PULA IMVULA

>> GROWING FOOD >> GROWING PEOPLE >> GROWING PROSPERITY >>

GRAIN SA
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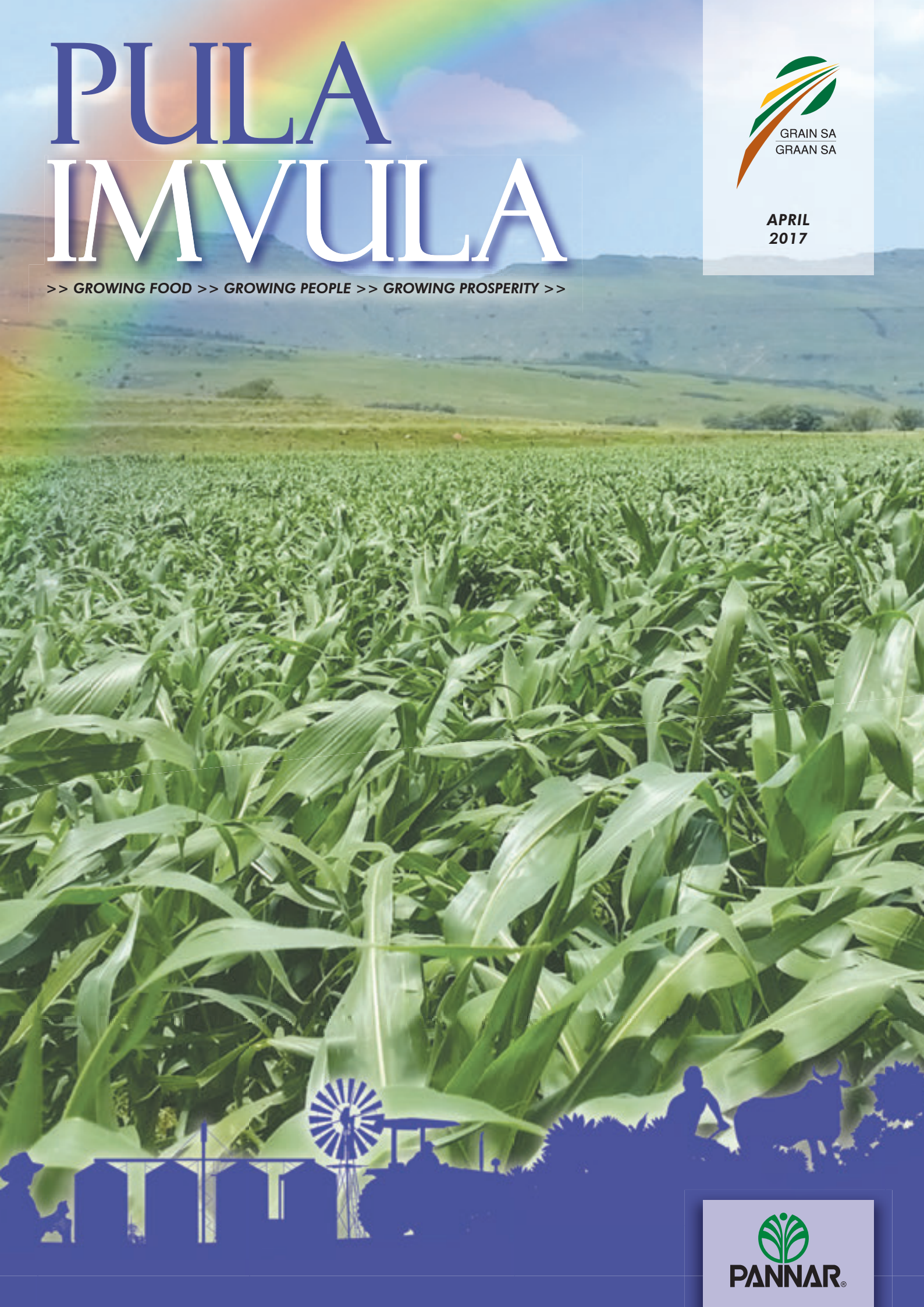
APRIL
2017



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PULA IMVULA

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IN THIS ISSUE...

We have recently travelled widely around the grain producing areas of South Africa and all the crops are beautiful. We are so appreciative of the rains that have fallen so that our households and our nation can be food secure. To have food is a most basic human need and we are glad to assist the farmers who are feeding our nation.

As with everything, there are challenges. Now that we have a good crop on hand we need to think about harvesting and storage. In terms of the health risks relating to food, we need to pay attention to the ways in which we harvest and store grains. It is really important that we should assist our grains to dry out completely while exposed to air flow – storing damp grain will increase the risks relating to fungal development and these fungi lead to the development of mycotoxins. Dear farmer – remember that your crop is food for people and animals and your task is not completed until your crop is dry and stored safely.

Once you have a surplus of grain, you can sell (to earn money) and you can also feed your household. This household includes your poultry and your livestock, both large and small. During a recent visit to small farmers in the Mthatha area, I was reminded of the value of more grain within the household – one particular farmer mentioned how she is able to feed the fowls, Muscovy ducks, goats, sheep and cattle. Having adequate food will increase the productivity of all your livestock.

During May, the NAMPO Harvest Day will be taking place in Bothaville again (in the Free State). This year we will be having a special exhibition of equipment for the small farmers. This is a great opportunity to experience the greater grain industry – input suppliers, suppliers of mechanisation as well as many other stalls of interest. We hope to see you at NAMPO 2017.

Let us enjoy the rest of this Autumn season – soon you will be working very hard to bring in the harvest. We have been so blessed and we need to count our blessings and appreciate the good crops.

Front page photograph taken by Gavin Mathews.

Always be on YOUR GUARD!

I am privileged to work closely with many smallholder and subsistence farmers in the rural areas of KwaZulu-Natal. Continually these farmers amaze me with what they can achieve on a small piece of land, and this while facing many adverse challenges daily.

What has become evident to me is that the farmers who spend as much time as they possibly can in their fields, nurturing their crops and guarding off unwanted pests and livestock are the ones that reap the rewards come harvest time.

What I would like to achieve in writing this article is to see more subsistence farmers take on the role of nurturer and protector. We need to stand guard over our crops until we reap the last cob. Just as we nurture and protect our children from infant to adult, so too we need to take on a parenting role over our crops if we would like to see them yield and succeed.

So, what are these challenges and what do farmers do in the field to combat them?

Crows

Crows are an absolute menace and can cause huge damage in maize that has just germinated. As the little seedlings pop through the soil, the crows peck them out one by one, line for line. If we leave them to feast on the seedlings, there will be nothing left.

Solution

Be ever present in your maize field from dawn to dusk. Put in the hours of effort so that you can have something to harvest. I would like to use the example of two farmers in the Hlathikhulu area of KwaZulu-Natal, Mr Mzwayi Zuma and Mr Musa Khumalo. These two dedicated farmers cultivate neighbouring fields on approximately seven hectares of land. They take shifts guarding their crops by using whips and sling shots to scare the flying thieves away. It is hard work that continues until the maize pip has disintegrated underground (usually about two weeks' post emergence), but their efforts will definitely pay off.

Gerbils

Gerbils are small little rodents that cannot resist any grain and are becoming a big problem in South Africa. Their numbers seem to be growing every year, largely due to the lack of predators which prey on them. They usually live in colonies in the maize field which can be identified by lots of little holes close together the size of tennis balls. They can consume huge areas of planted grain in your field which reduce your yield and are also an eye sore as weeds flourish where the soil is uncovered. Many farmers battle to find solutions to control these rodents.

Solution

There are chemical control measures which can be used to either treat your seed when you plant or to put down their holes. I am not going to discuss these measures in this article. For more information, you can contact your local chemical representative to assist you.

But even without making use of chemicals one can still make a big difference by simply employing a few basic control strategies. Remember that nature is amazing in providing balance. Where man interferes, this 'bal-

Mr Mzwayi Zuma pointing out a line of maize eaten by crows.

> *"We need to stand guard over our crops until we reap the last cob.*

Whips in hand to scare away the crows.

> *Nurture and protect, stand guard!*

ance' can be disturbed. So, take note of how things work in undisturbed environments and try to replicate this. Plant poles around your field to assist the owls to hunt the gerbils. Don't kill snakes! Snakes are a natural predator of rodents. If we kill snakes the rodent population will explode as we are witnessing. If you see a snake while working in your field, just leave it to do its job.

Lastly one should also become creative. I would like to use the example of Mrs Sindisiwe Gama in the Loskop area near Estcourt. With the assistance of her son, she made hundreds of small traps using wire and mesh and placed them all around the field near the Gerbils holes with grain inside to lure them in. They were especially successful during the winter months when food is scarce. If you are patient and dedicated to the task you will notice a marked improvement when you plant again.

Cattle

Cattle in the rural areas are the number one pain for any maize farmer planting on communal land. The problem especially occurs in the months leading into winter when grazing starts becoming scarce. Livestock owners push them into the communal cropping land where there is still plenty of food causing big damage to the maize in the fields. Therefore, many farmers reap their cobs before it is dry and transport it to their homes for storage. This results in loss of weight on the cobs as well as rotting cobs.

Solution

The obvious solution is fencing your field; however, fencing gets stolen which is why farmers are reluctant to erect them. The second option is to negotiate with the livestock owners and come to an agreement to keep the cattle out until harvest time after which they can make use of the stover left on the fields. One could even get the local counsellor or Nkosi involved in these negotiations. If all these fail, you have little other choice but to put in the hard effort once again and stand guard over your field. If you can't then ask your brother, if your brother can't then ask your father. Just don't leave your valuable crop to get destroyed.

Nurture and protect, stand guard! Put this into action in your farming enterprise and you will see your efforts rewarded when harvest time comes. I truly hope to see more and more subsistence farmers take this to heart. It will only lead to better household income for you and your family and contribute to food security in our country.

Article submitted by Gavin Mathews, Bachelor in Environmental Management. For more information, send an email to gavmat@gmail.com.

Area of maize destroyed by gerbils.

Important mycotoxins relevant to maize

South Africa is renowned for its good quality maize and this crop is important to commercial and subsistence farming communities. Although maize has many uses, the most important is that of the production of food and feed.

Maize and maize-based products are consumed by the majority of South Africans (between 67% and 83% of the population), and the average cooked maize consumption per day is estimated between 476 g - 690 g per person. For this reason, the contamination of maize by fungi and the resultant production of mycotoxins, remains a very important concern.

In the previous article (March 2017) we explained that mycotoxins are toxic chemicals produced by fungi that grow naturally on various agricultural crops. Although the extent of fungal growth on crops can be visible to the naked eye, the occurrence and levels of mycotoxins are not. These levels may vary extensively in a single maize cob, as well as between neighbouring plants.

The mycotoxins relevant to commercial maize produced in South Africa are: Fumonisin (FB) associated with Fusarium Ear Rot;

Figure 1: Maize kernel structure.

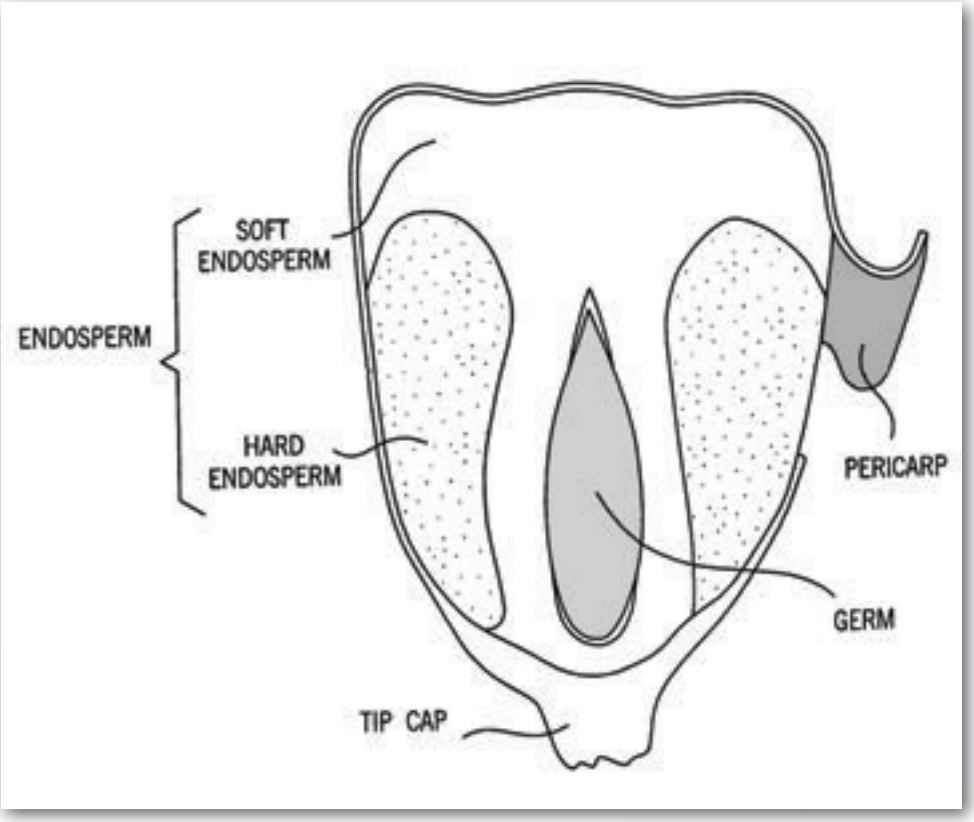

Table 1: Description and purpose of the various maize milling fractions.

Milling fraction	Description	Characteristics	Maize-based products
Grits	Degermed product consisting of large pieces of broken maize endosperm and free of husk and germ	Flaking	Ready to eat breakfast cereals (cornflakes) and samp
		Coarse	Cereal and snack food Maize Rice
		Medium (**Semolina**)	Cereal and snack food
		Fine (Semolina)	Brewing Maize porridge
Maize meal	Milling of the horny and mealy endosperm	Predominantly coarse (**SUPER maize meal**)	Maize porridge Pancake and muffin mixes, corn snacks, cereal and bakery products
		Granulated	Pancake and muffin mixes, corn snacks, cereal and bakery products
Maize flour		Fine (**SPECIAL maize meal**)	Maize bread and bakery mixes, infant foods, biscuits, wafers, filters and carriers in meat products and breakfast cereals
			Snacks and polenta
Chop/bran	Mixture of the outer layer of the maize kernel, the pericarp and mealy endosperm	**Hominy Chop**	Animal feed
Maize germ	Contains the embryo part	Rich in oil	Oil Animal feed

deoxynivalenol (DON) and zearalenone (ZEA) associated with Giberella Ear Rot, all caused by *Fusarium* fungal species.

In rural areas in South Africa where people grow maize as a daily staple (subsistence farming), FB has been the most important mycotoxin and normally occurs at relatively high levels. This has been the case for rural Eastern Cape (EC), Limpopo (LP), and KwaZulu-Natal (KZN). DON has also been detected in subsistence maize from the rural EC. The mycotoxin aflatoxin (AFLA), produced by *Aspergillus flavus*, has been observed in rural LP and KZN. The reasons for these differences in areas include climate, insect pests, soil quality and agricultural practices.

The maize kernel

Those of you that farm with maize will know that each maize kernel is made-up of different parts (**Figure 1**) and each of these is of commercial importance. **Table 1** provides a description and summary of kernel parts (also known as milling fractions).

Fungal and mycotoxin occurrence within a maize kernel

The *Fusarium* and *Aspergillus* fungi are soil-borne organisms and usually survive in plant debris (stubble) between seasons. These fungi can infect the plants pre-harvest in various ways: Through the roots or carried over in contaminated seed (*Fusarium*); wind and water transmission, as well as through insect and other wounds (*Fusarium and Aspergillus*). Aspergillus is also known to be a serious problem when grain is not stored properly. Fungi enter the maize kernel from the outer layers and move to the inner kernel layers, therefore mycotoxins are known to be mainly concentrated in the surface layers of the maize kernel. Furthermore, the pericarp can act as a physical barrier against the fungi entering the endosperm.

Fate of mycotoxins during food processing; dry milling as an example

The chemical structure of mycotoxins makes it impossible to remove them completely from crops and therefore they can only be partly removed by food processing and/or other specific clean-up (decontamination) methods. Food processing that may reduce mycotoxin contamination includes sorting, washing, dehulling, milling, brewing, baking, frying, roasting and alkaline cooking.

> *“The chemical structure of mycotoxins makes it impossible to remove them completely from crops and therefore they can only be partly removed by food processing and/or other specific clean-up (decontamination) methods.*

Good ‘healthy’ maize kernels.

Damaged and infected maize kernels.

Milling of maize is a physical process regarded as the first step in the production of maize-based products by removing the outer structure (pericarp) to expose the endosperm, which is then turned into various fractions such as grits; germ; meal and fine flour. The fractions mostly used for the production of human foodstuffs are the grit and flour with their respective particle sizes and grading, whereas the bran and germ milling fractions are mostly used for animal feed and oil extraction, respectively (Table 1).

In South Africa dry milling is mostly utilised to produce food products such as samp, maize rice, unsifted, sifted, coarse, SUPER and SPECIAL maize meal. The levels of mycotoxins within the different milling fractions will differ depending on numerous factors such as how the far the fungi have entered into a kernel (surface or inner layers) and the physical breaking of each kernel into its various milling fractions. Due to the complexity of the milling process during which unprocessed maize produces various fractions, the mycotoxin levels may either be redistributed or concentrated.

In the next issue we will continue to explore mycotoxins relevant to other grains such as wheat, sorghum and barley. The question of safety levels we will address in a later issue when we will talk about the impact of mycotoxins on human health.

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The importance of a cash flow statement

In some articles of our series regarding management we have referred to and discussed various aspects of a cash flow statement. In this article we will discuss the importance of a cash flow statement in more detail.

The recent drought has brought to the fore that it is absolute important as part of financial management that we pay attention to the cash flow statement. These days cash flow is probably the most important aspect of financial management of a farming business.

Financial management consists of four main activities of which the first one is financial record-keeping and compiling of the necessary financial statements. The purpose of the financial statements being to determine the financial result (profit/loss) through an income statement, to determine the financial position (ratio of assets related to liabilities) through a balance sheet and to determine the cash flow position via a cash flow statement. The information from the statements then provides one with a picture of the success of your business. Your business is only 100% successful if the results from all three statements are positive.

A danger of the process when compiling financial statements is that it is possible for someone who understands the process quite well to adjust the figures in the statements, especially in the balance sheet and to a lesser degree in the income statement, to suit a specific purpose. This can be done for tax purposes or when one is in need of a loan. However, because an actual cash-flow statement reflects the inflow and outflow of cash in the business one cannot adjust the information to suit a specific purpose. Your actual cash flow statement has to balance with your bank statement of the same date. A bank statement is an external source of financial information. This represents the first importance of an actual cash flow statement – it provides accurate financial information regarding the cash flow of a business.

> *These days cash flow is probably the most important aspect of financial management of a farming business.*

Secondly, your cash flow statement will be the first statement to signal whether something is wrong in your business or not. For a normal general mixed type of farming, as a rule of thumb, the cash flow ratio should be 120% or better. The ratio is calculated by expressing cash-income/cash-outflow as a percentage. This aspect will of course only be true if your cash flow statement is up to date and preferably on a daily basis. With the technology of today this is quite possible to achieve.

Thirdly, practically this statement indicates whether you will have enough cash available at any specific time, such as at the end of a month, to meet all your commitments. For instance, the paying of wages, electricity bill, monthly payments on accounts, and so forth. Should you not be able to meet all your commitments at any given time, it will be the first sign of a problem in your business, except if you can explain the position satisfactorily. You may have incurred a lot of production expenses (outflow) before an inflow of cash from a crop to be harvested.

Fourthly, another important aspect of a cash flow statement is to judge the debt servicing ability of your business. This is normally judged by using the information as portrayed in a projected cash flow statement. As of late this is a very important issue and when applying for credit the financier will have a thorough look at your projected cash flow statement. The financier will also calculate the projected cash flow ratio using the information from your projected cash flow statement. As already explained it is regarded that this ratio should be 120% and higher indicating that you should have enough cash available to pay all debt and all other farming expenses as required.

Apart from what is discussed as important regarding a cash flow statement the real value of this statement is experienced when proper financial management regarding this statement is applied. This will entail that before the beginning of your financial year you should compile a projected cash flow statement which should then be compared to your actual statement on at least a monthly basis.

By doing this you take control over your expenses and should there then be an overspending it must be explained and if necessary you could adapt the cash flow statement accordingly. Expenditures (cash-outflow) are normally under your control.

> *Your business is only 100% successful if the results from all three statements are positive.*

Income (cash-inflow) is normally influenced by various macro factors over which a farmer has very little influence, if indeed any. Should your income be lower than projected, you should adapt your cash flow statement to accommodate the lower income. In practical terms a lower income implies that you have less money to spend. Therefore, you will have to consider expenditures thoroughly and if need be, postpone certain expenses. A lower income could also force you to apply for additional credit to keep your business running.

To conclude, to survive under the present challenging circumstances of a farming business in South Africa, it is of the utmost importance to become financially literate.

Article submitted by Marius Greyling, Pula Imvula contributor. For more information, send an email to mariusg@mcgacc.co.za.

Invasive alien plant species (IAP)

A great deal of South Africa's water is used by plants that do not belong here. They are called invasive alien plants. These plants are invasive because they spread and displace our natural trees and plants.

Invasive alien plant species (IAP) are species whose introduction and/or spread outside their natural distribution threaten biological diversity. They are non-native to an ecosystem, and may cause economic or environmental harm. They impact negatively on biodiversity, including decline or elimination of indigenous species – through competition for water and the disruption of local ecosystems and ecosystem functions. IAPs, introduced and/or spread outside their natural habitats, have affected natural biodiversity in almost every ecosystem type on earth and are one of the greatest threats to biodiversity.

Without natural enemies, these plants reproduce and spread quickly, taking valuable water and space from our indigenous plants. Many alien plants consume more water than local plants, depleting our valuable water resources. Thick alien vegetation can also provide fuel for veldfires, making them exceptionally hot, which damages the burnt area's soil structure. IAPs cost South Africa tens of billions of rand annually in lost agricultural productivity and resources spent on removing or managing them. IAPs are a major threat to biodiversity in catchment areas, potentially disrupting the delicate natural balance in ecosystems. As we depend on biodiversity for water, food, wood, clean air, medicine and much more, it is vitally important that we protect this resource.

The regulations identify a total of 559 alien species, including 383 plant species as invasive in four different categories, and a further 560 species listed as prohibited and may not be introduced into the country. Visit *https://www.environment.co.za* for a list of AIPs and their categories.

AIP categories

- **Category 1a and 1b**: Must be removed and destroyed immediately.
- **Category 2**: May be grown if a permit is obtained and the land owner ensures that the invasive species do not spread beyond his/her property.
- **Category 3**: May not be planted.

It is interesting to note that some invasive plants are categorised differently in different provinces.

Alien vegetation management

There are a number of ways to control the growth and spread of alien invasive plants. The 'treatment' would depend on the species being controlled.

Biological

Some alien plants have natural enemies, such as insects and diseases that only affect a specific species. The controlling agents (beetles, viruses) are sourced from the country of origin and released here among an invasive species to control it.

Manual

Young or small invaders can be manually removed from the soil. The plants should be stacked and disposed of responsibly to prevent regrowth.

Mechanical

Larger plants and trees can be chopped or cut down. Trees can also be killed by removing a 30 cm - 40 cm strip of bark around their trunks (known as 'ring-barking'). This prevents food going to the leaves and kills the tree.

Chemical

Two or more methods can be used at the same time e.g. ring-barking and then spraying herbicides on the stump.

How can you help?

- Learn how to identify, control and remove invasive alien plants.
- Educate others.
- Join or form a hacking team to control alien plants in your area.
- Remove the IAPs when they are still small.
- Replace alien plants with indigenous ones.
- Plant indigenous, water-wise plants in your garden.

IAPs and the law

The task of managing alien vegetation lies mainly with landowners. In August 2014, the Minister of Environmental Affairs published the 'Alien and Invasive Species Regulations' to limit the negative effects of IAPs. The regulations call on landowners and sellers of land to assist the Department of Environmental Affairs to conserve our indigenous fauna and to foster sustainable use of our land.

Non adherence can result in a criminal offence punishable by a fine of up to five million rand (ten million if a second offense) and or a period of imprisonment of up to ten years.

Top 5 IAPs per province

- **Gauteng**: Balloon vine, Black wattle, Bloodberry, Bugweed, Castor oil plant.
- **KwaZulu-Natal**: African tulip tree, Ash leafed maple, Baloon vine, Bloodberry, Bugweed.
- **Limpopo**: Black locust, Bugweed, Butterfly orchid tree, Castor oil plant, Kudzu vine.
- **Mpumalanga**: Coral creeper, Moth catcher, Yellow flowered Mexican poppy, Butterfly orchid tree, Camphor tree.
- **Northern Cape**: Blue leaf cactus, Castor oil plant, Chinese tamarisk, Common thorn apple, Giant reed.
- **North West**: Bird of paradise flower, Boxing glove cactus, Canary bird bush, Common dodder, Four o'clock.
- **Western Cape**: Rooikrans, Black wattle, Port Jackson, Silky hakea, Long leafed wattle.

Related websites

- Working for Water *www.wfw.org.za.*
- Environment *www.environment.co.za.*
- Invasive species South Africa *www.invasives.org.za.*

> *"Many alien plants consume more water than local plants, depleting our valuable water resources.*

Article submitted by Ingrid Marti, Freelance Journalist. For more information, send an email to ingridmarti7@gmail.com.

Science supports SUNFLOWER PRODUCTION

Agriculture today has to strive increasingly to produce more food for a growing population in a challenging economic environment. It is no longer just a way of life followed by men in overalls and dungarees – 'Agriculture is a highly integrated profession, practiced by professionals who apply modern business techniques, scientific knowledge and mechanical innovations to their operations' – Earl Coke.

Sunflower production has an important role to play in South African crop production scenarios. Annual production is between 500 000 tons - 700 000 tons. It has been useful in crop rotation programmes but it is also a good crop to grow in marginal soils. Furthermore, it is well adjusted to a wide variety of soils from heavy to sandy loam soils. Another important characteristic is that it has a shorter growing season than maize so it can be planted a little later where conditions make it necessary, and it has also been found to withstand early frosts.

Crop Estimates Committee

This team conducts scientific surveys to estimate the preliminary area planted. This is useful information for you the farmer as it will guide you as to the markets which operate on a supply and demand basis. Too much sunflower planted will suggest lower market prices at harvest time. (The same applies to maize production.) The preliminary assessment of area under sunflower production for 2017 is 665 800 ha, which is slightly down by about 52 700 ha less on the previous season. (This information is freely available on *http://www.sagis.org.za*).

Dr A Nel from Potchefstroom ARC-GCI maintains that it is only high levels of efficiency in your production process that will ensure financial success. Naturally this is fundamental to sustained farming – otherwise farmers will soon be out of business and unable to feed the hungry nation! The key to this level of efficiency is to unlock as much information about available cultivars as possible, in order to make informed decisions about which cultivar is best suited to local climatic conditions as well as to the anticipated season. New farmers should talk to seed company representatives, experienced neighbours and then find out the following information about each cultivar:

Yield potential

This is the tonnage you can anticipate harvesting per hectare in a normal growing season. Find out what the long term yield potential is for sunflower crops grown in your area. This enables you to set a yield target.

The number of days to flowering

This is very important. Your actual planting dates will influence your seed selection. If for example you can't get into the field due to high rainfall and muddy conditions – or alternatively, if it has been too dry to plant – you need to consider the number of days you have available left in the growing season before the onset of the frost season, and choose the seed accordingly.

It is a recognised fact that in terms of genetics there has been slow progress in the development of new sunflower varieties and enhanced yield potential. Sunflower yield is as much a function of BEST practises as cultivar selection so these will ALWAYS work hand in hand.

Other factors which affect sunflower yields

- Soil preparation is important. You need to inform yourself of common field preparation

Pula Imvula's Quote of the Month

If everyone is moving forward together, then success takes care of itself.

~ Henry Ford

> *Agriculture is a highly integrated profession, practiced by professionals who apply modern business techniques, scientific knowledge and mechanical innovations to their operations. – Earl Coke*

practices in your area and also keep yourself informed on modern thinking around caring for the soils at your disposal. A lot of farmers are electing to go the no-tillage route both for the sake of building up healthy soils as well as for the attractively lowered costs of field preparation. No-till does not just happen – it must be approached scientifically and through a process of self-education and information gathering.

- Appropriate fertilisation is always important and plays an important role in yields realised. Your fertiliser programme must always be based on scientific soil analysis. The sunflower plant is known to utilise the nutrients in the soil exceptionally well due to its extensive root system which are able to reach nutrients which cannot be taken up by some other crops.
- Plant population is the single most important contributor to yield potential. Nursing the young seedlings through the difficult and challenging emergence stage is highly management intensive and will very likely require that you scarify the crusty earth's surface just prior to emergence, which is normally about 3 - 4 days after planting. A stand of 30 000 - 45 000 plants on a hectare is a good average guide if maximum yields of up to 2 t/ha are your aim. Once you have a good stand on the field you will look at other factors to enhance yields.
- Weed control is critical. Weeds compete aggressively for the nutrients and moisture which should benefit the sunflower plants. The plants are especially vulnerable during the first 3 - 4 weeks, as this is the slow part of their development. It is also wise to do a final cultivation just before the tractors can no longer get into the field without harming the sunflower plants.
- Insect control is important and this requires regular monitoring of your crops looking for signs of pests from as early as eggs and worm stages. If you need to use herbicides to control a pest invasion, it is always wise to work closely together with the representatives of the chemical companies who will visit the field and advice you as to application rates. Make sure that your farm workers are well educated about working with chemicals and that they have all the necessary safety gear at their disposal to ensure their well-being at all times.

Not only are sunflowers a very rewarding crop and a joy to behold, but they can make a valuable contribution to your long term farming programme because of low input costs and also because they generally perform well under the dry conditions, which are more normal for South African producers.

Acknowledgements

Sunflower cultivar recommendations for 2016/2017 – Dr AA Nel, ARC-GCI, Potchefstroom.

Article submitted by Jenny Mathews, Pula Imvula contributor. For more information, send an email to jenjonmat@gmail.com.

Yield evaluation and harvesting planning

The 2016/2017 summer production season is by now moving into the harvesting and final marketing phase for soybeans, sunflowers and other summer crops. This year has been characterised by good to very good rains prior to the planting season interspersed with an extremely hot and dry November and December.

The period just before your soybeans have reached physiological maturity is the ideal time to evaluate all the previous management decisions coupled with rainfall received contributing to an interim yield estimate that can be compared to a final yield at combining.

Estimating soybean yields

A yield estimation at this stage can provide valuable information as to the detailed planning for the commencement of combining for various lands, combine capacity required, total mass of the expected crop, land to storage delivery, storage capacity required, cleaning and drying costs to be incurred, and marketing strategy.

Table 1: Seed mass per hectare.

Seed mass (grams)	Seed/kg	Seed size description
0,18	5 556	Commercial certified seed samples
0,17	5 882	
0,16	6 250	
0,15	6 667	On farm harvested seed sample – normal year
0,14	7 143	
0,13	7 692	On farm harvested seed – dry year or late planted
0,12	8 333	
0,11	9 091	

Estimation techniques

Yield potential is essentially an estimate of four components which are the number of plants per hectare, number of pods per plant, number of seeds per pod and number of seeds per kilogram.

Methodology

Plants per hectare (pl/ha)

Use a tape measure to measure a length of 10 metres of plants in a planted row of soybeans in at least 10 average crop representative sampling areas in a particular land. Avoid headlands or cross planted areas at the edge of lands being assessed.

Count the number of pod bearing plants within each 10 metre length of row. Divide the total from 10 samples by 10 to give you the average plants per 10 metre row. Multiply this answer by 10 to give you the number of pod bearing plants per 100 metres of planting row in a planted hectare area measuring 100 metres by 100 metres square. For ,92 metre row spacing multiply the above answer for 100 metres of row by 110 planted rows per hectare to give the required answer of pod bearing plants per ha. Use a multiplying factor of 133 rows per planted hectare for ,75 metre rows.

Pods and seeds per hectare

Select 10 plants at random and count the pods. Divide by 10 to get an average number of pods per plant. Keep in mind that pods lower than 12 cm from the soil might not be picked up by the combine head. Open the pods and assess the number of fully developed seeds per pod which usually vary from 2 to 3 seeds per pod. In a dry year use 2, in an average year use 2,5 and in a good year use 3. Multiply the average number of pods by the average number seeds, times the number of plants/ha to give you the number of seeds/ha.

As can be seen in **Table 1** seed mass varies considerably and can affect the results of the yield estimation quite considerably. Choose or estimate or weigh seeds to be accurate and multiply the number of seeds/ha by the seed mass per seed. Divide by 1 000 to get kg's/Ha and again by 1 000 to get t/ha.

Reduce this answer by 10% for harvesting and shattering losses.

Example

Having assessed the lands as detailed above and given the following the calculation is shown below. Average no of plants per 10 metre tests 220; row width ,92; pods per plant 20; seeds per pod 2,5; mass of seed kernels 0,15 grams.

Calculation

- 220 plants per test x 10 (100 metres of row) x 110 (rows per ha) = **242,000 pl/ha**
- **242,000 pl/ha** x 20 (pods/pl) x 2,5 (seeds per pod) = **12,100,000 seeds/ha**
- **12,100,000** x 0,15 (grams per seed)/1 000 (kg's/ha)/1 000 (t/ha) = **1,815 t/ha**
- **1,815 t/ha** less 10% = 1,815 x ,90% = **R1,64 t/ha estimated yield.**

Harvesting tips

One of the most important factors in successful soybean production is having your own combine maintained in excellent condition with the correct settings for drum speed and header and immediately available as each land needs to be combined. If a mature crop has rain on it shattering losses can be huge. If using a contactor make sure that he will be available within days of having been given notice that the crop is ready.

Conclusion

Use a yield estimation of soybeans as a harvesting planning tool for the current crop as well as an exercise in assessing which management techniques will result in successful production in future seasons.

Article submitted by a retired farmer.

Opportunity for sufficient soybean production in SA

The world oilseed production has increased strongly since 2012, mostly due to growth in the United States, Brazil and Argentina. Part of the reason for this production uptick is the increasing global feed requirements from some of the largest consumers such as China. Over the same period, South Africa has also seen an increase in production, even though it's still below the annual requirements.

However, growth in domestic soybean production was disturbed by the 2015/2016 drought season. Between the 2014/2015 and 2015/2016 marketing season, soybean production declined by 30% from 1 070 000 to 741 550 tons. However, looking ahead, there are signs of possible recovery this season.

Applying the Crop Estimates Committee's (CEC) preliminary production estimates for the 2017/2018 marketing year, it's estimated that South Africa's soybean production could reach 946 000 tons. Alongside this is an expected rise in feed consumption, which is likely to increase by 28% from the current season.

Graph 1: SA Soybean import and export. Source: SAGIS

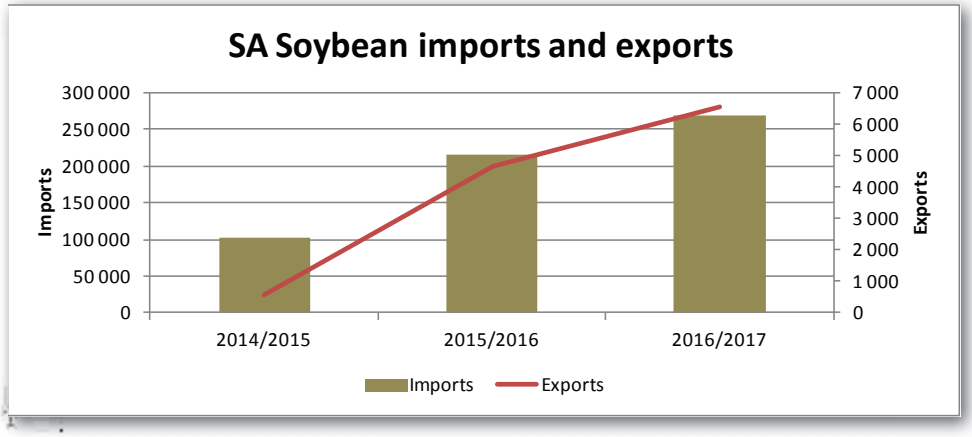

Table 1: Supply and Demand Estimates. *Source: Grain SA*

The supply and demand for soybean in South Africa				
Updated 27 Jan 2017	**Grain SA projection**	**Below average** 2017/2018**	**Average** 2017/2018**	**Above average** 2017/2018**
Marketing year	**2016/2017***	**Scenario 1**	**Scenario 2**	**Scenario 3**
Area planted (x 1 000 ha)	502,80	542,20	542,20	542,20
Yield (t/ha)	1,47	1,50	1,65	1,80
CEC crop estimate ('000 ton)	**741,55**	**813,30**	**894,63**	**975,96**
	('000 ton)	('000 ton)	('000 ton)	('000 ton)
Commercial supply				
Opening stocks (1 Mar)	89,13	146,83	146,83	146,80
Commercial deliveries	711,55	783,30	864,63	945,96
Imports	450,00	230,00	150,00	70,00
Total commercial supply	**1 250,68**	**1 160,13**	**1 161,46**	**1 162,792**
Commercial demand				
Commercial consumption				
Food	23,81	24,80	24,80	25,00
Feed (Fullfat soya)	103,12	132,00	132,00	132,00
Crushed for oil & oilcake	960,00	850,00	850,00	850,00
Total	1 086,92	1 006,80	1 006,80	1 007,00
Exports	8,00	9,00	9,00	9,00
Total commercial demand	**1 103,85**	**1 026,80**	**1 026,80**	**1 027,00**
Carry-out (28 February)	**146,83**	**133,33**	**134,66**	**136,00**
Pipeline requirements	135,87	125,85	125,85	126,00
Surplus above pipeline	10,97	7,48	8,81	10,00

The soybean for human consumption is also expected to increase from 23 800 tons of the previous season to 25 000 tons. Worth noting is that an increase in domestic demand for soybeans leaves room for an increase in imports of oil and oilcake, which means that domestic production, is not yet sufficient to meet the growing local demand.

Table 1 illustrates the Grain SA Supply and Demand scenarios. Worth noting is that despite the possibility of an above average crop in the upcoming season, South Africa could remain a net importer of soybean – with an estimated 70 000 tons import requirement.

This points out to the opportunity that lies in the production of soybeans in a world where feed and human consumption is rising.

From **Graph 1** of the South African soybean import and export activity over the past three years, it is evident that although there has been a rise in imports, this was also followed by a rise in exports. It would therefore be advisable for farmers to consider soybeans during crop planning in order to meet the rising local demand and subsequently reduce the import requirements over time, while ensuring that the country has enough produce for the export market. With that said, profitability will be the main guide in decision making during the planting seasons.

Article submitted by Michelle Mokone, Agricultural Economist: Grain SA. For more information, send an email to Michelle@grainsa.co.za.

All components of a farming system must work together to guarantee success

Climate undoubtedly has a major impact on all producers. Not only does it have a financial implication, but production methods are also often reconsidered in drought as well as waterlogged years.

Some producers will consider changing something. The question what to change would include: What should producers produce, how should this be produced and what should be changed in the current system?

Should a direct-planting farming system be introduced? Or should I follow a rip-on-row farming system? Can I afford not to lime this year? Articles in the media often use the term 'farming system', as well as terms like conventional farming system or conservation tillage farming systems.

One can rightly ask: what are these farming systems and do I also produce in a farming system?

Objectives and requirements

The objectives, needs and requirements of the producer definitely play the most important role in any farming system. Make sure that you know where you are headed and know your interests, as well as your strengths and weaknesses. You can have the very best resources and be the best manager, but if the type of farming system does not suit you, it will not work in the long term.

Various definitions of a farming system exist, but basically a farming system amounts to the strategy that is followed to employ your resources to achieve profitability and objectives in the long term by applying agricultural production in such a way that it can be sustained in the long term, conserves resources and protects the diverse composition of resources.

Within the farming system there can be a combination of different components and enterprises, where the one component or enterprise perhaps become the input of another enterprise, and where the crops or management in one year possibly affects the production of enterprises in the next year.

Many articles refer only to the soil cultivation done. The soil cultivation is part of the production process followed to produce a crop, but is not the only factor that ensures production. Given the system, all aspects should be employed correctly to ensure optimum production.

However, farming systems do not concern only production, but also marketing and compensation for the work done and capital used. Profitability is a critical aspect of ensuring the sustainability of any farming system. If the system does not have the ability to produce profitably, the farming system is definitely doomed.

Likewise, your attitude plays a role. It is possible to save yourself from bankruptcy, but extravagance will in the long run also end in bankruptcy. Check your spending and measure the yield on the investment.

In order to produce products sustainably in the long run, you as producer and manager are responsible for deciding on the employment of information, which includes:

- Agricultural climatic conditions like the amount, distribution and reliability of rainfall, soil type, topography and temperature.
- Resources, which can include fields, veld, irrigation water, tractors and equipment.
- Cultivation practices that determine the production method and the crop to be produced.
- Economic environment like supply and demand, the prices of products and inputs to be produced.
- Funds, marketing and management skills.
- The long-terms objectives and production attitude of you as the producer.

Composition of resources

It is a fact that the composition of resources for the various farming undertakings differs. Rainfall between different farms in the same district differs, as do the number of tractors and the equipment available. The composition of soil types and soil depth differ, as do previous management practices. This causes the production ability of the farms to vary.

The financial position of producers also differs dramatically. Some producers (and they are the minority) are cash farmers, while the others have to use production credit. Immediately the possible opportunities are limited. These inputs can and must determine and guide the cultivation practices that are followed.

Each producer has his own objectives, limitations and opportunities, and these limitations must be taken into account when decisions about farming systems are made. The farming system must also adapt to the objectives of the farming activities.

If you as producer know where you are headed, you can make plans to get there.

With these differences in resources it is important to realise that no farming system can be applied across the board. There are certain principles to be applied, and these principles will definitely benefit the production.

Each producer will have to develop and implement his own production system to optimise his restrictive resource and to include his future plans. It is important to know what the pillars of the system are and how all the different components are linked together to maximise the profit of the farm.

Implementing the new system

If new, improved farming methods for the current system are developed, the components of the new, improved system first have to be implemented and tested in the current system before major changes can be introduced. It is a good thing if this existing system can be improved, otherwise it makes no sense to merely chase after new buzz words and other novelties.

New changes to the production systems will definitely also have an effect on the existing components of the system. For example, if you decide to stop the grazing of crop residue, it will have a definite effect on the stock component. First determine what the impact will be and then manage the impact sensibly.

First calculate the difference in profitability between the two systems in the long term, and if this is positive, decide whether the changes should be implemented. Be careful of looking only at profitability – sustainability is just as important as profitability.

Sometimes a change in the farming system could change the composition of the components. If these changes are implemented, the profitability of the business should also benefit over the long term.

Long-term profitability

Research into the farming system is aimed at investigating and improving the future and retrospective links in the system. Long-term profitability remains the criterion against which everything should be measured. Sometimes this can mean that sacrifices have to be made in the short term to ensure long-term profitability.

It makes no sense to sacrifice crop rotation merely because the profitability ratios between the crops are diverging in the short term.

Rotation crops and stock components

Good, sustainable production systems usually include the use of rotation crops. There can be many reasons for this, but let us assume that it is done to maintain the production ability of the soil. Sometimes the use of different rotation crops and cover crops can dramatically increase the profitability of the system, but the matter should be considered carefully before it is implemented.

Work done at the Nooitgedacht Agricultural Development Centre in Ermelo in the 1980s and 1990s revealed that a combination of agricultural crops, different perennial and annual pastures and the introduction of cattle and sheep dramatically increased the profitability of the farming activities.

The stock components were managed to optimise production and allow it to overlap with the production of grazing. In times with abundant, high-quality feed, there must be stock to turn the high-quality feed into money. If feed is scarce or of a low quality, the animals should be in a maintenance phase where production is not essential. These trials emphasised the importance of timing.

The results of production practices applied in the north-west Free State and other districts revealed a long time ago that the introduction of perennial pasture grasses can dramatically increase the profitability of the agricultural crops and at the same time reduce the risk. The grain yields in these systems were significantly higher than others in the area. The introduction of perennial grazing in the production system will have to be tested economically first, as the resources between producers differ so dramatically. It cannot be merely assumed that the system will increase profitability.

Management is important

Management is the most important component of any system and can make or break it. If the producer does not have the ability to manage the system correctly, tears and distress will be the result. Marketing and price management are also an integrated part of any farming system.

There is no sense in producing, but the products cannot be sold or the price is so low that it is not profitable. Supply and demand of products play a major role in the farming production system.

A long-term surplus in the products produced has no use if the price and profits remains under pressure. The profitability of this farming system will remain under pressure for ever.

Knowledge is also essential to make any farming system work. It does not help if the producer knows what to produce, but does not know how to produce it. Make sure that you understand the production of the enterprise or acquire knowledge on cultivating this enterprise. Ask yourself: When did I research or attempt anything new with respect to my production practice?

Remember that a farming system has to be assessed in the long term. If decisions are made with respect to the system changes, it will affect all components in the system. Adjust the objectives of the business and planning around the farming system. Also make sure that the financial planning is built around the farming system.

Share knowledge with others and implement the changes, but remain honest with yourself. If something does not work, change it and build on the positive aspects.

Summary

Farming systems are set up with a view to achieving long-term objectives. No farming system should be exactly the same as another producer's, but the important principles will be applied to all.

Make sure that the farming system will increase the profitability of the business in the long term. Ensure that the farming system maintains or – even better – improves the resources we are borrowing from our children.

Be aware that there must always be a combination of stock, crops and cultivated pastures. Remember that you will always produce inside a system, and that you must produce within the production cycle of this system.

If there are any questions, contact the author at 082 759 2991.

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(Grain SA/Sasol photo competition)

Integrated crop and pasture-based livestock production systems

This article highlightes a specific crop species that can play an imperative role in conservation agriculture (CA)-based crop-pasture rotations.

Besides improving the physical, chemical, hydrological and biological properties of the soil, such species, including annual or perennial cover crops, can successfully be used as animal feed.

Livestock production systems are in many ways dependent on the utilisation of forage species, in this case as an annual cover crop, and can therefore become an integral component of CA-based crop pasture rotations. It is imperative to identify a plant species fulfilling the requirements of a dual purpose crop, i.e. for livestock fodder and/or soil restoration.

This article focuses on an annual summer grass cover crop with the potential to be used to improve soil conditions and to provide high quality fodder for ruminants and horses.

Eragrostis teff, teff or *tef*

Teff originates in Ethiopia and is an annual scantly tufted grass that can grow to 1 m tall. Teff is a very leafy plant and has a high yield of grain when in seed. This is a C4 plant and uses light efficiently in low moisture conditions.

It is also a shallow-rooted grass and has the ability to establish quickly in many different soil types. There are many different types of teff with three main types of seed colour. The white teff is slow maturing, grows in cooler conditions and is superior for grain production. Red and brown teff are faster maturing grasses and are superior for fodder. Because of its good nutritional qualities, teff is most commonly produced as a hay crop in South Africa.

Agro-ecological distribution

Teff requires an average rainfall of as low as 350 mm per annum, and the grain teff can grow with rainfall as high as 2 500 mm per annum. This species resists moderate droughts, hot weather, poor soil and low fertility.

Most cultivars require at least three good rain showers during the early growth and a total of 200 mm to 300 mm of water. Most teff in South Africa is grown in areas that receive between 400 mm to 900 mm rainfall. White teff has the ability to tolerate some frost; however, it will not survive prolonged periods of extremely cold temperatures. On the other hand, teff can also tolerate high temperatures of 35°C and higher.

With regards to soil types, teff is adapted to a variety of soil types and can be grown on sand to turf soils. It should be noted that even though teff grows on clayey soils, such as black turf soil, it does not tolerate waterlogged conditions. It is therefore essential that the soils in higher rainfall areas should be well-drained for optimal teff production. From a soil chemical perspective, soils with a pH lower than 5 will not significantly affect the growth of teff, thus making this species acid soil tolerant.

Management and utilisation

Since teff is a crop mainly grown for hay production, it is extremely important to ensure a firm, fine seedbed for the very small seeds sown. Consequently, a level and uniform seedbed is required which will facilitate an easier hay harvesting process. When planting teff, it is essential to consolidate (roll) the seedbed before and after seeding. It is also important to make sure that the soil fertility levels are up to standard, especially the phosphorus (P) and potassium (K) levels being at least 15 mg/kg soil and 100 mg/kg soil, respectively.

Once the teff has germinated, the pasture can be fertilised twice during the growing season with two applications of 50 kg N/ha. If too much nitrogen is applied, this can result in the lodging of the species which results in difficult harvesting and significant loss of dry matter (DM) yield.

When planning on seeding teff, it is important to take note of whether it is being planted with other perennial sub-tropical grasses, such as *Eragrostis curvula* (weeping love grass/*oulandsgras*) – which is a common practice, or on its own, as this determines the seeding rate.

Teff is usually planted in early summer and can then provide at least two harvests. However, when planted mid-summer one harvest is usually obtained. The sowing rate for sandier soils is 7 kg/ha to 10 kg/ha and for clayey soils 10 kg/ha to 15 kg/ha and should be planted between mid-October and mid-January.

Teff is often used as a 'nurse crop' for many perennial pasture crops, and is quite commonly used in a mixture with Rhodes grass and Smuts finger grass.

When teff is seeded with these other species, the ratio of teff to other species is impor-

Eragrostis teff at early flowering stage.

tant, as the teff can smother the other species if not managed correctly. It is therefore important to lower the seeding rates of teff to 5 kg/ha to 8 kg/ha depending on soil type (sandier versus clayey) and rainfall (low to high).

Soil conservation and health benefits

Teff is becoming more and more attractive as a temporary nonweedy ground cover in many parts of the world. Its function as a temporary ground cover due to its quick establishment and competiveness with other weeds has made this species an extremely important crop in the rehabilitation of degraded and disturbed soils.

As previously mentioned, teff is quick to establish and this becomes an extremely important characteristic of a pasture ley or cover crop which addresses the threat of erodible soils. Since teff has a shallow root system it therefore has the ability to stabilise the soil surface and not deplete the soil moisture and nutrient levels at deeper levels. As teff is currently being used as a 'nurse crop' it has the function of creating a micro-climate at the soil surface, thereby lowering the soil temperature which facilitates the germination of the more perennial species, but also preventing significant moisture loss through lowered evaporation at the soil surface.

Management challenges

The small size of teff seed poses problems during sowing and indirectly during weeding and threshing. At sowing the very small seed size makes it difficult to control population density and its distribution. The uneven plant stand after germination has an impact on nutrient use efficiency of the crop and crop yield.

Teff is not recommended for grazing purposes, since much plant material is lost due to trampling by grazing animals. It is also not suitable for silage and even less for foggage as reasoned in the latter statement.

Teff is therefore an extremely important hay crop and can provide high quality fodder. Harvesting of the crop is difficult because of lodging. Since teff lodges heavily it is not advisable to use higher rates of fertiliser to increase yield.

Teff rust (*Uromyces eragrustidis Tracy*) and head smudge (*Helminthosporium miyakei Nisikado*) have been reported as the most important diseases on teff (Stewart and Dagnachew, 1967 and Tareke, 1981).

Damping-off caused by *Drechslera poae (Baudis) Shoemaker* has been found to be severe and even damaging when higher rather than lower seed rates and early rather than late sowing dates were practised (Ketema 1997). Other insect pests have also been reported and include Welo bush-cricket (*Decticoides brevipennis Ragge*), central shootfly (*Hylemya arambourgi*) and the red teff worm (*Mentaxya ignicollis Walker*) (Ketema, 1997).

Teff in full bloom.

Animal production aspects

Teff is known as a very good quality hay crop. It is ready for hay making within 65 days to 75 days. For the best results it should be cut during the early to mid-flowering stage. It can produce between 2 tons DM/ha to 8 tons DM/ha, depending on all the climatic and management factors. Some producers have been successful in irrigating teff pastures and can produce up to 12 tons of DM per hectare. This grass is often used in the equine industry due to its high quality. With regards to the forage quality of teff, it is reported that it can have crude protein levels as high as 11% and as low as 6%. Teff has a crude fibre content of between 27% to 35% and a digestibility of 55% to 60%.

Conclusion

Considering the role of pasture ley and cover cropping systems in conservation agriculture, as an annual short-season crop and a plant that grows best during the hot summer months, teff can be used as an 'emergency' forage crop in the event of delayed planting, poor stands, or winter kill of another crop.

As a short season ley crop, teff can provide a good weed competitive ground cover to protect the soil from soil erosion especially in a dry season, which teff is tolerable of. With its shallow root system and low fertility demands, it is more preferable to have teff grow in a rested land than undesirable weed species that contributes future weed seed to the seed bank.

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FORAGE CEREALS for winter

Winter forage crops can fill the gaps in a fodder flow or compensate for other specific challenges or deficits. Japanese radish and all the small grain forage cereals (stooling rye, triticale and oats) fall into this category.

Forage cereal crops

PANNAR has oats, triticale and stooling rye cultivars that produce good quality forage in the critical late autumn, winter and spring months. Each of these types has its own application in a fodder flow programme. It is therefore essential to consider the characteristics of each type to use their strengths to the best advantage. The right cultivar choice ensures that sufficient grazing is produced at the right time.

Of the three types of crops (oats, triticale and stooling rye) oats is the most palatable for livestock. However, oats is also the most sensitive to cold and if winter temperatures regularly drop below -5ºC, triticale or stooling rye should be more successful. Stooling rye is the most cold tolerant of the crops and withstands temperatures below -15ºC quite well.

As with wheat cultivars, forage cereal cultivars are grouped by their growth habit onto spring, intermediate and winter cultivars. Each of these types has their own application as a forage crop in a fodder flow programme. It is therefore important to consider the characteristics of each type.

Root crops

Japanese Radish (Raphanus sativus)

Japanese radish is probably the most underrated forage crop in South Africa among those who have never planted it before. No other crop uses water and fertiliser as efficiently as Japanese Radish.

It is particularly useful where pasture under irrigation is insufficient or absent. This succulent feed source is well adapted to the cooler easterly parts and is used in autumn and winter until early spring. It is not cold or frost sensitive and requires approximately 350 mm rainfall over the four month growing period. Good grazing for cattle and sheep. Dry material is highly digestible. For cattle it is best pulled or ploughed out and fed whole. Avoid chopping into pieces as cattle may choke. A good alternative source of roughage.

Table 1: Planting time – February to April is the normal planting time.

Cultivar	Characteristics and use	Seeding rate kg/ha		
		Rows	Broadcast	Irrigation
Oats: LE TUCANA	Excellent autumn and winter pasture.	40 - 50	50 - 70	100
MAJORIS	A quick to establish, medium season white oats cultivar with excellent yield.	40 - 50	50 - 70	100
Triticale: PAN 248	A relatively quick triticale type. Suitable for providing grazing in the late autumn and winter months.	35 - 45	50 - 70	120
PAN 299	A true winter type triticale with a very good stooling ability. This cultivar is particularly suitable for use in the late winter and spring months. PAN 299 develops slowly initially and is ready for grazing after 12 to 13 weeks.	25 - 35	40 - 60	100
Stooling Rye: SOROM	Quick spring type stooling rye also suitable for late plantings in June, July and even the beginning of August when forage is needed urgently.	30 - 40	40 - 60	75

Table 2: Planting time – on the eastern Highveld early to mid-December, although January to end of February is the usual planting time.

Cultivar	Characteristics and use	Seeding rate kg/ha
		Rainfall >600 mm
ENDURANCE	A unique late flowering, soft leaved fodder radish. It usually produces good quality root and leaf material right through to the end of August. In some areas production can extend into September.	Dryland: 2 Irrigation: 3,5

1

2

3

Photo 1: It is essential to consider the characteristics of winter forage cereals and to use their strengths to the best advantage.

Photo 2: Petrus van Rooyen in a healthy planting of Majoris which is used for silage.

Photo 3: Japanese Radish is a good feed source for sheep.

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Disturbed weather patterns and devastating dust storms:

The solution lies right beneath our feet

South Africa has probably never before experienced the levels of extreme weather patterns and dust storms of the current season. Temperatures reached record levels amidst a severe drought in almost the entire summer sowing area. At the same time dust storms ravaged the area on an almost weekly basis. This edition looks at conservation agriculture.

Conservation agriculture – the ally of the producer, soil and climate

Rectifying soil health, soil deterioration, global warming, productivity and sustainability are all inextricably linked to each other, and the solution is simply to balance carbon levels in the atmosphere and the soil.

The only way to do this in practice is through conservation agriculture (CA). On every hectare where soil organic matter is increased by just 0,1%, 8,9 tons of CO_2 is sequestrated. This is potentially incredibly valuable, but in practice this is not only possible, but is already exceeded by various excellent CA producers.

Conservation agriculture involves the application of the following practices, explained on the basis of examples from this practice.

Minimum mechanical soil disturbance

As was mentioned above, soil disturbance should be avoided as far as possible to stop the downward spiral of soil degradation. The idea is to plant directly in undisturbed but well-covered soil without mechanical soil preparation, with so-called minimum- or no-till practices.

Special no-till planters are required for this (see **Photo 1**). This also holds other benefits like considerable reductions in energy usage and the emission of greenhouse gases.

Permanent organic ground cover

Soil cover protects the soil against any form of erosion. As soil cover reduces from 100% to 1%, the erosion rate increases by about 200% (Pimentel, 2006).

Soil cover of at least 30% is therefore required. **Photo 2** depicts how a good cover of crop residue drastically reduces wind erosion in the western grain regions, while tons of soil are lost from exposed fields in **Photo 3**.

1

No-till planters planting directly in crop residue, North West. *Photo: Hannes Otto*

2

A good cover of crop residue in conservation agriculture on sandy soils in the north-west Free State. *Photo: Hendrik Smith*

Disturbed weather patterns and devastating dust storms: The solution lies right beneath our feet

Winter cover crop mixture

A winter cover crop mixture that is preferably planted before the middle of March (see Photo 5):

- Black oats (30 kg/ha)
- Grazing vetch (15 kg/ha)
- Radish (3 kg/ha)

3

Poor ground cover or stripped fallow land makes soil extremely vulnerable to wind erosion. *Photo:* Volksblad

According to Jones (2007), the practice of bare fallow land is a self-destructive exercise that should be avoided at all costs. During dry periods wind erosion causes enormous damage, and this is followed by water erosion during thunder storms – which will become increasingly severe. Ground cover can be provided by crop residue and/or cover crops.

Crop diversity and using cover crops

Plants are naturally the main link between the energy of the sun and soil. The more and the longer plants grow in the soil (or have living roots in the soil), the quicker carbon accumulates in the soil (through the bridge of liquid carbon).

At least three crops should be rotated/associated and the use of multi-species cover crop systems to accelerate this soil biological process is increasing rapidly (see **Photo 4** and **Photo 5**).

Cover crops naturally also provide an ideal solution to producers who were unable to plant cash crops in time due to the drought. A suitable cover crop or mixture can be planted any time from January to March to protect and improve the soil, but also to provide stock with quality feed.

The producer as primary innovator

The success of CA depends directly on the quality of its application. This immediately implicates the producer as the primary innovator in the system, because CA 'happens' or is adapted in every producer's unique situation.

It is therefore a social construct that is determined in particular by social (i.e. the values, objectives and beliefs of people), but also by economic and biophysical factors.

The innovative ability and the intention/motivation of a producer (the jockey) play a major role in the success of CA. The CA innovation

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A summer cover crop mixture with lablab, sun hemp and feed sorghum, Ottosdal. *Photo: Hendrik Smith*

process is on the farm and life-long, and is strengthened by the support of a group of producers, like a study group.

The more these producer groups, structures or innovation platforms are used and supported by other role players like researchers and agribusinesses, the quicker and better (quality) are the process and the system.

On-farm trials are one of the main instruments in this learning or innovation process (see **Photo 6** and **Photo 7** at the Ottosdal no-till club trials, one of the Grain SA/The Maize Trust projects promoting CA in the western grain areas).

Conclusion

The message should be clear: The way in which we farm will either release more carbon into the air and contribute further to global warming, dust storms and soil deterioration, or it will return carbon to the soil, under our feet where it belongs, thus becoming part of the long-term solution.

The reconstruction of soil through conservation agriculture is a practically viable key to the sustainability of grain cultivation in South Africa and the world, and is the responsibility of our generation.

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Photo 5: A winter cover crop with grazing vetch, black oats and radishes, Ottosdal. *Photo: Hendrik Smith*

Photo 6: A summer crop planted directly in a dead winter crop, north-west Free State. *Photo: Hendrik Smith*

Photo 7: Soil profile investigation at conservation tillage trials, Ottosdal. *Photo: Hendrik Smith*

Article submitted by Hendrik Smith, Conservation Agriculture Facilitator: Grain SA for SA Graan/Grain SA April 2016. For more information, send an email to hendrik.smith@grainsa.co.za.

Grain SA interviews...
Simo Themba Zwane

Simo Zwane is an active member of the Louwsburg Study Group in KwaZulu-Natal. He is 35 years old and uses what he has to the best of his ability.

Where and on how many hectares are you farming? What do you farm with?

I farm at Louwsburg in Mzamo Location (Abaqulusi Municipality, KwaZulu-Natal Province). I started planting maize on 0,2 hectares and am currently farming on communal land planting maize and dry beans on 1,5 hectares of dryland. As I have no access to equipment I use my hands.

What motivates/inspires you?

The fact that there are no jobs opportunities motivates me to become a more successful farmer. I see farming as the only way that I will make a living and a means to alleviate hunger and put food on the table. I want to get ahead in life and make something of myself as nobody else will do it for me. I have learned that farming is my life, it gives my family food and income.

Describe your strengths and weaknesses

Strengths: I'm still young, energetic and I believe I can do whatever is required on the field with my hands. I thrive to improve and have the ability to do what I've been taught and learned.

Weakness: Financially I'm not that good and I do not own any implements, I do everything with my own hands.

What was your crop yield when you started farming? What are your respective yields now?

When I started, I was just more than satisfied if I managed to harvest 1 t/ha - 2 t/ha on average in a good season. Then Grain SA came along with new technology and better ways of producing maize. I am now in the 3,5 t/ha - 4 t/ha region under dryland and that was despite the severe drought we experienced last season.

What do you think was the main contributor to your progress and success?

Joining Grain SA study group, attending study group meetings, attending farmer's days, doing training courses – that's what played a vital role to my progress. I also have passion for farming and willingness to continuously learn new things.

What training have you received to date and what training would you still like to do?

I attended the Introduction to Maize Production and Basic Engine Repair courses. I would still like to learn more about Dry Bean Production, Tractor Maintenance and Workshop Skills and any other trainings courses that equip me with required skills in farming. I am willing to learn as it will equip me to do better at farming.

Where do you see yourself in five years' time? What would you like to achieve?

In five years' time I would like to expand to 10 ha - 20 ha on communal land. I would like to be a successful farmer and farm with other crops not only maize, be a supplier to the local market and I would like to grow from strength to strength in farming. I would love to produce more maize per hectare but need more training and knowledge.

What advice do you have for young aspiring farmers?

They must see farming as a business and not run away from farming because nowadays there are no job opportunities and they must utilise the land that they have, no matter how small it is. One must have a passion for farming and believe in oneself and continue working hard.

Article submitted by Jurie Mentz, Development Co-ordinator of the Grain SA Farmer Development Programme, Vryheid. For more information, send an email to jurie@grainsa.co.za.

The Corner Post

GAWIE ALBERTS
Working together everyone can achieve more

In this new series, *The Corner Post* will feature the mentors who form part of the Grain SA mentorship programme. A mentor is that person who gives you advice on how to achieve your own goals and dreams.

Although Gawie Alberts, is not a full-time farmer his love for farming and his knowledge of agricultural practices, combined with his training and linguistic skills (Swati, Ndebele and Sepedi) makes him an excellent addition to the team of mentors who form part of Grain SA's mentorship programme. He joined the programme during the 2015/2016 season and is looking forward to a long journey of helping subsistence farmers to realise their dreams.

According to Gawie anyone can become a mentor if they have the desire to make a difference in South Africa. 'I believe a day is wasted if you haven't made a difference in someone's life,' he says. In the current season, he is hoping to make a difference in the lives of 96 subsistence farmers who together cultivate 107 ha of land. He is conveying the importance of correct agricultural practices to these farmers who have been divided into seven groups: A group in Hazyview, one in Barberton, four in the Badplaas area and the latest addition, the Draaikraal group in the Lydenburg area. These groups consist of farmers of all ages and even includes a farmer of over 80.

Teamwork divides the task and multiplies the success

The dictionary explains teamwork as a combined effort of a group of persons working together as a team for a common cause. Gawie learned an important practical farming principal from the new group. In most of the areas which fall under his mentorship, farmers are living in remote areas which makes the feasibility of the study group concept difficult. 'A lot of valuable training time is wasted on travelling to and from the plots of land to work with farmers on a one-on-one basis,' he mentions.

The Draaikraal group has the advantage that they have applied the principle of teamwork – individual farmers working together as a group on a communal piece of land. 'Everyone isn't trying to survive by just cultivating their own tiny piece of ground, but together these eight people tend to a 8 ha block with great results,' he shares. 'The outbreak of the African armyworm didn't destroy this group's crop as together they tackled the problem, spraying and defeating the outbreak as a team.' To Gawie this group shows that small farmers working together as a team, cultivating a bigger piece of land as a unity is the way to go forward to develop subsistence farmers into commercial farmers. This way costs can be shared and better yields can be achieved.

One of the advantages of farming together as a group is that it will make study groups more accessible in the remote areas. Farmers who have not become part of the project can also see the results on the bigger piece of land first-hand. 'I believe that training should be done in the field. I have found that with the group sessions in a building, interest is easily lost. In the field farmers can see the different growth phases and other agricultural practices and this keeps their attention.'

Gawie says that the economy of scale also does not justify small isolated farming operations. 'Working together can definitely lower costs and is to the advantage of everyone involved. Farming operations like planting can be done faster and problems can be attended to as a whole, rectified quicker and leads to less damage. Better results are also achieved,' he explains.

The three things that this mentor sees as pillars on which this viable solution should be built, are trust, respect and support. 'Farmers must trust each other and realise what the advantages are of working together for this to work. Having respect for each other's strong points and supporting each other will help them to see that if you cultivate 10 ha as a team, you will manage a cycle quicker and achieve a higher profit than when you work on your own 1 ha, doing all the work yourself,' he explains.

Chinenye Ogwumike, a Nigerian-American professional basketball player said, 'True dreams are made when you put aside individual wants for the collective good'. This is the way Gawie sees it. Forget about your ego, work together and change from a small farmer into a commercial one.

The impact of mentorship on the mentor

Mentorship has changed Gawie's perspective about agriculture. 'One becomes aware of how hard people are prepared to work with very little resources available to them and how keen they are to improve their circumstances,' he says. He thoroughly enjoys showing the small farmers the advantages of better agricultural practices.

One of the challenges South Africa faces is getting people to work together. Amongst the many highlights in his short time as mentor are a young couple, a man and wife working together and achieving great success as their focus is on nothing but their produce – maize, tomatoes and sweet potatoes. 'This young man doesn't just blindly follow the advice I give, but thinks about what works for his circumstances.' When they were advised to rip the field, he saw that he could plant in the rip lines. 'This is why I enjoy being a mentor – it is exciting seeing a farmer's initiative and his crop was some of the best maize I have seen from my groups', he shares excitedly.

This month's edition of The Corner Post was written by Louise Kunz, Pula Imvula contributor. For more information, send an email to louise@infoworks.biz.

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