some parts of the Western Cape when the correct cultivar was chosen in conjunction with conducting sustainable management practices.

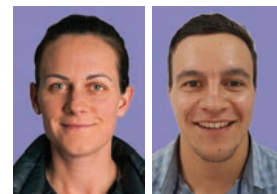
KEY MANAGEMENT PRACTICES

Summarised are the key management practices for drought conditions recommended by our top producers:

- Stick to appropriate seeding rates (2 kg/ha to 2,5 kg/ha for conventional and Clearfield cultivars and 3 kg/ha to 3,5 kg/ha for TT cultivars).
- Plant only with certified seed.
- Make sure the seed is treated with an insecticide and fungicide (most certified seeds are treated).
- Choose cultivars with a short growth cycle.
- Adapt the herbicide programme to prevailing conditions (for example: When expecting dry conditions – apply clethodim between the 2 to 6 leaf stage (no later than the 6-leaf stage).
- Adapt the insecticide programme to prevailing conditions (for example: Pyrethroids lose effectiveness in $>25^{\circ}\text{C}$ conditions).
- Swath at the correct seed colouring stage. Yield losses are higher when swath too early versus swath at a later stage (pod shatter resistance of the new canola cultivars have improved substantially).

The total volume of canola production for 2019 was estimated at approximately 100 000 tonnes compared to 109 707 tonnes in 2018. Currently, the average yields for the three Western Cape growing areas and inland growing areas are 1,35 t/ha (Overberg), 1,28 t/ha

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(Southern Cape), 1,51 t/ha (Swartland) and 2,64 t/ha (inland) respectively. The average yield for all canola delivered to Soill is currently standing at 1,37 t/ha, which is an excellent yield average taking into consideration the extreme weather conditions of the past season.



1 Flower weaning as result of high temperatures ($>28^{\circ}\text{C}$).



2

Canola in the Overberg.



3

Canola in the Swartland.

CHALLENGES AND THE WAY FORWARD

Climate was once again the canola crops biggest challenge this year. Canola's tolerance to drought conditions has proven the crop to be a trustworthy component of a crop rotation system with grains.

Global warming and its effect on incurring climate conditions cannot longer be ignored. It is important for farmers to incorporate sustainable management practices in order to lower risk in case of occurring drought. Therefore, conservation agriculture must form an essential part of every canola farmer's management system. Also, by choosing the correct canola cultivar you can further eliminate yield penalties caused by drought. Seed technology has proven to keep track of current conditions and continue to release short growing high yielding cultivars which has shown to still deliver above average yields in spite of low rainfall and high temperatures. ■

SUNFLOWERS

– a golden opportunity

THE BEAUTIFUL GOLDEN SUNFLOWERS WHICH PAINT PARTS OF THE SOUTH AFRICAN COUNTRY-SIDE WITH BRILLIANT GOLDEN YELLOW DURING THE SUMMER MONTHS, PRESENT A GOLDEN OPPORTUNITY FOR FARMERS WHO INCLUDE THEM IN THEIR PRODUCTION PLANS. THIS BROAD-LEAFED PLANT IS VERSATILE AND PROFITABLE.



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The main value of the sunflower lies in its high oil content. The seeds are compressed to extract oil and the by product is a valuable oil cake which is high in protein and oil and is mixed into cattle feed. Many

poultry feeds and bird seed mixes also include sunflower seeds. Sunflower seeds are increasingly used as a health food, as a snack or a sprinkle in salads.

A warm and dry climate is considered optimal for sunflower production so sunflower has become a very important crop in the drier central and western regions of the country. Cool and moist conditions during the crop ripening phase are unsuitable, since rust and head rot can occur; while extremely hot conditions can cause charcoal rot. It has a shorter growing season and a greater tolerance of cold and even frost conditions than many other crops. It is a very adaptable plant. It can be planted late into summer – as late as the first week into February if rains come late, which has been the case in the past few years.

Another advantage of growing sunflowers is the production costs of sunflowers are significantly lower as the plants are excellent at utilising residual nutrients in the soils left from previous crops. This is because the sunflower has a deep tap root which can dig deep for moisture and nutrients that have leached down and out of reach of many other crops. For this reason, the sunflower plant is an ideal crop to use in a crop rotation system with other crops like maize and beans or other leguminous crops.

SUNFLOWERS ARE THE PERFECT DANCE PARTNER FOR MAIZE

Growing sunflowers after maize helps mitigate many of the problems triggered in a field. Some of the benefits of integrating sunflower into your crop rotation are:

Minimal moisture is required

The sunflower taproot system can reach as far as 1 m to 1,5m deep into the soil. This means they are better equipped than many other crops to handle drought conditions and they can deliver high yield production on limited moisture. A crop such as maize does not have the same root system and cannot access nutrient and moisture to the same depth as a sunflower can.

Helps break the disease cycle

What has become known as ‘the rotation effect’ is what happens when changing the crop grown in a field results in reduced disease transmission and pest resistance. When you change the crop, the disease pathogens die, and their life cycle is interrupted. An example is sunflowers should not be planted in the same field more than once every three to four years because sunflowers have a high susceptibility to Sclerotinia head rot and the same goes for soybeans which are susceptible to cyst nematodes. Crop rotation reduces weed build up too. ■



RISKS ATTACHED TO GROWING SUNFLOWER

- Sunflowers need a very good stand (plant population) in order to produce good yields of between 1,5 t/ha to 2 t/ha in the western summer cropping regions. Great care has to be taken to ensure the crop emerges successfully. My family of farmers hover over their new sunflower fields like a mother hovers over her newborn babies!
- Sunflowers do not enjoy extreme heat when emerging. The seeds do not produce a strong vigorous seedling at first. Even the slightest crusting of the surface soil can inhibit emergence, especially if heavy rains fall after planting and before emergence. If crusting occurs great care needs to be taken to till the soil and loosen the crust without harming the seedlings.
- Because the sunflower has such a long taproot, it is necessary to be aware that while the crop can effectively utilise every drop of available moisture (which is a good thing), it can also tend to dry out the soil profile. This needs to be kept in mind when planning the follow-on crop in that field.
- The efficient uptake of water by sunflower plants means that if late autumn rains do fall, it is particularly important to keep those fields weed free throughout the winter months so as to conserve as much late moisture as possible to counteract the drying effect of a sunflower crop.



SOME FINAL POINTERS

- Sunflowers should not be planted in the same field more than once every 3 to 4 years.
- A sunflower crop does not leave much residue on the field after harvest – something to remember when one is trying to control soil erosion.
- Sunflowers thrive in well drained soils but will tolerate clay loam to sandy loam soils.
- One of the big advantages of the sunflower plant is, it is a vigorous grower and the plants and leaves are strong and robust in size. This means it competes well with most weeds, but it is important to control weeds early on, so they do not get a head start on the sunflowers.

Oilseed outlook for the new season

FOR THE 2020 PRODUCTION SEASON FOR SOYBEAN AND SUNFLOWER, THIS ARTICLE WILL GIVE A BRIEF OUTLOOK OF THE PLANTING INTENTIONS.

SOYBEAN OUTLOOK

According to the Crop Estimates Committee (CEC) report the intentions to plant for soybeans for 2020 shows an increase of 2,05% or 15 000 ha compared to the previous season – from 730 500 ha to 745 500 ha.

Over the past decade, soybean production has been on the rise and amongst summer crops; it has been a good alternative for maize as it compared well in terms of profitability; especially for drought prone areas in the North West and parts of the Free State. Although soybean area has been expanding substantially, yields remain low. In order to have good yields, the assumption is that there should be good rains and improved cultivars.

Sunflower prices are trading closer to export parity levels compared to the same period last year.

It is expected that the breeding and technology levy for soybeans will accelerate yield gains in the future. The choice to plant more soybeans in the coming season can also be attributed to the movement of the derived price from export parity levels towards import parity levels (**Graph 1**). However, weather will be a big determining factor. The optimum planting period starts from mid-November; some farmers have received a bit of rain, while others are optimistic that they will get enough to plant during the planting window. According to the South African Weather forecast, there are good prospects of rains for the last two months of 2019 until January 2020; things are definitely looking up in terms of fulfilling local demand.

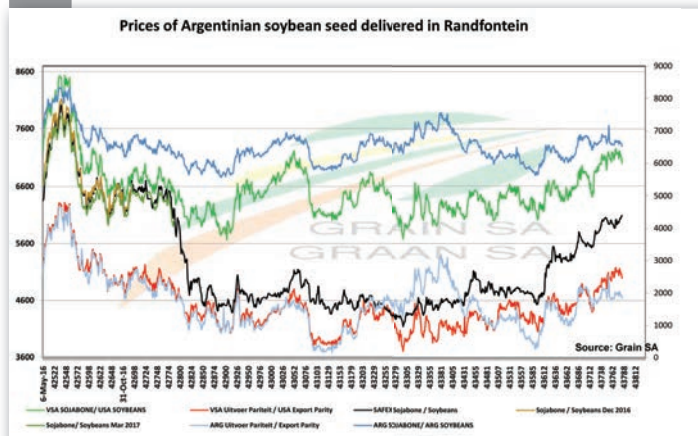
SUNFLOWER OUTLOOK

In the case of sunflower seed, the expected area planted for 2020 is estimated at 538 500 ha, this is about 4,49% or 23 150 ha more than the 515 350 ha planted last season. Sunflower prices are trading closer to export parity levels compared to the same period last year (**Graph 2**). This will be one of the determining factors as to whether the farmers plant sunflower or not. ■

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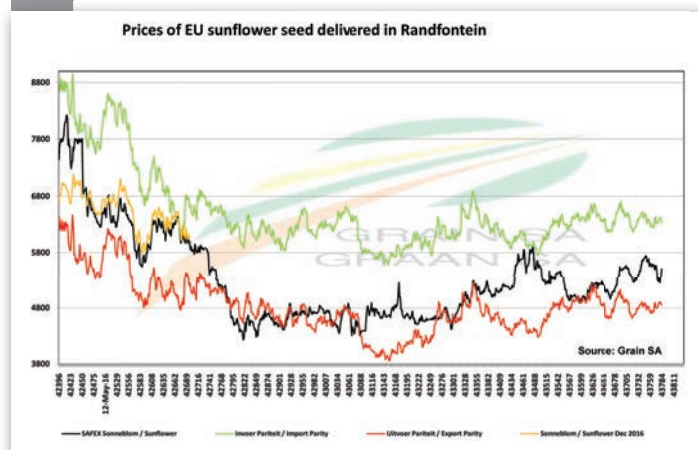


1 Soybean parity prices.



Source: Grain SA, 2019

2 Sunflower parity prices.



Source: Grain SA, 2019

Overview of the markets

IN THIS ARTICLE WE GIVE AN OVERVIEW OF THE GLOBAL AND LOCAL MAIZE SUPPLY AND DEMAND FOR 2019/2020 COMPARED TO THE PREVIOUS SEASON.



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GLOBAL OVERVIEW 2019

Global maize production forecast for 2019 have been lowered due to a downward revision in Mexico, however global production is still set to reach its second highest level on record. Consumption for the 2019/2020 season remains flat with demand for food on the rise while feed demand keeps falling especially in the USA.

Trade in 2019/2020 has shown a slight decrease (-1,5%) compared to the previous season's record volume. Global ending stocks

are expected to decrease by about 1,8% mainly due to the cut in USA ending stocks.

LOCAL OVERVIEW 2019

According the Crop Estimates Committee (CEC), production forecast for maize for 2019 is about 11,186 million tons, almost 14% less than

the previous season of 12,510 million tons (**Table 2**); with area estimated at 2,301 million tons and an expected yield of 4,86 t/ha. Specifically, white maize is still estimated at 5,538 million tons with a yield of 4,27 t/ha, while yellow maize has been estimated higher by 1,9% at 5,648 million tons with yield prospects of 5,64 t/ha.

Global production is still set to reach its second highest level on record.

Local demand is expected to increase compared to the previous season mainly because of an upward estimate in yellow maize for animal feed. Trade in terms of exports is expected to decrease by 48,7% compared to the previous season, due to a significant decrease in yellow maize exports. Ending stocks are anticipated to decrease by 36%, with pipeline stocks expected to last just over one and a half months. ■

1 Global supply and demand of maize.

| | 2018/2019 Estimate (million tons) | 2019/2020 Forecast (7 Nov) (million tons) |
|---------------|---|---|
| Production | 1 118,1 | 1 122,6 |
| Supply | 1 486,5 | 1 479,0 |
| Consumption | 1 141,6 | 1 141,5 |
| Trade | 165,9 | 161,5 |
| Ending stocks | 356,4 | 331,0 |

Source: USDA, 2019

2 Local supply and demand for maize.

| | 2018/2019 Final (tons) | 2019/2020 Forecast (31 October) (tons) |
|------------------|------------------------------|--|
| Production (CEC) | 12 510 000 | 10 779 107 |
| Supply | 15 867 123 | 13 936 193 |
| Local demand | 10 919 979 | 11 064 500 |
| Trade (exports) | 2 284 058 | 1 170 000 |
| Ending stocks | 2 663 086 | 1 701 693 |

Source: NAMC, 2019



Don't say you don't have enough time. You have exactly the same number of hours per day that were given to Helen Keller, Pasteur, Michaelangelo, Mother Teresa, Leonardo Da Vinci, Thomas Jefferson, and Albert Einstein.

~ H. JACKSON BROWN JR



REGULARLY ASSESS YOUR CATTLE FARM

critically for sustainability

THE PRICE OF WEANERS, OLD COWS AND SLAUGHTER CATTLE HAS MOVED SIDEWARDS OVER THE PAST FEW YEARS. MANY ANALYSTS LIKE ABSA AND THE MEAT PRICES OF MR CHRIS DERKSEN SUPPORT THIS STATEMENT. LIKE IN MOST AGRICULTURAL INDUSTRIES, THE CATTLE INDUSTRY IS ALSO A PRICE TAKER.

This causes producers to be continuously challenged to produce. Producers should ensure that efficiency and effectiveness are high – and even then profits remain under pressure.

To increase profitability, either more should be sold or the price at which it is sold should be raised. Better marketing requires more attention, but due to the cyclical nature of production, it is an enormous challenge to escape the large supply of cattle at certain times.

DIFFERENT SYSTEMS AND PROFITABILITY

Regardless of the production system in which the cattle is being produced, there is no big variation in the profitability of the different systems. The different cattle production systems are shown in **Table 1**.

Given this information, it is clear that the profitability per system, except for the 36-month system, does not vary a lot. From that we can conclude that the farming system involved does not necessarily affect the profit dramatically.

However, there are other facets of farming that have a greater impact on profitability than one realises. Producers forget about these, and they can eventually dramatically reduce the profitability of the branch concerned.

Here is a list of the basic factors that need to be in place and that should be kept in place:

- Sufficient roughage must be available at all times – in other words there should be enough food throughout the year.
- The right supplementary feed to balance the needs of the animals and those of the feed.
- Producing in cycle with resources.
- Adequate clean water.
- Timeous and preventive disease and parasite control.

MANAGE YOUR RESOURCES CLOSELY

The first factor that plays a role is to keep on producing in cycle with the farm's natural resources. When compiling the budget, a standard of one bale of hay per animal in winter should be included. This means that hay should be supplied for one month. As soon as this feeding period is extended to two months, the profitability is under significant pressure. **Graph 1** shows the effect of one extra bale of hay per animal.

Graph 1 may be a little skewed, because the number of large-stock units (LSU) carried now may be more. This can compensate for the higher production costs.

Assure yourself of how many animals your natural resources can handle. Compile a well-planned feeding flow programme and manage the shortages in this programme with bought and stored feed.

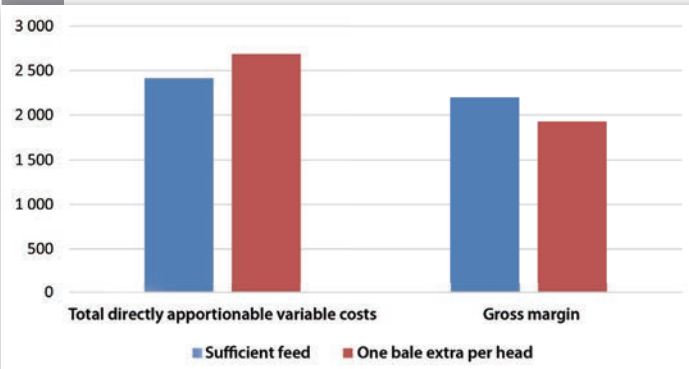
The management of cultivated pastures is just as important. Fertilise the cultivated pastures according to the potential of the crop. The rule of thumb is that 1 ton of dry matter per hectare needs approximately 100 mm

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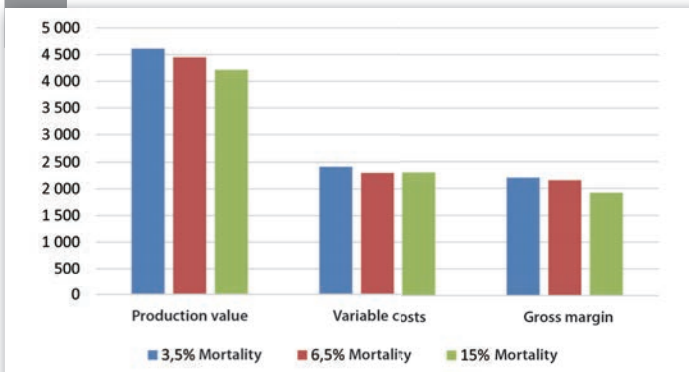
1

The effect of too many cattle for the resource and one extra bale of hay is predicted within a traditional weaner system (R/LSU).



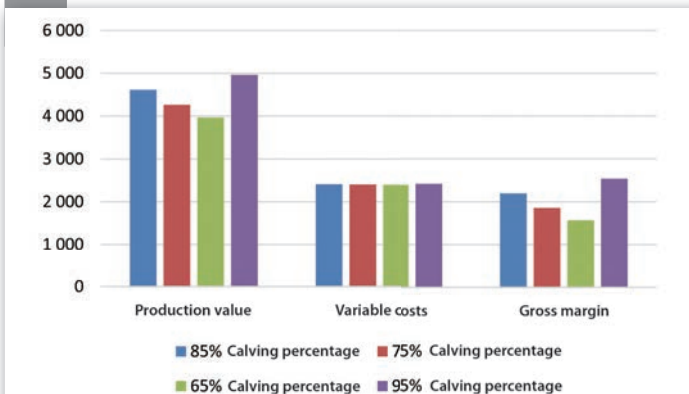
2

The effect of different calf mortality percentages in a traditional weaner system (R/LSU).



3

The effect of different calving percentages within a traditional weaner system.



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Regularly assess your cattle farm...

1

Budgeted gross margin determination of various Mpumalanga production systems for the 2018/2019 production year.

| | 36-MONTH MARKETING SYSTEM | 18-MONTH MARKETING SYSTEM | TRADITIONAL WEANER MARKETING SYSTEM | POST-WINTER WEANER MARKET- ING SYSTEM |
|--|---------------------------------|---------------------------------|---|---|
| | PER AVERAGE LSU | PER AVERAGE LSU | PER AVERAGE LSU | PER AVERAGE LSU |
| Calving percentage | 85% | 85% | 85% | 85% |
| Gross production value | 4 130,15 | 4 881,77 | 4 610,24 | 4 803,94 |
| Directly apportionable variable costs | | | | |
| Fodder and licks | 1 283,99 | 1 395,90 | 1 017,74 | 1 301,67 |
| Dosing | 86,74 | 84,57 | 69,50 | 80,98 |
| Vaccination | 58,81 | 110,13 | 119,47 | 120,29 |
| Other injections (trace minerals and medicine) | 40,15 | 40,78 | 39,51 | 39,78 |
| Dip | 43,45 | 40,90 | 39,73 | 47,05 |
| Other (ear-tags, gas, etc.) | 13,03 | 13,91 | 10,57 | 12,94 |
| Casual labour | 13,12 | 13,16 | 13,11 | 13,20 |
| Machinery, tractors and diesel | 122,50 | 122,85 | 122,40 | 123,24 |
| Veterinarian and consultants | 284,37 | 372,95 | 371,57 | 374,12 |
| Equipment | 35,00 | 35,10 | 34,97 | 35,21 |
| Cattle purchases | 437,50 | 438,77 | 437,14 | 440,14 |
| Production credit interest | 145,12 | 160,14 | 136,54 | 155,32 |
| Total directly apportionable variable costs | 2 563,77 | 2 829,16 | 2 412,25 | 2 743,94 |
| Gross margin | 1 566,38 | 2 052,61 | 2 198,00 | 2 059,99 |

of rain. Furthermore, growing animals produce 1 kg of meat per hectare per millimetre of rain.

If cultivated pastures are cut, baled and removed, the following extraction figures can be used:

- N: 20 kg - 25 kg N per ton of dry matter
- P: 1,2 kg phosphate per ton of dry matter
- K: 15 kg potassium per ton of dry matter

Soil pH and analysis remain the basis on which fertilisers should be administered. Talk to your fertiliser representative to decide what will be best for your farm. The generally accepted norm is to rather fertilise a section too much, than to fertilise the whole area only partially. Just remember that if the cultivated pastures are grazed, the fertiliser needed will vary dramatically from the norm.

Resting natural pasture is very important. Research conducted at the Nooitgedacht Agricultural Development Centre proved that the production of pasture rested for a full growing season will be twice that of grazed pasture in the following year. Therefore, it makes sense to rest pasture during winter, to utilise it and then utilise it again the following season.

MORTALITY MANAGEMENT

Producers may think that inoculation is not worth the trouble or the cost. It is just another calf dying. **Graph 2** (on page 15) illustrates the effect of different calf mortality percentages. The assumption is that the producers with the 3,5% mortality percentage do all inoculations, while the others do no inoculations.

Remember: All inoculations are not necessarily reflected in the mortality, but a large percentage is reflected in the calving percentage.

Graph 2 illustrates that the production value between 3,5% mortality and 15% mortality is approximately R400, while the saving in costs is approximately R117. It does not make sense to not do inoculations. Talk to a veterinarian in your area to get the correct inoculations for your area.

HIGH CALVING PERCENTAGES ARE NON-NEGOTIABLE

Calves are the commodity sold in a weaner system. The more efficient and effective you are as a producer, the more calves will be available to be sold. **Graph 3** (on page 15) shows the effect of the different calving percentages.

It proves that producers should do everything in their power to produce as many calves as possible up to marketing level. As producer you should therefore ensure that there is always enough pasture available at all times, that the correct licks and fodder are given in time, that inoculations are done timeously and that the bulls are capable of doing their jobs – to name a few factors.

Heavier calves bring in more money. A 10% change in calf mass with sale has a dramatic influence on the eventual profitability. From calculations done purely by increasing the weaning mass by 10% the income for the system increased by approximately R200 per LSU. Do everything in your power to get the calves as heavy as possible and to ensure that the average daily gains (ADG) of the calves are the best that they can be.

Given the expectation that the prices can move relatively side-wards in the coming season, producers should emphasise the efficiency and effectiveness of production. Take the time to assess yourself and to compare yourself with other producers. In this way you can increase the profitability of the farm. ■

Valuable GROUNDNUT TIPS

IN SOUTH AFRICA, GROUNDNUTS ARE PLANTED ON A CONSIDERABLY SMALLER SCALE THAN THE FOUR MAJOR GRAIN CROPS, NAMELY MAIZE, WHEAT, SOY-BEANS AND SUNFLOWER. THE GROUNDNUT INDUSTRY IS IN MANY RESPECTS UNIQUE, WITH A VARIETY OF CHALLENGES, BUT ALSO OFFERS JUST AS MANY OPPORTUNITIES.

An example is the marketing channels that differ drastically from those of other crops. In this respect groundnuts are one of the few grain crops that does compensate you for the quality of the grain. Production practices should therefore not only lead to the desired yield, but also to groundnuts of excellent quality.

When planting groundnuts, the history of the planned fields should be studied thoroughly. Pay attention to the following important aspects:

- Make sure the soil is not acid and that sufficient calcium and magnesium are available for absorption. Liming the year before planting is a good practice.
- Fertilise adequately with nitrogen (N), phosphate (P), potassium (K), sulphur (S), calcium (Ca) and magnesium (Mg) according to the potential. Sufficient phosphate, potassium, sulphur, calcium and zinc are important for normal growth and development to ensure a high yield potential and satisfactory quality. Discuss fertiliser planning with an expert adviser.
- Preferably plant a maize field that was kept clean with glyphosate and grass herbicides or where relatively little atrazine/broad-leaved herbicide was applied (at dosages suitable for crop rotation

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with groundnuts). Atrazine and other broad-leaved herbicides can transfer to the groundnuts and drastically impair yield and quality. Discuss weed control with an expert adviser.

- Groundnuts are one of the best rotation crops – particularly in rotation with maize. Unfortunately, crop rotation also has disadvantages like wind erosion, which often deprives the subsequent maize crop of potential.
- Crop residue from the previous maize crop is sometimes a challenge and can be ploughed in timeously. Where the tilling method is deep ripping, the residue can be kept on top of the soil.
- Groundnuts can be planted on dryland every five years and under irrigation every three years – provided no disease like black root and Sclerotinia rot occurred.
- Fields that were fallow and kept clean, were limed and have a little more clay (7% - 10%) in the topsoil are the best option for planting groundnuts. The biggest benefit is that you can plant early in the season with relatively little rain.

The decision to plant groundnuts is made from a cost viewpoint eight out of ten times. It is assumed that the crop is considerably cheaper than some of the other grain crops that can be planted. This may be true in the short term, but definitely not in the long term.



1

Correct production practices and rain at the right time led to an excellent crop and also to excellent quality here.



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Valuable groundnut tips



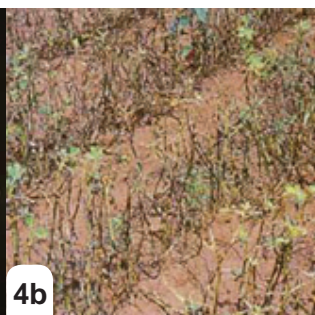
2
Rhizoctonia and other soil-borne fungi occur in cold, wet conditions in particular.



3
Young groundnuts with a thoroughly developed first crop and sufficient nodule bacteria (Table 2).



4a



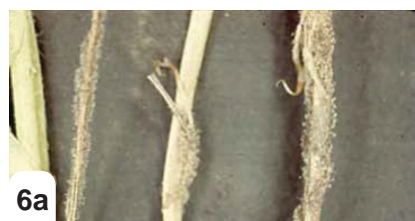
4b

Leaf spot on groundnuts.



5

Web blotch in different stages (left – initial stage, right – advanced stage).



6a



6b

Botrytis usually occurs late in the season.



7

Black root rot under irrigation.



8

Sclerotinia rot.

If groundnuts are managed as a marginal crop, it will seldom exceed the profit per hectare of other grain crops. However, the opposite is true, namely that if the crop is well managed, the result is excellent yield and quality. In such a case there is no grain crop that can beat groundnuts.

LESSONS DURING PLANTING

- With groundnuts the planting date is critical, and there should be a frost-free period of at least ± 150 days for the plant to reach maturity. The ideal planting date is therefore from October to 25 November.
- Planting is usually too sparse (**Table 1**). Plant 150 000 plants/ha on dryland and 300 000 plants/ha under irrigation.
- Try to maintain in-row spacing of at least 75 mm.
- The soil should be warm enough, with a minimum soil temperature of 15 °C or warmer at 06:00 in the morning. Soil fungi (**Photo 2**) can have a major effect on establishment if the soil is cold and wet.
- Use a high-quality and tested inoculant to ensure that the nodule bacteria fix sufficient nitrogen (**Photo 3**) (**Table 2**).
- Treat the seed with registered fungicides and insecticides.
- When groundnuts are planted under irrigation, the soil can be irrigated before planting. The best practice is to give the plants a chance to emerge before irrigating again.
- Plant between 50 mm and 75 mm deep to ensure that the seeds have sufficient moisture to germinate.
- Plant with a registered nematicide.

The plant establishment that is planted is seldom achieved. That is why between 3 000 seeds/ha and 5 000 seeds/ha more should be planted to achieve the desired final establishment.

LESSONS DURING CROP INSPECTION

Of all the grain crops groundnuts definitely require the most attention during the season. Management decisions and timing can have a major effect on the profitability (yield and quality) of groundnuts.

An early, correct, preventive disease control programme, for example, can mean the difference between profit and loss if the climate is conducive to the development of diseases.

The main foliage diseases that limit groundnut yields are early and late leaf spot (particularly the latter – **Photo 4a** and **4b**), and web blotch. Leaf spot will usually be the first foliage disease to occur. The incidence of web blotch (**Photo 5**) is more prominent in cool, wet weather.

The incidence of active nitrogen-fixing (pink) nodule bacteria always remains an important focal point to achieve optimum yield under the given climatic conditions. We often wonder if there are enough nodule bacteria to produce sufficient nitrogen. Table 2 provides a general guideline to ensure that sufficient nitrogen fixation does take place.

Botrytis (**Photo 6a** and **6b**) occurs late in the season under moist conditions as soon

as the night temperature starts dropping. The tolerance of the various cultivars for various diseases and other economically significant pests differs. This information is contained in *Grondbone, altyd 'n wenner* by CJ Swanevelder.

Black root rot (**Photo 7**) and Sclerotinia rot (**Photo 8**) can cause major damage – particularly under irrigation, but also when wet conditions prevail in dryland tilling. Avoid fields with a history of these diseases.

Regular crop inspection will ensure that the foliage diseases and insects are controlled. Do not underestimate aphids and red spider mites. They can cause great damage – particularly if the plants experience drought stress.

The correct and timely control of diseases will also provide feed that is of an excellent quality and sought after by stock farmers.

Good, strong plants with sufficient leaves also facilitate the mechanical harvesting process. Groundnuts should preferably be removed before frost occurs. Groundnuts can be harvested as soon as 75% of the pods have matured. The pods are mature when 75% of them have a dark brown or black outside wall when scraped.

SUMMARY

Groundnuts are left behind with regard to cultivar development and biotechnical improvement, but it remains one of the best rotation crops in a rotation system with maize. The secret of an excellent groundnut crop lies in effective production practices and timing. ■

1 Plant establishment (plants/ha and kg seed/ha) for different row widths to achieve adequate establishment with 75 mm in-row spacing.

| Plants/ha | Inter-row spacing (M) | | | | | |
|-------------------------------|-----------------------|---------|---------|---------|---------|--------|
| | 0,3 | 0,45 | 0,6 | 0,75 | 0,91 | 1,52 |
| | 444 444 | 296 296 | 222 222 | 177 778 | 146 520 | 87 719 |
| Kg seed/ha | | | | | | |
| 60/70 (± 2 321 seeds/kg) | 191 | 127 | 96 | 76 | 64 | 39 |
| 70/80 (± 2 678 seeds/kg) | 166 | 112 | 84 | 67 | 56 | 33 |

Adapted from *Grondbone altyd 'n wenner*, CJ Swanevelder

2 Assessment of effective nitrogen fixation by nodule bacteria.

| Early-season nodule scale | Nodules/plant | Management decision |
|---------------------------|---------------|--|
| Excellent | >20 | No response to additional nitrogen fertilisation. |
| Very good | 16 - 20 | Little or no response to additional nitrogen fertilisation. |
| Good | 11 - 15 | Little response to additional nitrogen fertilisation. |
| Moderate | 6 - 10 | Possible response to additional nitrogen fertilisation. |
| Poor | 1 - 5 | Additional nitrogen fertilisation is essential to provide optimum yield. |
| None | 0 | Additional nitrogen fertilisation is essential to provide optimum yield. ■ |

Adapted from *Texas Peanut Production Guide* by Todd Baughman, 2006

Management of Sclerotinia head and stem rot

SCLEROTINIA SCLEROTIORUM IS A HEMI-BIOTROPHIC FUNGAL PLANT PATHOGEN, AS A BIOTROPHIC AND NECROTROPHIC PATHOGENIC LIFESTYLE IS FOLLOWED. THIS FUNGUS HAS AN EXTENSIVE HOST RANGE OF MORE THAN 500 PLANT SPECIES, INCLUDING SUNFLOWER, SOYBEAN AND CANOLA.

These crops play an important role in the South African economy as oil seed crops. However, some vegetables may serve as alternative hosts which include (but are not limited to) cabbage, carrot, potato, squash, and tomato. Many common South African weeds are also susceptible to infection by this pathogen and are associated with these crop production systems.

COMMON NAMES

As a result of the many host plants associated with this pathogen there are more than 60 common names associated with *S. sclerotiorum* infections. The most common are Sclerotinia head rot, Sclerotinia stem rot, white mould and cottony soft rot.

These common names are associated with the distinct symptoms and signs associated with Sclerotinia infections. The symptoms associated with a disease are the host's response in a conducive environment, whereas the signs are a physical visible reaction of the pathogen. These signs may also be seen morphologically in the laboratory.

In the case of Sclerotinia diseases, mycelium (mass of fungal hyphae) and sclerotia (**Photo 1**) are the distinguishing signs of the pathogen's presence. Sclerotia, melanised masses of hyphae, are key to the life cycle of this fungus as they are the survival structure produced.

The disease is more prevalent in fields where crops have a dense canopy and air circulation is limited, as a result creating a favourable micro-climate for disease development.

SYMPTOMS

The visible symptoms are dependent on the host growth stage. Seedling wilt may occur, although Sclerotinia head and stem rot frequently develop at flowering and pod or seed filling stages. Brown water-soaked lesions (**Photo 2a**) are initial symptoms observed that become covered with white (although may in some cases be cream in colour) cotton-like mycelium on sunflower heads (**Photo 2b**) and soybean pods as well as in and on the stems of both sunflower and soybean (**Photo 2c** and **Photo 2d**). The white mycelium on the face of sunflowers eventually develops into a net of black sclerotia (**Photo 2e**). As the disease matures, a shredded appearance, with sclerotia between plant fibres can be observed in sunflower specifically (**Photo 2f**). This fungus can also infect the subterranean crown and form sclerotia within the lower stem of sunflower and soybean.

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DISEASE INITIATION

The initiation of the infection cycle of Sclerotinia diseases is dependent on the interaction between the sclerotia present, i.e. primary inoculum source, the presence of the host and an environment conducive to disease development. Sclerotia are highly tolerant to dry heat of up to 70°C and prolonged periods of freezing.

Sclerotia can stay viable in the soil for up to eight years, although this is dependent on the isolate and locality, as well as soil characteristics, to mention a few. Sclerotia found in the first 5 cm of soil are considered important for disease initiation. Infection by *S. sclerotiorum* can occur through two means of germination to produce primary inoculum, namely myceliogenic and carpogenic germination.

Each method of germination is dependent on the environmental conditions present. Myceliogenic germination occurs when sclerotia produce hyphae under temperatures ranging from 20°C to 25°C in the presence of high relative humidity, assumed to be greater than 80% according to literature.

Carpogenic germination results in the formation of apothecia **Photo 3a**, which appear as mushroom-like structures. This occurs at lower soil temperatures ranging between 16°C and 20°C at a higher relative humidity as that for myceliogenic germination. Apothecia are commonly misidentified as the common bird's nest fungus **Photo 3b**.

Apothecia release ascospores into the air under high relative humidity and changes in air pressure, favouring long distance dispersal and infection. Literature states the movement of ascospores can be within-fields and between fields. However, it is accepted that most ascospores are dispersed within 150 cm of their apothecial source. Furthermore, *S. sclerotiorum* has the ability to remain dormant in the form of mycelium in infected plant residues when environmental conditions are unfavourable for germination and infection.

DISEASE DEVELOPMENT

From the above it is clear that *S. sclerotiorum* is highly dependent on its environment – both environmental and agronomic conditions – for disease initiation, development and survival. Cool and wet conditions favour disease development. A daily plant surface moisture of 12 hours to 16 hours or a continuous plant surface moisture of 42 hours to 72 hours together with temperatures ranging from 10°C to 25°C are required for disease development.

The disease is more prevalent in fields where crops have a dense canopy and air circulation is limited, as a result creating a favourable micro-climate for disease development. This is directly related to the population density and row spacing selected at planting, as well as the selection of cultivars prior to planting, as cultivars vary in their physiological structure, i.e. determinate or indeterminate. Thus, increasing inter and intra-row spacing or reducing plant populations per hectare will increase air circulation which may reduce the risk of Sclerotinia infection.



1
Morphology of Sclerotinia sclerotiorum sclerotia (C), mycelium (A) and the apothecia initials, known as stipes (B). Photo Marlese Meiring



2a
Field symptoms and signs of Sclerotinia sclerotiorum: Water-soaked lesions on sunflower head. Photo by Lisa Rothmann



2b
Mycelium covering sunflower head. Photo by Lisa Rothmann



2c
Stem rot and sclerotia on sunflower. Photo by Marlese Meiring



2d
Soybean stem. Photo by Marlese Meiring



2e
Shredded appearance of sunflower head. Photo by Lisa Meiring



2f
Net of sclerotia from sunflower head. Photo by Lisa Meiring



3a
Apothecia of Sclerotinia sclerotiorum. Photo by Lisa Rothmann



3b
The innocent bird's nest fungus (Nidulariaceae spp.) commonly misidentified as apothecia. Photo by Lisa Rothmann

MANAGEMENT PRACTICES

This pathogen has a complex life cycle and interaction with its hosts and environment, which makes the management of this disease intricate. One of the first steps to managing the disease is to purchase disease free certified seed. The South African National Seed Organisation (SANSOR) uses methodologies prescribed by the International Seed Testing Association (ISTA) for evaluating registered seed.

The current limitation from ISTA of sclerotia in soybean seed is 0,2% in a 1 000 g sample. This is required prior to the issuing of a final seed lot certificate. The virulence of the sclerotia is not tested during this period. However, legislation states no more than 4% sclerotia may be present in canola, soybean and sunflower seed. There-

fore, the SANSOR regulations are much stricter, only allowing 20 g of sclerotia per 10 kg, in contrast with the 400 g of sclerotia per 10 kg. The efforts which SANSOR make to ensure limited levels of sclerotia must be commended.

Seed treatments have been said to reduce the germination of the sclerotia present. Preliminary tests at the University of the Free State (UFS) of sclerotia, found in treated sunflower seed, have indicated that sclerotia may still germinate, although this requires further elucidation.

Weeds are also known as alternative hosts and thus it is crucial to reduce the quantity of weeds present within and surrounding host crop fields. This will reduce the build-up of the fungus, either in the form of mycelium or sclerotia, in the immediate vicinity of the host crop. Crop rotations with non-host crops can reduce Sclerotinia

Management of Sclerotinia...

inoculum levels. However, the survival time of sclerotia in soil as well as the extensive host range of the pathogen should be kept in mind.

There are contradictory reports on the effectiveness of tillage practices on controlling Sclerotinia diseases, due to the relationship with sclerotial survival. Reduced tillage promotes surface sclerotia, and reduces the production of apothecia, while deep tillage can promote re-emergence of sub-soil inoculum and sclerotia to the upper 5 cm of the soil surface, which is the pathogen's active zone.

Burning crop residues is a common practice to reduce pest populations. There is limited information available on the effectiveness of burning on sclerotia or mycelium survival and viability on stubble. Reports state that the amount of stubble, sclerotial size as well as temperature and duration of the fire can result in variable results of the sclerotia germination, and ultimately yields burning as an ineffective method of control.

Biological control of Sclerotinia diseases can be achieved through two pathways, i.e. directly through the use of actively growing micro-organisms to target and parasitise the pathogen, or indirectly through secondary metabolites produced to suppress pathogen growth, promote plant health and induce resistance mechanisms.

The former focuses on the use of the fungus *Coniothyrium minitans*, which reduces sclerotial survival through degrading the sclerotia in fields previously infested with *S. sclerotiorum*. The latter includes fungal and bacterial organisms such as *Trichoderma* spp. and *Bacillus* spp. There are multiple biological control products available in South Africa. However, the efficacy of many of these within our South African context needs to be confirmed.

NO RESISTANT CULTIVARS

Currently, in a worldwide context, there are no commercially available resistant sunflower or soybean cultivars. However, sunflower and soybean cultivars differ in their response to the pathogen under various disease-favourable conditions. The selection of more 'tolerant' cultivars can reduce the risk of infection, yield losses and inoculum build-up in fields.

The response of sunflower and soybean cultivars to disease potential can be quantified using a statistical tool, known as regression analysis. The type of response as well as the relationship observed between Sclerotinia head and stem rot within a cultivar to changing disease potentials can be determined. Disease potential is defined as the average disease severity over all cultivars of the respective crop under specific environmental conditions.

Three response types can be observed between Sclerotinia incidence in a cultivar and Sclerotinia potential:

- Cultivar tolerance to increasing disease potential.
- Cultivar intolerance to increasing disease potential.
- Cultivars having a linear relationship with increasing disease potential.

This regression methodology can be an effective and accurate tool to quantify the response of cultivars to different disease potentials and subsequently help the selection process of cultivars for a specific disease potential.

FUNGICIDES

There are limited registered fungicides in South Africa. Currently, benomyl and procymidone are registered for use on peas and sunflower, whereas only the latter is registered for use on dry-, green or soybean. Furthermore, the exorbitant cost of the chemicals and their application as well as the potential requirement for multiple sprays are economic risks for producers.

Risk assessment

Forecasting the risk of Sclerotinia diseases, based on agronomic and weather variables, could benefit producers by identifying intervention thresholds and optimising the timing of management strategies.

These risk assessments have been successful internationally for canola and soybean. The systems range from simple checklists to more advanced mathematical modelling, which is ultimately visualised as a risk percentage or proportion, followed by a recommendation to apply (as well as application timing) or withhold fungicide applications.

This regression methodology can be an effective and accurate tool to quantify the response of cultivars to different disease potentials and subsequently help the selection process of cultivars for a specific disease potential.

PROBLEMATIC IN ECONOMICALLY IMPORTANT CROPS

The change in agronomic decisions, environmental and weather conditions, management practices and the susceptibility of germplasm has led to an increase in the importance of Sclerotinia diseases worldwide. The greater the prevalence and severity of the disease, the lower the yield and the greater the inoculum build up.

In the 2017/2018 season, sunflower and soybean epidemics causing up to 80% yield losses were reported in the Eastern Free State. During 2014, in South Africa, the effects of Sclerotinia stem rot of canola gained more attention due to the greater prevalence of the disease during the season compared to previous years.

Although extensive literature is available with regards to Sclerotinia diseases, this disease remains problematic in economically important crops, and the pathogen's behaviour locally needs to be clarified.

This investigation is a priority of the South African National Sclerotinia Research Network. The spread of *S. sclerotiorum* into critical South African crop production areas and its associated yield losses, highlight the importance of identifying and deploying effective management measures to safeguard agricultural land against the initial incursion of this pathogen. Please feel free to connect with the South African National Sclerotinia Research Network on their website at www.sclerotinia.co.za. ■

THE CORNER POST

VIEWPOINT

LIANA STROEBEL

Agriculture is the most important job in the world

THE GRAIN SA WESTERN CAPE OFFICE IN PAARL OPENED IN 2012. THIS OFFICE PROVIDES SERVICES TO FARMERS STRETCHING FROM THE SWARTLAND, OVERBERG AND DOWN TOWARDS THE SOUTHERN CAPE REGIONS. THIS OFFICE CELEBRATED A BIG BLESSING AT THE DAY OF CELEBRATION THIS YEAR WHEN ANDRIES VAN DER POLL WAS ANNOUNCED AS THE 2019 GRAIN SA/ABSA/JOHN DEERE FINANCIAL NEW ERA COMMERCIAL FARMER OF THE YEAR.

Two candidates from this area were entered for the New Era Commercial Farmer of the Year category this year and both were selected as finalists. According to the provincial co-ordinator in the area, Liana Stroebel, these two business minded farmers, Alfreda Mars and Andries van der Poll, have grown with leaps and bounds over the last five years. 'Farmers like these make our job easy because you only need to present an opportunity and they grab it and run with it.'

PASSIONATE ABOUT AGRICULTURE

Liana studied Agricultural Management at NMMU at Saasveld in George, after which she did a bachelor's degree in International Livestock Production in the Netherlands and finally obtained a master's degree in Sustainable Agriculture at the University of the Free-State. 'Since I can remember, I have always loved animals, being outdoors and getting my hands dirty. Studying agriculture was the only natural choice for me. Through my studies and working on various farms in between, my respect for nature, sustainable farming systems and the plight and needs of the farmer was realised.'

She joined Grain SA in 2013 and has never looked back. Initially, her tasks focussed mainly on information transfer through study group meetings, farmer training courses and the Pula Imvula magazine. Over the years, as the farmers evolved, their needs changed and with that, the type of support needed. Various new add-ons and initiatives have been introduced such as assisting farmers with business plans, helping them to apply for funding and providing farmers with industry exposure by organising visits to local commercial farmers, farmers days and commercial farmer study groups.

SERVICING THE WESTERN CAPE

As the majority of Grain SA farmers in the Western Cape farm with winter grains that require more hectares to be profitable, most of these farmers fall within the advanced farmer category. Liana is therefore not involved in these farmers' operations as a mentor, but oversees 24 farming entities. Some of these entities consist of single farmers where others consist of larger groups such as cooperatives, trusts or equity scheme projects.

In her capacity as co-ordinator she has to identify the farmers' needs and work towards addressing it as quickly and efficiently as possible – whether it is challenges with input suppliers, equipment,

record keeping, marketing, labour, diversification, conservation agriculture or funding.

Farm visits vary from planning meetings to checking crop progress and identifying challenges. It can also entail meetings with the farmers and other commodity representatives regarding streamlining their sheep or livestock enterprises to effectively slot in with their grain production systems, or planning meetings with mentors and sometimes even taking a mediation role when there are challenges among group members.

To Liana working as a provincial co-ordinator is an extremely satisfying job. 'It is just amazing to witness how individuals grow and develop over time. At the end of the day, we can only create a platform and present opportunities but it is up to the farmers what they do with that opportunity.'

She shares that one of the most important things she has learnt over the years is that everyone grows at their own pace. No two individuals, two regions, two farms or even two camps on the same farm are similar. 'Many institutions tend to want to class or categorise farmers into bulky boxes and support is too often generalised. Our farmers need tailor made support to suit their needs and particular situation'.

MENTORSHIP

Liana feels strongly about the importance of the Grain SA mentorship programme and the role mentors play in improving the skills of the mentees. 'Everyone needs a mentor – even the largest most successful commercial farmers also have mentors (in most cases even more than one) to guide and assist them. Surround yourself with people that know more than you do.'

To her a mentor is a person with very good practical farming knowledge and experience who knows the industry and its local role-players well. It is someone who can identify what knowledge or qualities a farmer needs to work on and is able to guide them towards that goal.

A mentor should therefore truly understand the farmer's background, available resources and personality and have the time and patience to teach someone. They should be able to commend the mentee's strong points and help them work on improving their weak points. 'It is also important that a mentor is resourceful and able to make plans in challenging conditions.'

Liana is passionate about agriculture and says farming is the most important job in the world. She shares this quote by Thomas Jefferson, the third president of the United States: *Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country and wedded to its liberty and interests by the most lasting bands.* ■



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