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JANUARY
2014

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Oil & Protein Seeds special feature

The importance of bees

Summer grains and oilseeds overview

PANNAR

PULA IMVULA

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NKGONO JANE SAYS...

IN THIS ISSUE...

COVER ARTICLES

INSIDE

We start a new year filled with hope and expectations – my best wishes for you all for a happy and successful year.

I trust that you were all able to spend time with your friends and families over the holiday season. I also hope that you all remembered to continue to take care of the summer crops during this time. We must never tire of looking for possible pests and diseases so as to be able to take control of any situation. Caring for the crop is as important as planting it.

For the wheat and barley farmers, you are starting a new cycle already – it is so very important to set good foundations for the coming season. Please make sure that you are preparing your lands well, and making the necessary plans for the production inputs and mechanisation that you require for this next planting season. In the summer rainfall areas, remember how very important it is to conserve moisture in the soil – your next crop will depend on this water for most of the year.

Maize farmers – please keep looking out for the stalk borer. He is your silent little enemy who is working hard to destroy your crop. Taking time to walk through the lands will be time well spent.

Many people will have planted late sunflowers due to the late rains in the North West and Free State – the weeds always pose a problem when the plants are small. Keep watching the lands and take the necessary steps to control the weeds.

As Grain SA we are hoping to have a few other financing options for farmers in place for this coming season. We are hoping to get support from the Department of Rural Development and Land Reform for mechanisation – we believe that this should be in the form of a grant. If you could get the mechanisation from the DRDLR, we will try to arrange so that you are able to get interest free (or low interest rates) loans for the production inputs. In this way, you will be in a position to farm, but you will not be a huge burden to the state every year. We cannot expect the government to provide production inputs each year – as farmers, we must learn to borrow money and pay it back. In this way, we will be able to help more and more farmers each year until we have all the available land in production.

Good luck for 2014 !

Front page photograph: SA Grain/Sasol Nitro photo competition.

Overview of the summer grains and oilseeds

(31 October 2013)

Over the past month, there have been a lot of price movements on the international markets and domestic markets; with an increasing food need observed in Africa. This article will briefly focus on the international grain and oilseeds markets as well as the domestic markets situation.

International markets

On the International markets, there is an expected recovery in grain production mainly due to favourable weather conditions in key producing countries, particularly in the US and the CIS (Commonwealth of Independent States) countries. Furthermore, the International Grain Council (IGC) (2013) noted an expected increase of 8% in production as compared to the previous year's low levels.

Maize

The 2013/14 maize production forecast has been revised to 948 million tons, 10% higher than last year's figures (**Figure 1**) (IGC, 2013). Harvests are underway in the US with better than expected yields. Ukraine is also expected to have a large maize crop, with projections at 28 million tons. This has led to some pressure on maize prices, to -29% lower for July 2014 delivery compared to a year earlier (**Table 1**). Recent dry conditions in South America have led to planting delays, which has led to declines in the expected maize production forecasts (IGC, 2013).

Soybeans

For 2013/2014, the soybean production forecast is also expected to rise by 4% as compared to the previous year, with the production estimate now at 282 million tons, due to better than expected yields from the US as well as South America. Brazil's 2013/2014 soybean production is forecasted at around 88 million tons as compared to 81,6 million tons the previous year (IGC, 2013). The prices for May 2014 delivery, is -7% lower than a year ago (Table 1).

Wheat

The 2013/2014 wheat production forecast has been cut in the CIS countries, particularly in Russia and Ukraine, due to unfavourable weather conditions which caused harvest delays as well as winter plantings delays. However world wheat production forecast is expected to be 9% higher compared to the previous year (IGC, 2013). This is due to increases in wheat

Figure 1: Total grains: World supply and demand. Source: (IGC, 2013).

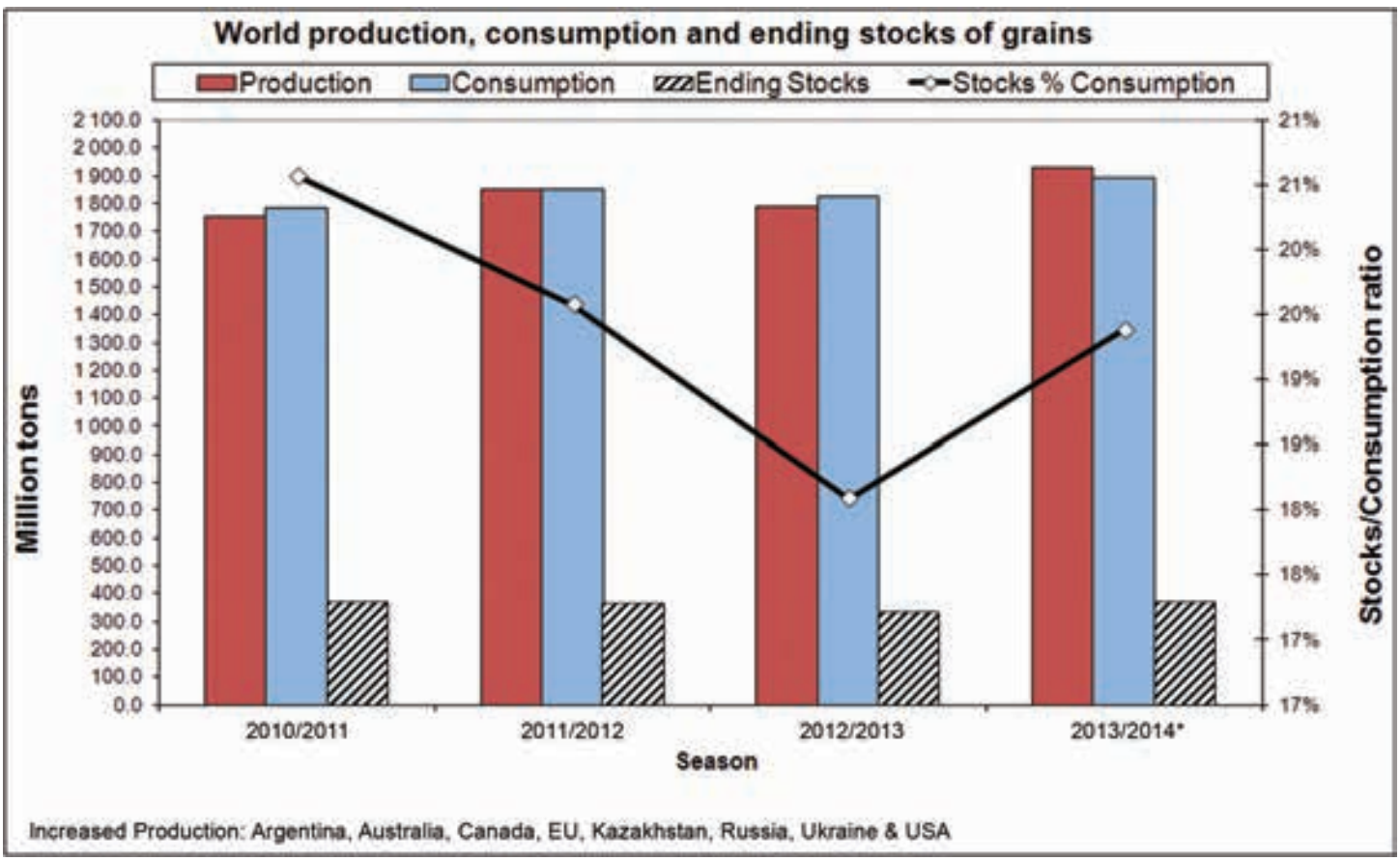
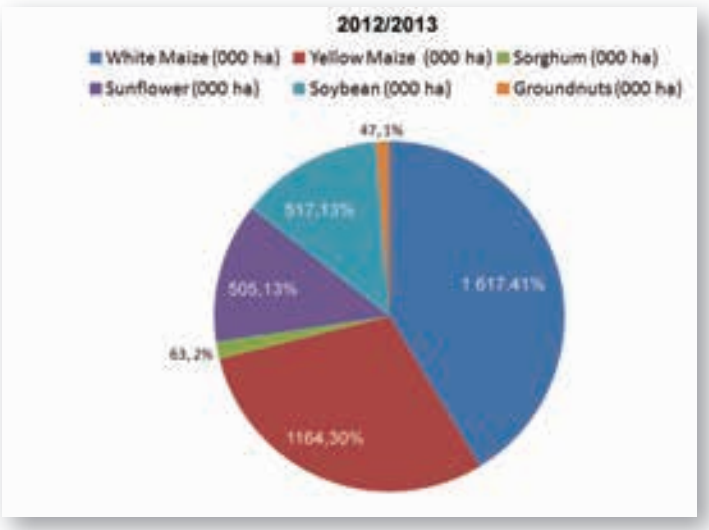
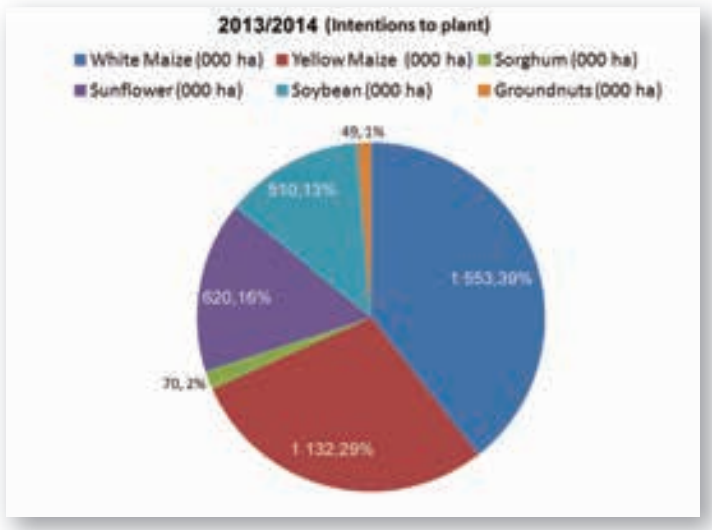


Table 1: Price comparison (year on year).

Price comparison (year on year)				
	Unit	**Nov 2013**	**Change (%)**	**Nov 2012**
CBOT maize July 2014	c/bu	454,25	-29%	646,25
JSE yellow maize July 2014	R/ton	2 009,00	-13%	2 322,00
JSE white maize July 2014	R/ton	2 063,00	-11%	2 333,00
CBOT soybean May 2014	c/bu	1 244,00	-7%	1 342,50
JSE soybean May 2014	R/ton	5 051,00	+2%	4 946,00
CBOT wheat Dec 2013	c/bu	667,25	-25%	890,50
JSE wheat Dec 2013	R/ton	3 497,00	-6%	3 720,00
JSE sunflower spot price	R/ton	5 410,00	-11%	6 085,00
Exchange rate	R/$	10,18	-16%	8,74
Crude oil	$/barrel	106,26	-1%	107,65

Figure 4: RSA hectares planted on summer grains and oilseeds. Source: (Grain SA, 2013).





production from Argentina as well as good yields expected from Australia. As a result, wheat prices for delivery in December are still -25% less than a year before (Table 1).

Sunflower

In 2013/2014 sunflower production is expected to decline, owing to unfavourable weather conditions in Russia and Ukraine which have led to harvest delays. Harvest progress in Russia is reported to be less than half of last year's pace. Dry weather conditions in Argentina have led to sunflower planting delays. Sunflower prices gained a lot of support owing to unfavourable weather conditions as well as increased demand from Egypt (IGC, 2013). The nearby domestic sunflower seed prices are -11% lower than a year before (Table 1).

Domestic crop prospects

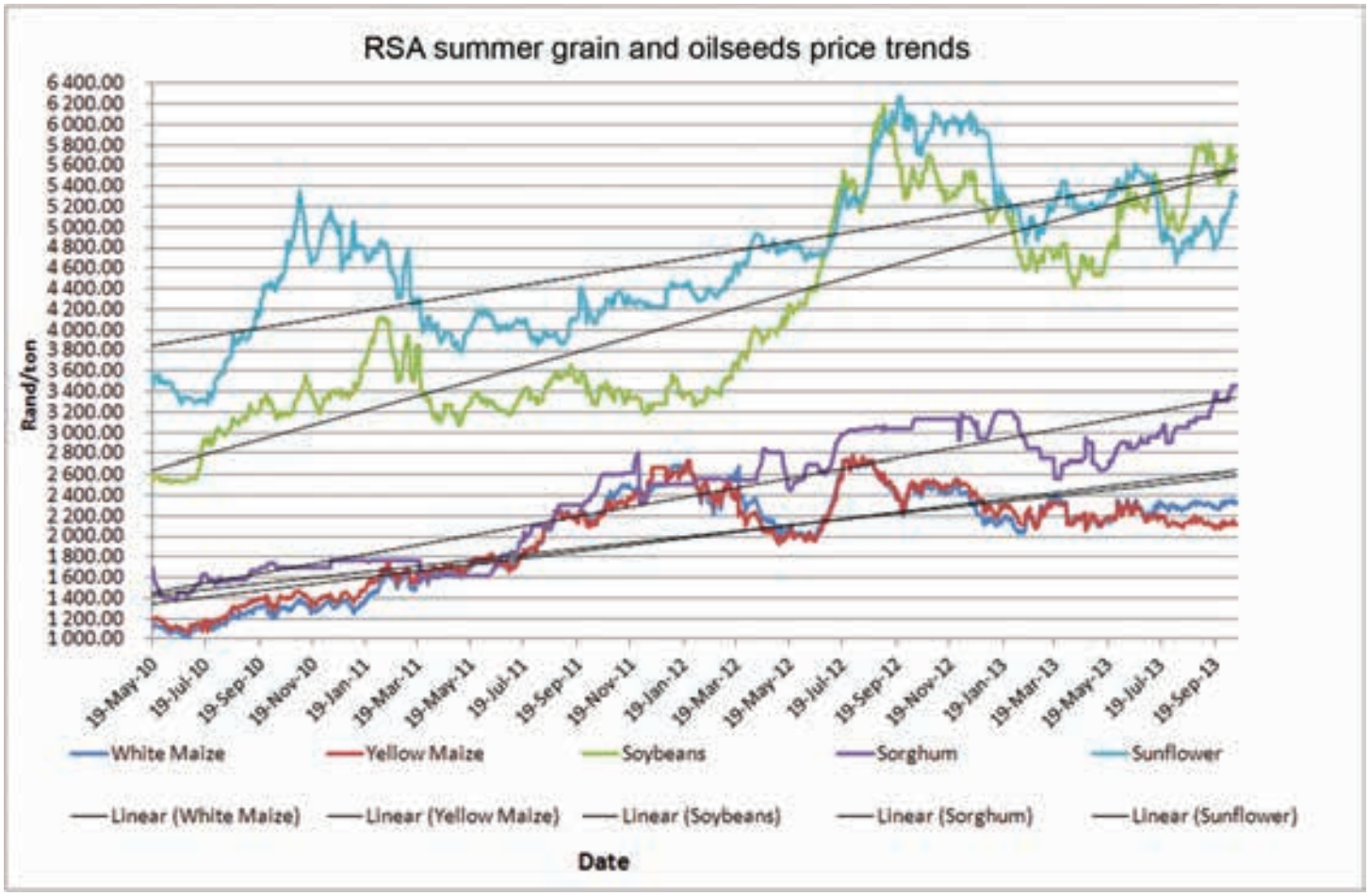
South African summer grain and oilseeds trends

Since 2010, commodity prices have been very volatile. White maize and yellow maize prices have been volatile but currently, white maize prices is trading at a premium above yellow maize; largely supported by the increasing demand from the neighbouring countries such as Zimbabwe. The sorghum prices are supported by the needed imports of sorghum.

Sunflower and soybean prices have also been showing an increasing price trend. The recently established soybean crushing plants increased the demand for soybean. There is an expected 845 000 tons of soybeans to be crushed in the coming season, producers are encouraged

Overview of the summer grains and oilseeds

Figure 3: RSA summer grain and oilseeds price trends. Source: (Grain SA, 2013).



to plant more soybeans. At the same time the domestic production and crushing of sunflower seed does not meet the domestic demand for sunflower oil. In 2012, South Africa imported a record of 187 000 tons of sunflower oil.

Hectares planted to summer grain and oilseeds

Planting preparations for summer grain plantings have started in South Africa. Trends show that South African producers expect that white maize production may decrease; while sunflower production is expected to increase (**Figure 4**). Producers hope for sufficient rainfalls as dry weather conditions affects soil preparations.

Figure 4 shows the changes in area planted. Comparing the area planted for the current planting season (2013/2014) as well as the intentions to plant for the coming season (2014/2015), the area planted to white maize is expected to decrease; from 41% to 39%. At the same time, area planted to yellow maize is also expected to decrease, from 30% to 29%; with the coming season expected to have 1 132 000 ha planted (Figure 4).

The area planted to sorghum is expected to increase, for 2014/2015 it's expected to slightly increase from 63 000 ha to 70 000 ha (Figure 4).

The area planted to sunflower is expected to increase from 13% to 16%, currently expected to be about 620 000 ha for 2014/2015. For soybean, the area planted is expected to slightly decrease from 517 000 ha to 510 000 ha for 2014/2015 (Figure 4).

The area planted for groundnuts is expected to recover slightly, from 47 000 ha to 49 000 ha for 2014/2015 (Figure 4).

The domestic grain and oilseeds prices follow the domestic factors of supply and demand, irrespective of the year on year decline in international prices. It is expected that the factors such as hectares planted, expected rainfall and new demand for commodities such as soybeans may dominate the level of domestic prices compared to the global factors of demand.

Keep price risk management strategies and the planting of alternative crops in mind as export parity does not support the current price levels for maize.

Further reading

GSA, 2013. Summergrains Import and Export Parity Prices, Pretoria: Grain SA.

IGC, 2013. Grain Market Report, Antwerp: International Grains Council.

Article submitted by Funzani Sundani, Grain SA Economist, Industry Services. For more information, send an email to funzani@grainsa.co.za.

CEO's New Year's message

Jannie de Villiers

The current season was one that grain farmers will remember for its extremes. The one moment we were celebrating the recapitalisation programme implemented by Government and the next moment we were disillusioned by a severe drought in the North Western part of our production areas.

The huge increase in our 250 Ton Club members from 66 to 83 members was probably one of the major achievements by Grain SA this past year. The number of members of the 250 Ton Club is in itself not the only goal. We are also celebrating the success of each farmer who has not just survived a terrible drought, but has increased his or her yield by farming smarter. This is what we live for as an organisation! Well done to the Grain SA team for a great year!

2014 outlook

The outlook for the new season is very positive. The demand for grain and oil seeds is still growing very strong. The Government's finalisation of the bio fuel policy and publication of the implementation date (1 October 2015) will stimulate local demand for grains and oilseeds even further.

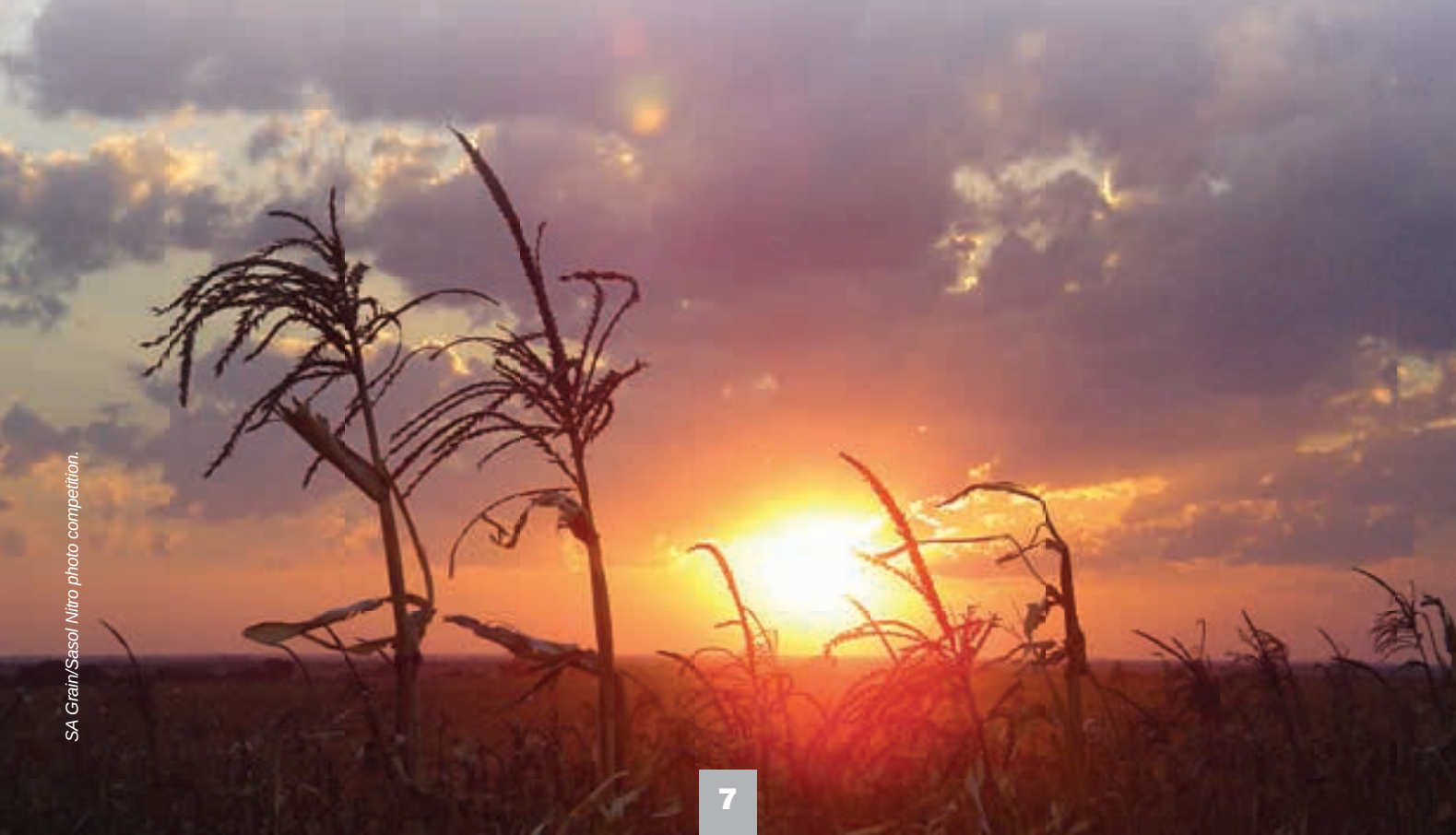
The guidelines for these bio fuel plants to procure a certain percentage of their feed stocks from black farmers were just what we have been waiting for. We are expecting some premiums above the maize price to encourage sorghum production. Indeed good news. The big disappointment was the temporary discontinuation of the government's recapitalisation programme. Grain SA is working non-stop to resolve the problems, but we have also embarked upon some new initiatives that could be more sustainable in future – something that is not so dependent on grants.

There are a growing number of farmers that are toying with the idea of weather forecasters that South Africa is currently in a dry cycle. The debate on the real impact of climate change is also not concluded. Never the less, our 2014 season in the North is already one month late. Many farmers will not be able to plant during the optimum planting period because of late rains. Despite technology (plants and practices) we cannot replace the rain. As an agricultural sector, we remain vulnerable and totally dependent on our Creator for the rain. I trust that by the time you read this, the rain would have come.

The late rain in the Southern and Western Cape delayed the harvesting process and had the potential to destroy parts of the good crops.

However, we expect a challenging season regarding the things we cannot control and for the rest: We look forward to good growth in the demand (and good prices) to pull us through.

Article submitted by Jannie de Villiers, CEO of Grain SA. For more information, send an email to jannie@grainsa.co.za.



SA Grain/Sasol Nitro photo competition.

SHEEP FARMING – which system is the most profitable?

A lot can be said about the profitability of the various sheep farming systems. The intensive and extensive systems in particular are discussed regularly.

As the sheep branch in the North West and the Free State is starting to expand again gradually, a discussion of the different systems is pertinent.

The first instalment in the series on sheep farming therefore involves the profitability of the different systems. The subsequent instalments will mainly deal with facilities and management and feeding matters.

The different systems are summarised in **Table 1**. The basis is a herd size of 300 ewes, which is the same for each system. The systems vary from extensive, where only natural grazing is used, to intensive, where a large part of the grazing consists of irrigated grazing.

These systems will form the basis of the instalments in this series.

Extensive sheep systems

Only natural grazing is used for this system. From time to time supplementary feed is supplied, but this is dictated by management activities. Examples of these are flushing and creep feed.

Note that the biggest farm – 360 ha – is required for this option to make a net profit of R223 493. The profit per hectare is therefore also the smallest of all the systems.

Semi-extensive systems

In this system a portion of the winter grazing is provided by, for example, maize crop residue. The total farm size is still the same, but the net profit is a bit higher. The reason for this is that the lambs require less creep feed as they also utilise the crop residue and therefore consume less creep feed.

The profit of the maize yield was not taken into account here, as it is a different component of the farming activities.

Semi-intensive systems

Here, too, grazing maize and planted grazing are used as sources of feed. The farm can therefore be about 152 ha smaller to maintain the same size herd. The profit per hectare

An example of grazing maize with green feed planted between the rows.

More intensive farming can increase multiple births.

increases, but the profit per ewe declines, as the feed costs rise.

Intensive systems

This system mainly uses irrigation as the main feeding source. It is expensive, but can handle a very high carrying value. The size of the farms therefore decreases drastically, which increases the profit per hectare. However, the profit per ewe is the lowest of the four systems.

Summary

The premise is that the herd management of each system is optimal, but that the performance of the herd (lambing percentage) will be the same. However, it is generally accepted that producers who farm more intensively usually pay more attention to herd management than the producer who farms extensively. The result is therefore a greater lambing percentage, with more profit.

The more intensive the farming, the higher the feeding costs are. The carrying capacity also increases with the greater profit per hectare, however. A combination of the systems can be used for the best results. However, in order to gain the most from the herd, the herd management should also be optimal.

Sources

Jordaan, F.P. Veldtoestand, produksie en weidingskapasiteit. Department: Agriculture, Conservation, Environment and Rural Development, North West Provincial Government, Potchefstroom.

Thorne, M.S. and Stevenson, M.H. Stocking rate: The most important tool in the toolbox. Pasture and Range Management, June 2007, Hawaii.

Article submitted by Hennie du Toit, Animal Scientist, NWK Agricultural Management Services, for SA Graan/Grain February 2013. For more information, send an email to hennie@nwk.co.za.

Tabel 1: The different sheep systems.

Size of farm	360	360	208	20
EXPENSES	**Extensive**	**Semi-extensive**	**Semi-intensive**	**Intensive**
Wet grazing (ha)	360	260	168	10
Costs				
Smuts finger (ha)			30	4
Costs	R0	R0	R55 170	R7 356
Irrigation (ha)				6
Costs	R0	R0	R 0	R118 446
M residues (ha)		100		
Costs				
Grazing maize (ha)			10	
Costs	R0	R0	R35 710	R0
Labour	1	1	1,5	3
Costs	R16 800	R16 800	R25 200	R50 400
Flushing (g/day)	300	300	300	300
Costs	R10 190	R10 190	R10 190	R10 190
Creep feed (g/day)	250	150	100	200
Costs	R22 644	R13 586	R9 058	R18 115
Inoculation costs	R23 373	R23 373	R23 373	R23 373
Lick costs	R86 400	R86 400	R86 400	R86 400
Total	**R159 407**	**R150 349**	**R245 100**	**R314 280**
Income				
Lambs	**R314 927**	**R314 927**	**R314 927**	**R314 927**
Old ewes	**R67 972**	**R67 972**	**R67 972**	**R67 972**
Total	**R382 900**	**R382 900**	**R382 900**	**R382 900**
Net profit	**R223 493**	**R232 550**	**R137 799**	**R68 620**
Net profit/ewe	**R745**	**R775**	**R459**	**R229**
Net profit/ha	**R621**	**R646**	**R662**	**R3 431**

Control of bollworms in soybeans

Bollworm infestations of soybeans in the Central and Eastern Free State last season, being the 2012/2013 season, caused extensive damage on some farms. The intensity of the infestation caught farmers by surprise. Some areas also experienced an infestation of army worm shortly after or with the bollworm attack.

Control measures were often carried out too late and the expected "kill" from certain spray applications did not work at all. This situation has resulted in claims by farmers from the chemical supply companies.

Depending on the planting dates and maturity class of the soybeans the infestations were also coupled with the extreme drought stress experienced on some lands and farms. These two factors occuring together had a very negative impact on yields and income.

Knowing a little more about the problem and its effective control will assist in avoiding high levels of damage for this year.

Description and life cycle

The African bollworm is known in the plant classification system by its Latin name of *Heliothis armigera* and is a member of the butterfly order or *Lepidoptera* and family of *Noctuidae*.

It is found in most of the commercial grown cash grain crops and vegetables such as all beans, cotton, cowpeas, peas, sorghum, tomato, sunflowers maize and soybeans. It also infests and completes its life cycle on many weed species associated with the above commercial crops. It can be concluded that it is very wide spread throughout Africa including Southern Africa.

If climate conditions are suitable for the pests large enough numbers of moths can emerge and start flying at virtually the same time and go through several cycles in the growth period of our summer crops. Many hectares can be infested in a few days.

The darkish brown moths with a wing span of 35 mm to 40 mm lay a large number of eggs, and the life cycle may be completed in a short time under warm conditions. The eggs hatch in 3 days to 5 days leading to the larval stage that last 17 days to 35 days and the pupal periods lasting 17 days to 20 days. The life cycle is completed in 25 days to 60 days depending on temperature. In ideal conditions several generations will thus infect some crops at least twice and the later plantings once in a summer season.

Damage

The caterpillars feed on leaves, buds, and growing points of the affected plants as well as the flowers and fruit. The resulting massive leaf damage reduces the effective leaf area for photosynthesis and thus can slow plant growth. This stunting of plants was observed in the field last year. The later feeding by the caterpillars on flowers and pods causes the most damage as the flower feeding can prevent pod and seed formation.

Observation

Small internal portions of leaf blade which have been removed are the first sign that the caterpillars have emerged. These windows of damage increase in size as the worms grow. Virtually the whole inside area of the leaf can be consumed. At a later plant stage clean circular holes are bored through the soybean pods. The damage can be seen on small and large pods. The small caterpillars are not noticed by farmers as their droppings fall to ground. In dry conditions they can be observed under the plant if one looks very carefully.

The holes serve as entry points for secondary infection by diseases causing further decay of the pods. One caaterpillar can damage several pods and once deeper inside the pods they are very difficult to reach with insecticides.

Farmers often observe, for the first time an infestation is noticed, caterpillars feeding with the head and forepart of the body inside the soybean pod with the rest of the body outside.

Behaviour of mature caterpillars

Once the caterpillars have reached maturity they fold themseves in an already eaten leaf

and spin the leaves together to form a protected area in which they begin the pupation stage which then leads on to the moth or flying stage. In warm mid season conditions, this can happen within 17 days.

Last season many farmers only realised how bad the infestation was when the rolled up leaves were observed.

Scouting

Scouting for the pests in each land throughout the season is critical. If the plant is shaken a number of moths will be disturbed and can be captured and properly identified.

Sweep nets can be used by forcibly sweeping the net through the plant canopy to catch some moths for identification.

A decision can then be made as to when or if control measures will be financially viable.

Critical factors and control measures

Variety selection

Various critical factors can influence the infestation levels of the crop. The different maturity classes of soybeans and growth characteristics can influence the intensity of infection at variuos stages in the season. In South Africa crops are planted in a small available climatic window when soil conditions are ideal so planning your way around the insect and plant growth life cycles can be difficult. The farmer can predict when the moths will fly in a particular season. Bear in mind as an increasingly large area of soybeans is planted in a farming district the risk of infestations in succeeding years will increase.

An area of 5% of the main crop can also be planted 10 days to 14 days earlier so that any bollworm infestation that results can be controlled in time.

Biological control

The bollworm caterpillars can be controlled naturally by various wasp predators and fungus infections. The diseased larva can be observed in the plant canopy which can have an ecologically balanced micro climate in ideal conditions. It was however noted that in practice only early intervention and spraying was effective.

The timing and application of chemicals

Soybean plants can withstand up to 35% foliage loss up to the blooming period. This can be measured by collecting a representative number of leaves from plants at random and assessing the percentage damge on each leaf. The total average damage at any one stage can then be calculated. However during blooming and during pod fill 20% leaf damage will result in yield loss.

As a guideline 25 or more larva of 12 mm in length per metre of row will cause a 35% average defoliation. It is generally accepted that chemical control by spraying will be commercialy viable when this level of damage is experienced. The problem is that damage escalates rapidily from 20% to 35%. It seems prudent to immediately initiate spraying at the 20% leaf damage stage or when 25 larva or more can be can be found per metre of row.

Chemicals and spraying

It is being found worldwide that the use of pyrethroid insecticides has become ineffective with a control of three out of ten applications being effective. The use of pythrethroids alone in the Free State in last year's control measures produced very poor results.

The recommended control measures are to spray a combination of pyrethroid and diamide based insecticides.

A possible effective combination would be a pyrethroid together with methomyl each applied at about 100 grams in a mix of 200 litres per hectare. Using water volumes below this simply won't cover the leaf and stalk to achieve good results. It is very important to spray at a pressure of three bars to ensure that leaves are shaken enough to expose the caterpillars protected within the leaves. It is virtually impossible to control them when they have penetrated the pods. The total cost of the chemicals for this application is only about R30 per hectare. It is well worth doing, as an insurance against any further escaltion of damage exceeding 20% leaf damage.

Always consult your chemical supplier or consultant for the best practical advice!

Conclusion

It is really critical that the farmer scouts for moths and caterpillars in an intensive and regular manner in order to be able to detect and control a potential dangerous infestation of bollworm as early as possible.

Article submitted by a retired farmer.

Photo: Effective control measures will assist in avoiding the damage seen on this soybean.

General principles of crop insurance

What does risk and insurance have to do with each other? As was explained in a previous article insurance is a way to manage financial risks by passing on some of the effect of adverse events to so-called insurance businesses brokers. These brokers specialise in providing services to the agricultural sector to reduce the adverse affect of risks.

There are many types of insurance but the principle of how insurance functions to reduce the adverse affect of risks remain the same. A group of people (those that are insured) pool funds (premiums) with an institution. The insurer or broker then uses these funds to cover a loss due to an adverse event, a hail storm for instance. From practical experience the principle was established that not everyone that is insured will experience an adverse event simultaneously. Therefore all contributors to the fund will help to cover the loss of one or a few contributors. And the more contributors the lower the premiums will become.

The advantages of participating in crop insurance are mainly as indicated in the previous paragraph, should you have a loss, the major part of your loss will be covered. Thus crop insurance provides peace of mind for the possibility that your whole crop may be destroyed by a severe hailstorm for example. Furthermore, having crop insurance also assists in improving your record-keeping and managing your crop production. When you are insured, it is compulsory to keep certain records and you are required to execute proper production actions or practices. The qualified field staff of the insurance broker is also available to give advice and support regarding the production of your crop throughout the season.

The main disadvantage of insurance is the cost of insurance which can be seen as wasteful if you do not file a claim with your broker during a particular year. Insurance can also be rather expensive. The cost for insuring your maize crop could be in the order of R300 per hectare and for sunflower R250 per hectare, mainly depending on the expected production. However, it is also important to bear in mind that your total production costs amounts to a couple of thousand rand per hectare and could be lost completely in the event of adverse weather conditions. It may also be seen as a disadvantage that as an insured person you will always have to carry a percentage of the risk yourself, meaning you will carry part of the financial loss apart from the premiums you have contributed.

The cost of insurance is determined by the type of crop, yield per hectare, the commodity price R/ton, your district (some districts are more prone to hail for instance than others), so-called no-claim bonus and what part of the damage will be carried by the farmer self. As far as crop insurance is concerned the premium is a once-off payment at the time you insure your crop.

When arranging crop assurance you will be required to supply a map of your farm indicating the lands to be insured, land numbers and areas, expected yield, yields of the last five years (if available) and soil analysis not older than two years. The necessity to provide the required information will be a benefit in terms of improving your record-keeping and your management.

When damage is experienced it must be reported to your broker as soon as possible providing all relevant information – crop, which lands, area, expected yield, date, and so forth to lodge a claim. Assessment of the loss will then be performed by trained staff.

There are a number of companies (brokers) involved in providing agricultural insurance services. When considering insuring your crop or other assets it is advisable to get information from more than one reputable service provider and to compare the premiums and services provided. Your money is involved – get the best value – shop around. This article only provides information in terms of the general principles of crop insurance. It will be up to you to obtain the specific information from service providers – they all offer different packages and services.

Farmers are particularly vulnerable to drought and hail, which will always be part of the risk associated with farming. To manage risks is up to the farmer and insurance is but a management tool.

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

The importance of bees for the pollination of sunflowers

Bees! These little creatures are so small but yet very vital for us as crop farmers of South Africa. Their value is too often overlooked and taken for granted. If the situation ever arose where bees disappeared from the floral kingdom, we would quickly feel their absence and we would in fact be facing a serious financial problem.

The global decline in numbers of the honey bee have led many farmers to extreme measures, where boxes of bee hives are leased and placed in crop lands to assist with the pollination process. This is especially evident amongst seed sunflower farmers in South Africa. In this article we will take a look at why these little creatures are so valuable to the sunflower producers of South Africa.

The pollination process

All sunflowers need to be properly pollinated in order to achieve maximum production. This is because for a seed to develop there needs to be movement of pollen from a male sunflower plant to a female plant. Bees do this very effectively indeed. One bee colony can have as many as 80 000 bees in it and each bee can visit between 20 and 25 flowers per minute and in doing so perform the vital pollination process. This is why it is crucial to protect the habitat of bees or at least provide for their habitat needs in and around the sunflower lands. If there is a shortage of bees in the sunflower lands during the flowering period it may lead to a possible loss of production by 25%. The loss of production will be caused by a number of chain effects due to the lack of bees such as:

- Poor seed filling;
- Increased pest damage; and
- Non-uniformity in seed ripening.

When there are sufficient pollinators doing the job then the flowers need only be open for a shorter period of time, thus the flowers are only exposed to pests for a short period which in turn will result in less damage. The pollination process will also be performed quickly resulting in a uniform ripening and maturing of seed across the land. This is very beneficial at harvest time. It is not only the production in terms of quantity which will be better because of good bee pollination, but also the quality of the seed will also be of a much higher standard. It has been analysed that sunflowers that have been pollinated well by bees have much higher oil content in the seed. This is good because higher oil also means a heavier seed.

> *It is crucial to protect the habitat of bees in sunflower lands.*

So how do we ensure our crops are well pollinated and how do we monitor the pollination process?

This is a relatively simple process. If you are using hired bee hives it is important to place the hives inside or as near as possible to the crops. It is essential to spread the hives out so that they are utilised to the maximum. The correct amount of bee hives also need to be placed in the sunflower lands. This is usually about 2 - 5 hives per hectare. Once the flowering is over we can monitor the success of the pollination by assessing the sunflower head. If the seed is well shaped, the head is well filled and there are tight clusters of seed that are uniformly set then we can rest easy that the pollination has been successful.

Sad facts!

Unfortunately the number of bees globally is plummeting drastically! This can be blamed on a number of things, but sadly we farmers are largely responsible. In order to correct this wrong we need to:

- Work on conserving the bees' natural habitats as best as possible;
- Be more careful with our use of pesticides;
- Don't destroy hives when they invade our space, rather get a professional to move them; and
- Respect and value their role in our businesses.

Most plants that are consumed by humans are directly or indirectly dependant on bee pollination. This is why we need to recognise the threat that their disappearance poses. We can't rely solely on leasing hives from bee keepers. This is very expensive, unsustainable and unrealistic! As farmers there is a need for us to become creative in the ways that we structure our farms so as to create an attractive environment for the bees and not a hostile one.

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

Know your herbicide

– Atrazine (member of the chloro-triazine group, which includes cyanazine, simazine and terbuthylazine)

Atrazine belongs to the chloro-triazine herbicide group (also called s-triazines). Other important herbicides that belong to this group are cyanazine, simazine and terbuthylazine.

A herbicide like metribuzin is a related triazinone herbicide that does not have a chlorine atom in its molecular structure like the chloro-triazines (see **Figure 1**).

The chloro-triazines are registered in South Africa for pre- and post-emergence control of mainly annual broad-leaved weeds and certain grasses in a variety of crops. Chloro-triazines do not all control exactly the same weeds equally well and they are also not always registered for use on the same crops. Cyanazine, for example, is registered for cotton, but the other three are not, while only simazine and terbuthylazine are registered for citrus. Al four are registered for maize, but simazine only because it contains a protective element in the formula.

The molecular formula for atrazine is C8H14ClN5, which means that one atrazine molecule consists of eight carbon atoms (the black colour in the figure), one chlorine atom (green), five nitrogen atoms (blue) and fourteen hydrogen atoms (white).

History

Atrazine was the first of the chloro-triazines to see the light after development by JR Geigy Ltd in Switzerland had started in the early 1950s. Atrazine was registered for the first time in Switzerland in 1956, and in the USA in 1958. Shortly afterwards it was also registered in South Africa and in many other parts of the world.

Before atrazine, 2,4-D and MCPA were the only herbicides available for the selective control of broad-leaved weeds. The main benefits of atrazine over 2,4-D were the following:

- Greater crop protection;
- Longer after effects and therefore an increased period of weed control; and
- It could be applied directly to soil, even dry soil, i.e. pre-emergence application was now possible.

Relatively small differences in their molecular structure explain the mutual differences between members of the chloro-triazines with regard to the spectrum of weeds that are controlled, tolerance of crops, behaviour and batch destination in the area. Despite differences in molecular structures, the triazines have exactly the same action, namely inhibition of the light reaction of the photosynthesis process in plants.

The registration status of atrazine in the world

Misunderstandings often exist about the registration status of atrazine in the European Union (EU). Atrazine was not banned by the European Commission (EC), which regulates herbicide and pesticide usage, among other things – atrazine was simply not reregistered after it had been deregistered in 2004, because so far no institution has submitted data on the potential for water pollution.

The EC therefore necessarily needs to assume that a reasonable risk exists that atrazine residues in water sources can exceed the maximum critical concentration of 0,1 µg/litre. The triazine herbicide terbuthylazine, which is closely related to atrazine, is registered for use in the EU, however.

Atrazine was in the first place deregistered in the EU in 2004 because concentrations of more than the arbitrary maximum of 0,1 µg/litre had been reported in some water sources. It is widely accepted that the use of high dosages of atrazine in non-agricultural situations (railways and roads) over decades in Europe was the main cause of the pollution of the water. That is why atrazine does not appear on EU/EC lists of registered herbicides, but, on the other hand, it does not appear on the list of banned substances either.

In the USA the Environmental Protection Agency (EPA) found as recently as 2009 that there was no supporting evidence on health and environmental risks that prevented the registration of atrazine in the USA. The Australian regulatory authorities came to the same conclusion in 2010. Admittedly, these countries now have measures in place to prevent the chance of pollution by atrazine, for instance the banning of atrazine for use in non-agricultural situations. This explains why atrazine is still a very popular herbicide in South Africa and many other parts of the world.

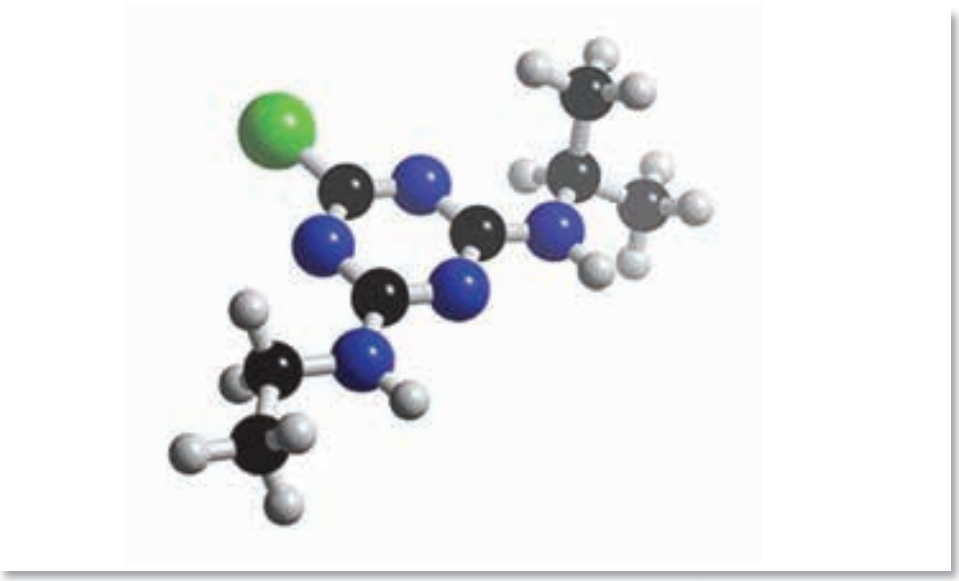


Figure 1: Three-dimensional representation of the atrazine molecule (2-chloro-ethylamino-6-iso-proylamino-1,3,5,-triazine). Source: www.3dchem.com/molecules.asp.

Action

The 'site of action' for the triazines, i.e. the site in a plant where the triazine molecule demonstrates activity through a specific 'mechanism of action', is located in the chloroplasts of leaves – where chlorophyll is found and photosynthesis occurs.

The exact site of action is the D1 protein, to which triazines bind, thus preventing energised electrons from being transferred there. Consequently the energy locked up in those electrons is lost because it cannot be involved in the production of sugars and starch. Without these energised carbohydrates plants cannot grow and develop properly and they can die – obviously the objective in the case of targeted weeds.

If only carbohydrate production is harmed by triazines, plants would actually starve – a slow process that cannot explain why damage occurs relatively quickly when sensitive plants are exposed to triazines. The actual major damage is caused when the released, energised electrons react with oxygen

(the other important product of photosynthesis) to form superoxide radicals, of which hydrogen peroxide (H2O2) is an example.

This is exactly the same hydrogen peroxide that is used to bleach hair. It breaks down cell membranes and thus disturbs the normal function of cells and their ingredients. Because the site of action of triazines is in the chloroplasts, their membranes are attacked first and chlorophyll (green pigment) in the chloroplasts is destroyed in the process. Loss of chlorophyll causes the affected parts of the leaf to become yellow (chlorotic). The chlorosis symptom of damage develops first and more intensely in the sections of the leaf where the triazine concentration is the highest.

Photo 1 shows the chlorosis that develops in sensitive plants (such as sunflower). Chlorosis starts at the tips and margins of the leaf because the highest concentration of triazine initially builds up there. As the concentration in the leaf increases, those parts of the leaf die off first. Necrosis therefore starts at the leaf margins and extends to the central part of the leaf.

Leaf veins of broad-leaved plants do not contain chloroplasts and consequently damage in these plant types is characterised by interveinal chlorosis. In contrast, in the case of maize, where a second type of chloroplast is found that is associated with the vascular bundles (veins), chlorosis first develops in the leaf veins (**Photo 2**).

Resistance to herbicides

The single site of action of triazines in the D1 protein holds a risk of the development of resistance, as the smallest natural change (mutation) in the D1 protein will make a plant with such a mutation resistant to triazine.

The first case of resistance to herbicides in the world was to atrazine – understandably so, if we take into account how long it was in use, how widely it was used, and the relatively high doses involved: up to 2 kg a.b. per hectare was the norm in maize for decades, including in South Africa.

The first case of triazine resistance was reported in the USA in 1968, in the weed Senecio vulgaris, which had been exposed to one or two treatments of atrazine and simazine per year in a nursery in the preceding years (1958 to 1968). Although there are several Senecio types in South Africa, S. vulgaris has apparently not yet arrived here. It is a weed in Australia, however.

Worldwide there are currently 69 types of weeds with proven resistance to herbicides whose action involves the inhibition of electron transfer in photo system 2 of the process of photosynthesis. These 69 types should therefore be resistant to any of the chloro-triazines.

In total there are already 393 types of weeds worldwide that are resistant to various herbicides. Resistance to the chloro-triazines is not a major problem in South Africa at present. In 1996 resistance to atrazine by *Amaranthus hybridus* was found on one farm in the Free State. The fact that this resistance has not expanded further and that new cases have not developed is probably due to the use of herbicide mixtures.

These days the chloro-triazines are applied alone in exceptional cases only, as mixtures of herbicides with different actions are an integrated part of the strategy to stop the development of resistance.

Behaviour in soil

Atrazine and the other chloro-triazines are absorbed most easily by the roots of plants, therefore it is customarily applied directly to the soil. Pre- and post-emergence application is possible, as the fraction that is not absorbed by the leaves of plants sooner or later ends up in the soil.

In acid soil (pH <4) the triazine molecules have a positive electric charge, and in neutral conditions (pH 7) they have virtually no electric charge. This means that adhesion (adsorption) to soil particles (clay and organic colloids) will be strong under acid conditions, but poor when the pH of the soil is close to neutral. Clay and organic colloids mainly have a negative charge in soil with a pH of 6 to 7, and consequently the adhesion of the neutral triazine molecule will be poor. The reason why triazines do not easily leach away in these pH conditions is mainly due to the fact that organic colloids (the humus fraction of soil) can also adhere to neutral molecules.

This explains why a maximum of 1 kg a.b. atrazine per hectare is now recommended for maize, for example. In the past, when 2 kg a.b. per hectare was recommended, many instances of phytotoxic residues being transferred to the next growing season occurred. Damage to sensitive follow-up crops like sunflower, dry beans and groundnuts was a major risk if liming was done before planting: an increase in soil pH released atrazine residues that had been adsorbed and these would be absorbed by the roots of the sensitive crop.

These days the general recommendation of a maximum of 1 kg a.b. atrazine per hectare not only prevents phytotoxic residues from being transferred to the sensitive follow-up crop, but it also reduces the risk of pollution of underground and surface water sources. It therefore makes sense to use the triazines in reduced doses (lower risk of environmental pollution) in combination with other herbicides, specifically herbicides with a different action (preventing the development of resistance to a specific action).

Future

For any technology to be of economic significance for more than 50 years is a remarkable achievement. Atrazine, as a leader among the triazines, has weathered strong attacks on its safety for humans and the environment over the past ten to 20 years, and so far nothing damning has managed to adhere to it. It is highly unlikely that new triazines will be developed, but the existing ones could remain useful and significant indefinitely as long as they are used with circumspection.

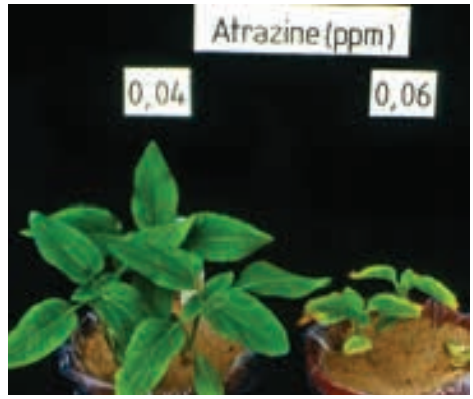


Photo 1: Atrazine and other triazines can, under certain circumstances, be transferred to the next growing season and damage sensitive follow-up crops (sunflower in this case) in low concentrations.

Photo 2: Under conditions that are particularly conducive to high atrazine activity even a highly tolerant crop like maize can be damaged. Note the damage symptom of vein fading, which is easily confused with interveinal chlorosis (characteristic of certain nutrient deficiencies).

Sources and further reading

Cobb, A. 1992. Herbicides and plant physiology. Chapman & Hall, London.

Heap, I. 2012. The international survey of herbicide resistant weeds. www.weedscience.com (accessed 20 November 2012).

Peterson, D.E. et al. 2010. Herbicide mode of action. Kansas State Univ Agric Exp Station and Cooperative Extension Service. (www.ksre.ksu.edu).

Pieterse, P.J. 2010. Herbicide resistance in weeds – a threat to chemical weed control in South Africa. S. Afr. J. Plant Soil 27(1). Special edition: 25th anniversary.

Reinhardt C.F. 1993. Biological activity and persistence of atrazine. PhD thesis, University of Pretoria.

Weed Science Society of America. 2007. Herbicide Handbook, 9th ed. Lawrence, KS, USA.

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Identification of disease in maize

One of the toughest things as farmers is scouting our crops and assessing their progress through the growing year. We always seem to have something more pressing on the go which we believe to be more important.

But let me tell you, casting an eye over your fields once in a while can be incredibly valuable, and may possibly save you lots of money if you pick up a problem quickly enough and treat it. Even today with all of our modified and advanced seeds which are apparently resilient to this and that, maize can be susceptible to numerous diseases. So beware and be vigilant.

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 plant's resilience and protect it from diseases. 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.

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.

All stalk and root rots cause lodging. This is when the plants fall over and a number of the ears may lie in the soil. This 'lodging' has financial implications since these cobs must be hand harvested which is an extra expense.

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 experts 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 course of action should be to consult your chemical representative or a neighbouring farmer who is knowledgeable on such matters.

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

MADE POSSIBLE BY
THE MAIZE TRUST

LAN – the most popular topdressing

LAN fertiliser or Limestone Ammonium Nitrate is one of the commonly used forms of nitrogen required by commercial crops and pastures. LAN fertiliser in granular form can also be found in various commercial mixtures made up of nitrogen, phosphate, potassium, sulphur, calcium and magnesium components.

LAN is mainly used as a convenient or "most" popular topdressing source of fertiliser nitrogen in the application of the extra nitrogen required above the amount used at planting.

LAN is made up of 28% nitrogen and 5% calcium.

Other nitrogen sources

Other fertiliser sources of water soluble nitrogen that can be used for topdressing include urea containing 46% nitrogen, ammonium sulphates made up of 21% N and 24% sulphur and potassium nitrate made up 13% N and 38 % K. Maize uses a large amount of sulphur. Nitrogen deficiency symptoms are often mistaken for a sulphur deficiency. In this instance yield responses would result from an application of ammonium sulphates.

The use of the alternative products would depend on soil conditions and the need of the crop for additional sulphur or potassium. Urea is usually the preferred source of nitrogen in irrigated maize production as it is very water soluble and can be applied through the centre pivot or other irrigation system.

Nitrogen requirements of crops

Once a soil test has been carried out the results are used in conjunction with an assessment of soil types, soil depth, moisture stored and amount of rainfall, the crop potential is then calculated. The amount and make of fertiliser, made up of the components mentioned above, is then determined by taking into account the amount of nutrient removal by the crop and yields planned.

All the fertiliser can be applied at planting but as will be discussed there are strong reasons for not applying the total nitrogen requirements at planting.

Much research by PJ Mohr in the middle 1970's showed the need to compensate for various factors including soil types and whether or not the season was regarded as a dry or wet year.

> *"LAN is made up of 28% nitrogen and 5% calcium.*

This factor was quantified as an index related to the capacity of a soil to release nitrogen to the growing crop. Using this index it can be implied that a sandy soil thus will supply 64% less nitrogen in a "wet" year compared to a "normal year". These percentages for other soil textures are loamy sand 43% less, sandy loam 31% less, sandy clay loam 12,50% less, clay loam 0%, clay 0%.

In a fertiliser regime planned for a maize crop yield of 4 tons/ha, grown in a sandy soil, a quantity of about 100 kg of Nitrogen per hectare would be required. An allowance of 25 kg of nitrogen per ton of the crop yield target has been given. Let us assume 40 kg of nitrogen would have been placed 50 mm under and to the side of the seed at planting in a mix of fertiliser containing nitrogen, phosphates, potassium and other ingredients. We are thus left with a balance of 60 kg of nitrogen to be applied as a top dressing. The top dressing must be applied while a tractor equipped with a suitable implement can still do the work without damaging the growing maize crop.

Application of the LAN topdressing

A topdressing of about 200 kg of LAN would supply 56 kg of nitrogen per hectare. The appropriate topdressing implement built with fertiliser bins and soil engaging tynes would thus be calibrated to apply 200 kg of the LAN product in granular form per hectare.

The topdressing equipment used can either be a three point mounted or trailed implement. The LAN can be applied as a separate operation or done together with a mechanical cultivation for weed control. This management will depend on whether or not the farmer has planned to only spray herbicides for weed control or will use a combination of chemical and cultivation control of weeds. In conventional tillage system some soils will benefit from the loosing effect of tynes while applying the LAN topdressing. Farmers that are equipped to apply all fertilisers in liquid form thus do not use LAN applied in the soil in granular form.

A high rainfall period in the previous autumn, winter and prior to planting would result in saturated soil conditions. At field capacity, which is defined as the soil having 50% moisture and 50% air spaces, the soil is in a perfect balanced state. However, when excess rainfall produces moisture conditions that exceed field capacity or saturated state the nitrogen normally held in the soil moves into the water and is leached out or removed from the root growing zone as the water moves downward in the soil.

Management of nitrogen applications in "wet" conditions

The above considerations thus indicate that more than 50% of the applied nitrogen can be leached or become unavailable from the soil. We have all seen the yellowing of maize plant leaves during high rainfall and saturated soil conditions.

You should assess soil moisture conditions on your own farm resulting from the pre-planting rainfall and rainfall received after planting. If it is suspected that nitrogen leaching has taken place the topdressing application of LAN can be increased from the planned quantity. For instance in extremely wet conditions in a sandy soil an extra 100 kg of LAN per hectare for a total of 300 kg of LAN would supply an extra 28 kg of nitrogen per hectare. The application can be reduced on higher in clay and loam soils.

Conclusion

Reserving the application of part of the nitrogen requirements for your crop as a topdressing after the crop has been planted and established can give you an opportunity to compensate for any high nitrogen leaching if above average rainfall is experienced after planting.

Assess moisture and expected rainfall patterns and allow for this possibility when doing your fertiliser planning and budget. Make sure that your topdressing equipment is in a good mechanical condition before the planting season commences.

Article submitted by a retired farmer.

Migration of the maize stalk borer in different mixtures of Bt and non-Bt maize

The refuge strategy is used in South Africa as well as in the rest of the world to manage the development of stalk borer resistance against Bt maize. The refuge strategy involves planting non-Bt maize next to or around a Bt maize field so that moths from Bt maize plants can mate with susceptible moths from non-Bt plants to ensure that the progeny is also susceptible and will still be controlled by Bt maize.

In South Africa the prescribed guidelines for a refuge is the planting of a 5% and a 20% refuge of non-Bt plants. Insecticides may be administered in the 20% refuge, but not if a refuge of only 5% is planted.

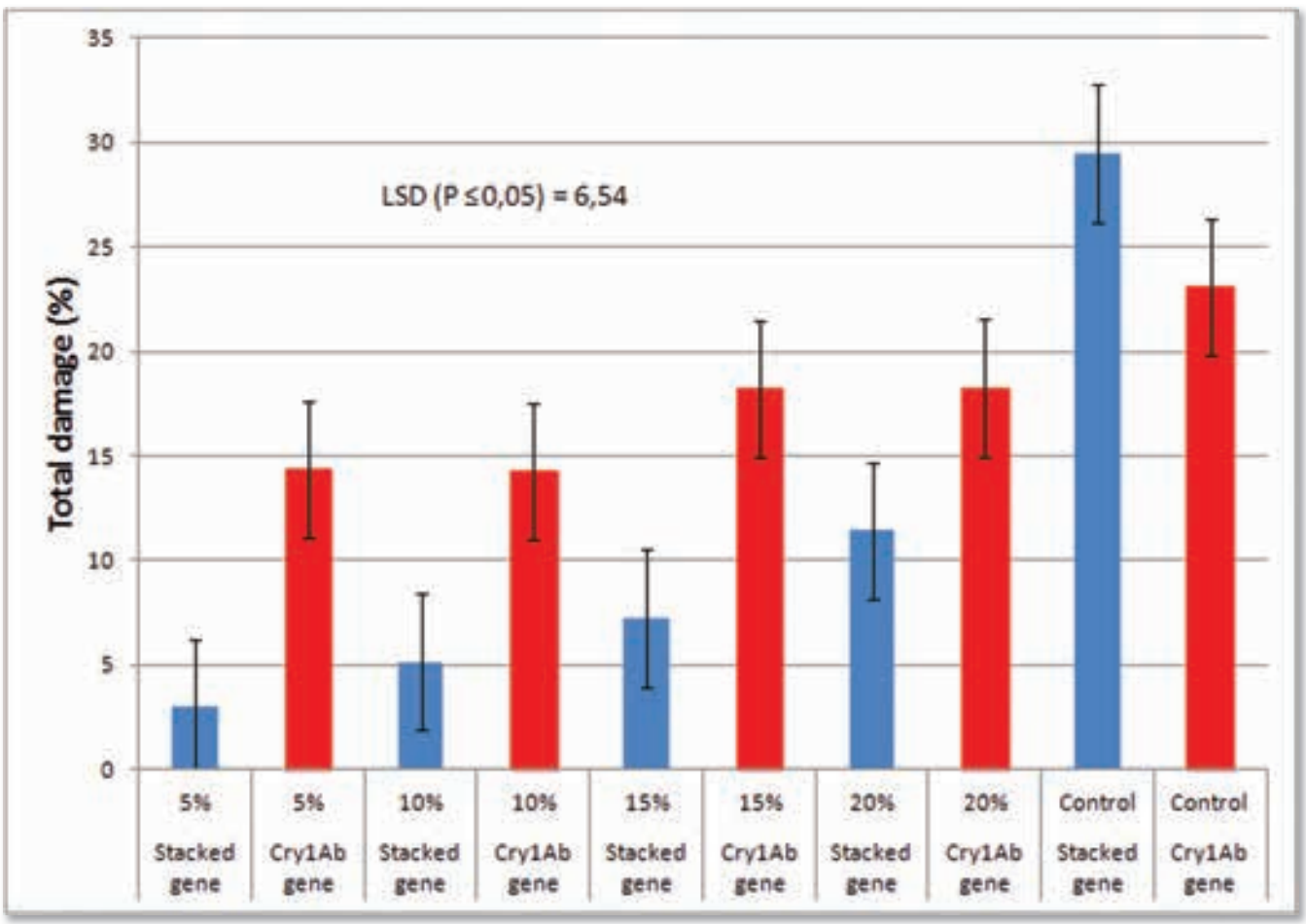
The two target stalk borers that can be controlled by Bt maize in South Africa are the maize stalk borer (Busseola fusca) **(Photo 1)** and the Chilo borer (Chilo partellus) (**Photo 2**). The former has developed resistance against Bt events that are expressed by Cry1Ab protein in maize plants, but are controlled by a new event that is a stacked gene with two proteins, namely Cry1A.105 and Cry2Ab2.

One of the main reasons why the maize stalk borer develops resistance is because of refuges that have not been planted or have been planted incorrectly. Research continues to better manage the development of resistance in insects and look at new strategies that are easy to apply.

The refuge in a bag strategy is one of the new strategies that is being researched overseas and applied for certain insects. This strategy involves a mixture of Bt and non-Bt seed in the same bag.

However, in the case of our maize stalk borer, larvae are known to migrate continuously to adjacent plants. Bt technology claims to control larvae effectively only in the first two stages of development. Therefore if a larva

Graph 1: Total percentage of stalk borer damage for different percentages of seed mixture of Bt and non-Bt seed. (Bars = LSD values).



on a non-Bt plant has completed the first two stages, it is possible that it can attack Bt plants and not be controlled. The ARC-Grain Crops Institute (ARC-GCI), in collaboration with the North-West University in Potchefstroom, saw the opportunity to assess the strategy if applied to the maize stalk borer in South Africa in the future.

The aim of the study was to study the larva migration of the maize stalk borer over time and to establish whether there was potential for applying this strategy to counteract the development of resistance by the maize stalk borer in South Africa.

A field trial was launched to check stalk borer migration in different TIS treatments. Both events that are commercially available in South Africa were assessed. Seed mixtures containing 5%, 10%, 15% and 20% non-Bt seed were planted in blocks, as was a non-Bt control block.

Each block was inoculated with 50 larvae in the middle plant of the block, and migration was observed over time by means of weekly counts of stalk borer damage. Large-scale migration was observed within the first three weeks. A high percentage of migration was observed in the blocks planted with the Cry1Ab gene and in the control blocks in particular.

In the blocks containing the Cry1Ab plants, the number of damaged plants always exceeded the percentage of TIS, except in the case of the 20% TIS (**Graph 1 in red**). No significant differences were observed in stalk borer damage if maize plants with the Cry1Ab gene were planted with the various percentages of TIS.

In blocks planted with the stacked gene the percentage of damage was always lower than the percentage of TIS, and the damage also differed significantly from the control (**Graph 1 in blue**). This means that the plants with the Cry1Ab gene were also damaged, but not in the case of those with the stacked gene. Previous studies have already proved that the number of non-Bt plants that can be damaged by one stalk borer egg package can be between three and seven plants next to one another. This implied that the observation of stalk borer damage in the Cry1Ab blocks was the same as in the case of non-Bt maize.

The level of migration and survival of stalk borer larvae planted with seed mixtures of Bt and non-Bt seed will depend on where the original infestation occurred – on a Bt or a non-Bt plant.

The probability of a non-Bt plant being the source of infestation is small, as the number of non-Bt plants in a TIS strategy will be low. The large-scale migration that was observed in the study showed that the TIS strategy could be contributing to larvae being exposed over time to sub-lethal doses of Bt, which could lead to selection pressure and the development of resistance.

The study revealed that in the case of seed mixtures containing more than 5% non-Bt seed, larvae can survive. This confirms that seed mixtures are not necessarily the designated management strategy to be followed to counteract insect resistance if a pest is known to migrate between plants.

Article submitted by Dr Annemie Erasmus, ARC-Grain Crops Institute, for SA Graan/Grain January 2013. For more information, send an email to erasmusa@arc.agric.za

Photo 1: A Chilo borer.

Photo 2: A maize stalk borer.

Identify weed species effectively

Weeds can be defined as any plant that grows where it is not desired and the term is usually associated with any plant that competes in commercially produced agricultural crops.

This does not mean that weeds are "bad". Without the diversity of the plant kingdom and the ability to reproduce millions of seeds that can survive for decades our precious topsoil would disappear after intensive cultivation. Millions of weed seeds are always present in every hectare of tilled soil and are ready to germinate at any time when moisture and climatic conditions are suitable.

Weeds also act as hosts for both a broad range of problem insects and diseases as well as the insect predators that control them.

Previous Pula articles have highlighted the moisture sapping abilities of weeds and the chemicals required to control them.

> *"When looking at the weeds in you lands, start your identification by seeing whether or not they are annual or perennial.*

Weed classification and types

Weeds that affect agricultural crops can be broadly described as either annuals or perennials. Annual weeds complete their whole life cycle in a single year with the plant dying at the end of the cycle after setting seeds that will germinate next year. Perennial weeds have cycles of growth each year but go into a dormant winter state, overwinter on nutrients stored in their roots, and then start growing again in warmer conditions during spring.

When looking at the weeds in you lands, start your identification by seeing whether or not they are annual or perennial. These types are further classified into monocotyledons that have a spread out and disparate or adventitious root system as compared to dicotyledons that have a taproot system. Monocotyledons germinate by extending the primary shoot from the seed through the soil and dicotyledons extend two or "di" primary leaf structures known as cotyledons through the soil into the air. Examples of a monocotyledon crops are a maize and sorghum plant and example of dicotyledons crops are sunflowers and soybeans. Dicotyledonous seeds produce broad leafed weeds while monocotyledonous seeds produce grasses and sedges.

Annual as well as perennial weeds include both monocotyledon and dicotyledons types.

Other broad distinctions can be made by observing whether or not the weed seeds are small seeded and therefore will germinate from a shallow position, being 0 mm - 50 mm, in the soil or large seeded and that will consequently only germinate from a deeper position being, 50 mm - 150mm, in the soil. Weed seeds can reproduce and propagate themselves by extending roots on the surface of the soil or by extending stolons under the soil or by means of seed or both.

Herbicide control in maize

Broad leafed weeds with a surface root system can be much more easily controlled mechanically than annual grasses and sedges. It is important to make a distinction between grasses and sedges as most herbicides only control one or the other.

Important weeds in maize

A list of weeds that are important to control would include the broad leafed types and the grasses and sedges. Farmers commonly use both English and Afrikaans names for common weeds. The problem is that in some areas different weeds have similar common names. It is thus very important to be able to identify the weed by its Latin name as well as its common name. The specific chemical control measures can then be decided on in consultation with your herbicide supplier or consultant.

The use of incorrect herbicides on wrongly identified weeds can be very costly. It is also extremely important to apply the recommended dosage in order to effectively kill the weeds. Many broad leafed, grass and sedge types have become resistant to the normal cost effective herbicides throughout South Africa because farmers have sprayed a "half dose" to save short term costs.

It is almost mandatory that each farmer have a copy of these books: Common weeds of crops and gardens in SA ISBN: 978-1-86849-399-9 and Alien Weeds and Invasive Plants in SA ISBN: 1-86849-192-7, both of which can be obtained from the ARC.

Sedges

Sedges have a huge impact on maize yield if not controlled and include yellow nutsedge (*Cyperus esculentus*) or *geeluintjie* and purple nutsedge (*Cyperus rotundus*) or *rooiuintjie*.

Grasses

Grasses that are the main problem weeds in maize production include common couch grass (*Cynodon dactylon*) or *kweekgras*, herringbone grass (*Urochloa panicoides*) or *beesgras*, naked crabgrass (*Digitaria nuda*), johnson grass (*Sorghum halepense*), goose grass (*Eleusine coracana*) or *jongosgrass*.

The wandering jew (*Commelina benghalensis*) is now becoming very resistant to chemical control in various districts.

Broad leafed weeds

There are many broad leafed weeds that need to be controlled and include the following types.

Perrennial pigweed (*Amaranthus deflexus*) or meerjarige misbredie, common pigweed (*Amaranthus hybridus*) or gewone misbredie, thorny pigweed (*Amaranthus spinosus*) or doringmisbredie, red pigweed (*Amaranthus thunbergie*) or rooimisbredie, eight seeded prostrate starbur (*Acanthspermumn australl*) or agtsadige kruipsterklits, horseweed fleabane *Conyza Canadensis* or *amoedskruid*, dwarf marigold (*Schkuhria pinnata*) or *kleinkakibos*, spiny cocklebur (*Xanthium spinosum*) or *boetebosssie*, hairy creeping milkweed (*Euphorbia chamaesyce*) or *harige kruipmelkkruid*, prostrate knotweed (*Polygonum aviculare*) or *volduisendknoop*, and purslane (*Portulaca oleracea*) or porsein or *varkkos*.

The above list shows the diversity of weed types that affect commercial maize production and is not meant to be an exhaustive list by any means. Certain weed types become problems in areas were the monoculture maize is practised and differ from district to district depending on the cultivation or conservation tillage practices followed.

Conclusion

The onus is on each farmer to become aware of and proficient in being able to identify all the weed species on their farms that will have an impact on your crop production. Only by knowing your weeds can the correct control measures be implemented.

Article submitted by a retired farmer.

RISKS – not unknown in farming

First of all what is a risk? A risk is the possibility that an unforeseen, unplanned, unnatural, out of the ordinary, unexpected event may occur and could cause a loss of some nature.

How does this affect a farmer? What do you do when you farm? A farming business can be described as a business producing and marketing agricultural products with the aim of being financially successful. However when you commence with the production of an agricultural product you face possible risks.

During the **production process** numerous events can occur such as uncertain climatic conditions (droughts, flooding, hail, severe frost) and the occurrence of disasters such as veld fires and the outbreak of plant and livestock diseases. Because of the physical damage, events such as mentioned have a serious influence on the financial success of the farm business.

During the **marketing process** events may occur that could disrupt the marketing process and/or affect prices adversely. The loss can be physical – you cannot market your product (bridges are damaged during a flood). Or the price of your product may drop due to changes to the policy environment (import tariffs for instance) and remember farmers are price takers. Financial institutions, co-operatives, input providers, product processors, et cetera sometimes act unpredictably. Remember the milk price?

You may also experience unpredicted negative conduct by your staff. Thoughtless behaviour by either the farmer or his staff could lead to unnecessary disruptive action as was experienced last year in the Western Cape, resulting in an interruption of the production and/or marketing of products.

Financial risks could be a lower income and/or problems with maintaining a positive cash-flow position, thus affecting the financial success of the business. It should be noted that production, marketing and financial risks are closely interrelated.

How can I manage risks?

It is a fact that there is no other business as prone to risks as a farming business. Therefore it is absolute necessary to manage your production and marketing and therefore your finances in such a way that the effect of the unforeseen events are minimised.

What about your production function?

First of all. We all know the saying "Do the basics right". In practice, farm with whatever you are farming as correctly as possible. Prepare your lands correctly, plant at the correct depth, do proper weed and pest control. If a dry period occurs and your maize plants have to compete with weeds for moisture the adverse affect will be more severe.

Do what you need to do with your livestock. Inoculate them as needed, control internal and external parasites properly, and so forth.

Remember in nature pests and diseases always attack the weakest fore mostly.

Secondly, do whatever you can to soften the blow of risks. Make the necessary fire breaks to at least give yourself an opportunity to fight an unexpected veld fire. Attend to water runoff courses to soften the damage of a sudden flood. Attend to build up a feed bank (make hay and/or silage) as a reserve should you experience a drought situation.

Thirdly consider to diversify. Diversify your farm business into more than one enterprise if possible but be mindful not to over diversify thereby burdening your management. Diversification entails a combination of farming enterprises that are not subject to the same risks. Diversify into crops that have different growth periods and are not equally susceptible to drought. The addition of a livestock enterprise will have a great effect on lowering risk. The price cycles for livestock do not coincide with those of crops. In addition, the marketing program of the livestock enterprise could be planned in such way that it improves cash flow throughout the year. The more diverse enterprises are the more risks are countered.

What about your marketing function?

Develop a marketing strategy to address most of the price risks. Crop farmers could make use of the futures market and forward contracts as ways to minimise prize risk. Sales contracts between farmer and dealer give both parties the assurance of secure prices and delivery. Through storage, the farmer can control the supply of agricultural products to the market. This will enable the farmer to negotiate better prices when demand becomes more favourable. Basically diversify the marketing of your crop. Market in different ways, to avoid being dependant on one price structure.

This principle can also be applied to livestock production, market your livestock in different ways – out of hand, auctions, contracts, delivering to abattoirs.

> *"All we know for sure, is that tomorrow will not be the same as today.*

Let's attend to the finances of your business

It is important to **maintain liquidity** in other words to have cash available when needed, ensuring that the farm business can meet its short-term liabilities. An unhealthy cash flow could arise from poor production conditions or declining product prices. Diversifying into two or more enterprises could assist in maintaining liquidity.

Another way in which financial risk can be managed is to pass the affect of an adverse event on to **insurance** companies. Insurance companies specialise in providing services to the agricultural sector to reduce the adverse affect of risks.

Lastly – do not forget about your human resource management

The labour unrest experienced by Western Cape farmers has brought human resource management on farms to the fore. The question is "What can I do to prevent something like this happening to me?"

A proper human resouce policy supported by proper records is the foundation for proper human resource management. Without these you run the risk of labour unrest.

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

Grain SA interviews...
Limos Malgas

Limos Malgas is a 61 year old developing farmer from the Malahleni Local Muncipality under the Chris Hani District Muncipality in the Eastern Cape. This month you can read more about this hard working, dedicated and eager to learn farmer.

On how many hectares are you farming? What do you farm with?

I farm on 454 ha and produce maize on 100 ha. I also farm with cattle and sheep.

What motivates/inspires you?

I grew up on a white farmer's farm and with my parents, I was a farm worker. It was my dream to be self employed. This dream came true after I found employment at the Cape Harbour.

Describe your strengths and weaknesses

Strengths: I am hard working, prepared to take risks, committed, dedicated and eager to learn from others as well as to take and implement advice.
Weaknesses: I am not educated to understand business.

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

My yield was 3 tons/ha and now I am getting 4 tons/ha.

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

The main contributor to my progress and success are the Grain SA training courses as well as the advice I receive from my Grain SA co-ordinator.

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

I have completed the Contractor's Course training. I would still like to attend the Introduction to Maize Production, Setting of Implements, Workshop Skills as well as the Farming for Profits courses.

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

In five years time, I would like to see myself as a commercial farmer, being able to use all the knowledge I have obtained in practice. I would also want be part of the 250 Ton Club.

What advice do you have for young aspiring farmers?

That employment in the country is scarce and that farming is a good way of living because you are self-employed.

Article submitted by Lawrence Luthango, Development Co-ordinator of the Grain SA Farmer Development Programme. For more information, send an email to lawrence@grainsa.co.za.

The Corner Post

What will the new year bring?

A new year has arrived on our doorstep once again and who knows what lies in store for us! Have you thought seriously about what are you going to do differently this year?

Farmers, being the eternal optimists almost always start the New Year thinking, "This is the one – it's definitely going to be better than last year!" Unfortunately, both we and our bank accounts are so linked to the weather that often we feel helpless, and think that everything is out of our control. But actually this is not the case – only certain things are out of our control.

Yes, we don't have any control over if it rains or not; nor how much it rains. The temperatures, the markets, the value of the rand and which country is at war with which! Why not do yourself a favour, be proactive and do what you can to set your mind at ease? Stop worrying about the things you cannot change. Worrying about issues beyond our control and outside of our power or authority, takes up far too much of our time and only serves to sap our energies. They also too often depress us and distract us from properly focussing on the things that in fact we can do something about. A wise farmer will choose to rather make the decision to use precious energy and time to be future focussed and do some planning around matters he does have control of.

There is a saying that says: "If we fail to plan – then we are planning to fail!" Planning is of utmost importance in all businesses and farming is no different! Too often we go from day to day and year to year doing things over and over in the same way as before and then strangely, we even often wish that things had turned out differently. Sometimes it is necessary to take stock of our businesses and decide what is working well and what needs to be changed. So, where should we start?

A good place to start when planning anything is focus by asking oneself some key questions like:

What are my goals?

Business goals should be like the rudder that steers a ship; if you are aimless in your business with no clear direction, you have a good chance of hitting the rocks! Set short term goals from one month to one year; then medium term goals which cover from one to five years and long term goals ranging between five to ten years. These goals should be written down in a diary or placed on a wall where they can be studied regularly to remind and re-focus one. It is also very important that these goals should be both **REALISTIC** and **MEASURABLE**. Goals are not dreams, they are possibilities which can be reached and made real. It doesn't help anyone if the goals are impossible, that is just another stress.

It is also important to make a distinction by having a set of goals for one's business and also a set of personal goals. These are different – but both sets of goals are very important to bring about harmony in one's life and make one a better farmer. Business goals should also never be in conflict with one's personal goals, that is, they must be in line with what the family's needs and ambitions are, and neither should these goals conflict with one's moral and ethical views. Decisions must leave one with a clear conscience, and the strength of conviction to carry them through.

So, when the broader goals are decided, allow these to give the direction. This will allow more meaningful decision making about the finer details to plan how to get to the goal. Also, one must try not to make the same mistakes over and over. If a practice keeps costing money, it should either be change it or done differently.

What am I PASSIONATE about?

One person will make a success of the same thing that another will fail at, just because of a different approach, or maybe a greater passion for that thing he or she is doing. It is important to identify what makes one excited in farming. If one has a passion for something one is more likely to make a success of it, so don't pursue a venture just because it seems like a money spinner, because it is fashionable or "just because everybody else is doing it". Analyse, do research, and if you really believe in your plan, then go for it full out.

What must be done?

Spend time and energy on planning. Make changes to the things you have control over. If you do decide that you want to make any drastic operational changes, make sure they are in line with both your business and personal goals. Set up a budget and plan your finances carefully and realistically. Get out on the farm, drive around your lands, and check fences and bad roads. Do more maintenance on your equipment or tidy your store rooms. There is always something out on the farm that needs our attention!

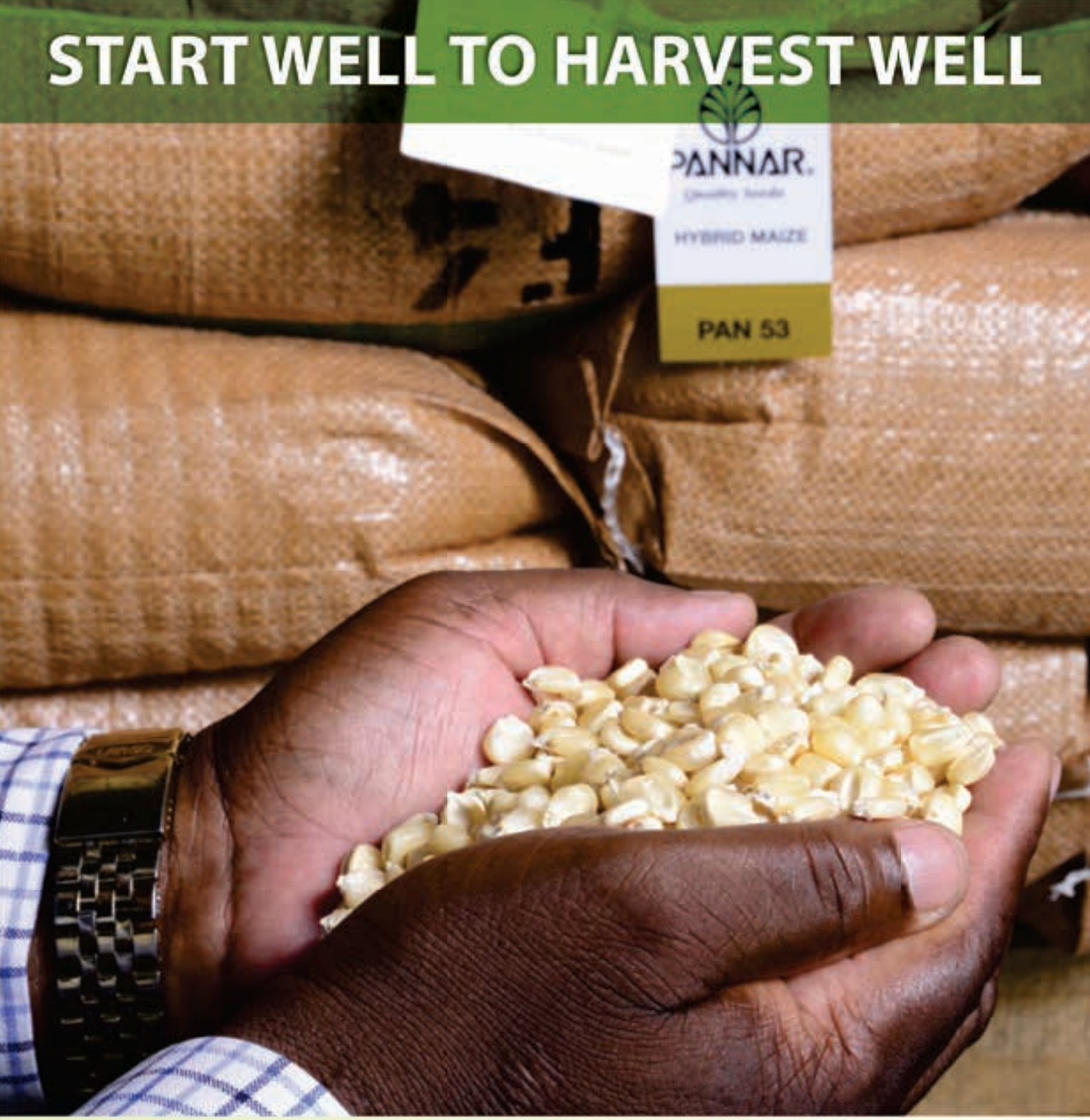
Read! Learn! Ask!

If you have analysed your business and feel you are weak in some key area then it would be wise to do something about it. As farmers we are never too old to learn in our constantly changing world! Getting help may mean going on a course or maybe just paying a visit to your neighbour. Don't be scared to ask, it can save you a lot of time and money as often those people have already made the mistakes and paid the "school fees". An old Chinese Proverb says, '*A single conversation with a wise man is worth ten years of study*.'

So remember next time you are sitting waiting for rain or maybe for some sunshine, and stressing about it, rather use that time constructively and work on the things you can do something about. The famous psychiatrist and Holocaust survivor, Viktor Frankl, said, "When we are no longer able to change a situation, we are challenged to change ourselves." I encourage you to think positively and act proactively rather than allow worries and despair to drain your energies.

This month's edition of The Corner Post was authored by Jenny Mathews, Pula/Imvula contributor. For more information, send an email to jenjonmat@gmail.com.

START WELL TO HARVEST WELL



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