

OILSEEDS

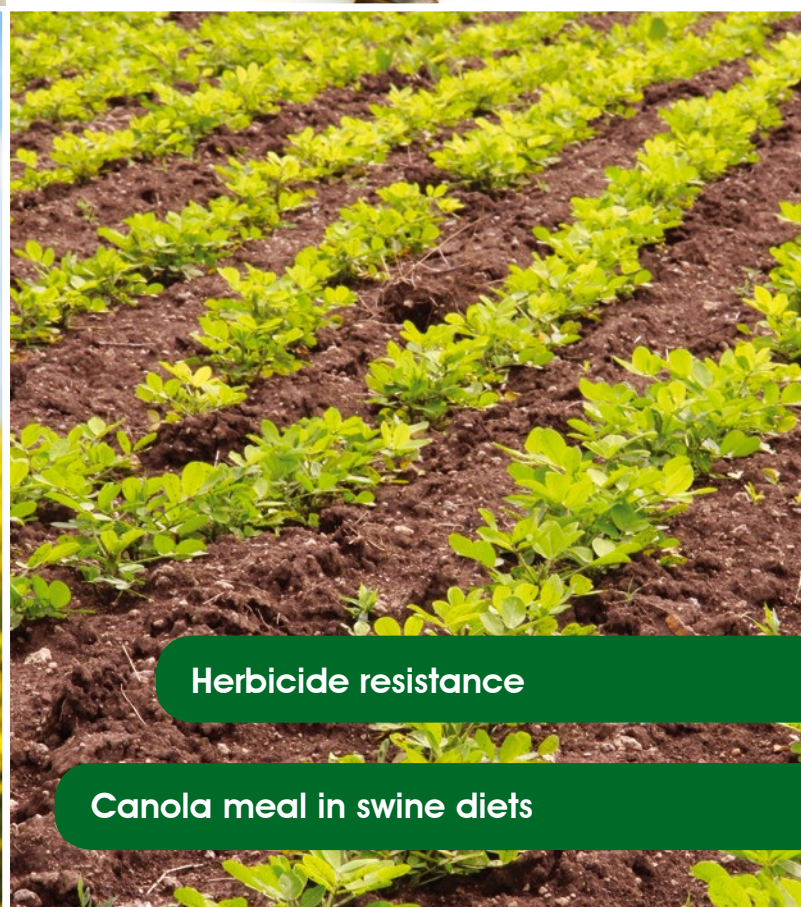
focus

Protein Research Foundation • Oil & Protein Seeds Development Trust • Oilseeds Advisory Committee



White leaf spot

Crop quality survey results



Herbicide resistance

Canola meal in swine diets

AFMA Forum 2016

STANDARD REGISTRATION CLOSES ON
31 JANUARY 2016!

**Sun City,
South
Africa,
1-3 March
2016**



The Animal Feed Manufacturers Association (AFMA) will once again host Africa's leading conference on animal feeding and nutrition – AFMA Forum 2016.

The 9th AFMA FORUM 2016, a triennial event, held from 1 to 3 March 2016 at Sun City, South Africa creates a platform where local role-players are informed of the latest international developments in the animal feed and nutrition industry.

Who should attend?

- Feed and food manufacturing companies
- Feed ingredient suppliers, including additive and premix suppliers
- Service providers to the feed and feed related industries
- Food processing companies
- Food industry input suppliers
- Service providers to the food processing and food related industries
- Biofuel and renewable energy industries
- International government and non-government organisations
- Government feed and food regulators
- Laboratories
- The grain and oilseed trade
- Service providers and input suppliers to the trading fraternity
- The agriculture bio-technology industry
- The fertilizer industry

Conference Topics:

- Global feed situation (International & African perspectives)
- Alternative animal health strategies through nutrition
- Feed additive technology
- Speciality ingredients
- Feed processing & technology
- Ruminant nutrition
- Monogastric nutrition (pigs and poultry)

For more information:

Contact the AFMA Office:

Tel: +27 (0)12 663 9097 / 663 3282

Fax: +27 (0)12 663 9612

E-mail: admin@afma.co.za

Contact the Conference Organisers:

Tel: +27 (0)21 422 2402

Fax: +27 (0)86 620 4555

E-mail: caro@soafrica.com

Stay informed – visit www.afmaforum.co.za



facebook.com/afmasouthafrica



twitter.com/afmasouthafrica

By Andries Theron, vice-chairperson of Grain SA

REVITALISING THE WHEAT INDUSTRY:

Problem solved or tip of the iceberg?

Winter grain producers would perhaps congratulate the editorial committee of *Oilseeds Focus* for compiling an attractive, scientifically correct and usable reference for research purposes. By addressing one of the key challenges in the grain and oilseeds industry, namely individualism or silos, the team positioned itself as a key role-player to benefit the entire value chain.

Although this publication focuses on oilseeds, I would like to focus on an industry that we all know, by discussing the rationale behind the revitalisation of the wheat industry. How is a producer affected and what solutions are offered to assist him to continue production?

Downward spiral

The South African wheat industry has been on a downward spiral for the last 15 years – from being self-sufficient and producing three million tons of wheat, to the current situation where the country has to import 1,9 million tons of wheat, with local production on 1,5 million tons.

The drivers behind this downward trend are legion – some being the impact of genetically modified (GM) maize in the northern dryland wheat-producing region, climate change and other crops such as canola and soya bean. However, the main driver has been profitability.

In a country where free market principles are applied, local producers have to compete with imported wheat from countries where production is subsidised and the quality of imported products is of a lesser value. Although this determines the price of local wheat, these influences placed the self-sustainability of wheat under pressure, and farmers have turned to canola, soya bean, barley and livestock to survive.

In order to revitalise an industry, constraints had to be identified and solutions found.

Lack of communication

A lack of communication between role-players has been the constraint that had the biggest impact on the wheat industry. The scare of the Competition Commission also had a negative impact on the industry. Value chain members were too wary to be seen together, and valuable communication to enhance production and quality ceased to be available.

Production took place without knowing the needs of product off-takers or those of the market. We used to be pleased with the quality of locally produced wheat, but substantial lowering of quality and grading standards was implemented without jeopardising product quality. The benefit of this is that with the slightly lower standards, we can increase cultivar yield with breeding and produce at a lower cost and still obtain the same grades.

Quality standards

The availability of information on quality, grade and product origin is essential to ensure the best price for what is produced. Wheat has specific quality characteristics and grades for where it was produced and stored. The more information producers can relay to clients, the better their chances of determining price.

There are still different criteria for locally produced wheat compared to imported products. We are global players who play by international rules. Producers will comply and the same rules should apply to off-takers.

Research and technology

Research and the availability of the best technology and new inventions are a must. Government-funded research is questionable and its continuation is uncertain. In order to be competitive, research focussed on production, practices and new cultivars is crucial. Time and funds are limited. Available research should be utilised to the benefit of local production. If

the value chain identifies research that will add value, it will have to fund itself.

Change is essential

Change is inevitable, but creates uncertainty. However, well devised and executed change brings about sustainability, profitability and food security.

Almost two decades have lapsed since the end of the regulatory market system and the implementation of free market principals. New guidelines were developed, new trading institutions were established and the South African Futures Exchange (Safex) widened horizons. However, a reluctance exists to revisit and refine this model that has been operating for so long. During deliberations on the revitalisation of the wheat industry, it soon became clear that the systems in place are lacking. Lessons learned should have an impact on outdated guidelines and regulations.

In order to survive in this fast-paced business world, change and adaptability are essential. With an exchange rate that has deteriorated by almost 50% over the last nine months, stagnation would have a producer out of business by now. Swifter and timely adaptation to an ever-changing business environment is inevitable.

Political uncertainty

With political uncertainty in an unstable environment, a farmer has to pose relevant questions before investing in a business.

An economy of scale can present a solution or threat. It makes economic sense, but the government requires land for redistribution. Move from grain to livestock, and one has a lower income and risk. Whatever solution we plan for wheat, government involvement must be limited.

The revitalisation of the wheat industry was a wake-up call. We ought to address the challenges before food shortages force us to take drastic measures to revitalise our industry. 🌱

The long-term strategy of the oilseeds industry

Significant progress has been made toward achieving the long-term goals of the oilseeds industry, which, among others, should be self-sufficiency, sustainability and global competitiveness. It is imperative that each individual oilseed value chain continuously reconsiders its short- and long-term objectives in order to measure the progress that has been made.

Achievements

We have had mixed success in the growth of oilseed production, with soya taking the lead at 283% growth over the last decade, followed by canola at 253%, sunflower remaining relatively stagnant at 1% and groundnut production showing a reduction of 25%.

The crush capacity investment has been a breakthrough for the oilseeds industry and it should be sufficient until 2025. Only then will we begin to have concerns over crushing capacity. The quality of oilseeds meals being produced in South Africa has also improved significantly, and will continue to do so in order to remain globally competitive.

Challenges

Maintaining growth in the oilseeds industry will demand not only hard work, but innovation, technology application and negotiating the environmental challenges such as drought. We look forward to this challenge and trust that all the industry role-players will keep up the great work that has been done thus far.

Oilseeds Focus in 2016

During a recent editorial committee meeting, the management of *Oilseeds Focus* decided to change the frequency of the magazine in 2016, so that we will henceforth have editions in March, July, September and December. Previously we published in January, April, August and November, but these months proved to be problematic in terms of not only market news and trends, but also from an advertiser's viewpoint.

We believe that the new frequency will meet everyone's approval and allow our advertisers to showcase their products during months that support their product promotions.

We once again wish to extend our invitation to industry role-players to submit articles for publication in *Oilseeds Focus*. This is your publication and we look forward to publishing your research and technical articles.

A new year awaits

The year 2015 ended on a difficult note, but we however remain positive people by nature. We trust that influencing factors such as drought and a poor economy will be alleviated and that all producers and role-players in the value chain, will be able to continue to prosper in our agricultural sector. A successful 2016 is wished upon every role-player in the oilseeds industry.

Dr Erhard Briedenhan

Send us your contributions and suggestions to make *Oilseeds Focus* an enjoyable and valuable publication for the oilseeds industry. Contact Dr Briedenhan at erhardb@netactive.co.za for more information.

Editor: Dr Erhard Briedenhan
082 551 1634 • erhardb@netactive.co.za

Committee members

Gerhard Scholtemeijer • 011 803 2579
Gerhard Keun • 011 803 2579
De Wet Boshoff • 082 301 1035

Panel of experts

Dr Jos de Kock
Prof André Agenbag
Mr Chris Cumming
Mr Adam Mostert
Prof Hettie Schönfeldt
Dr Dirk Strydom
Dr Ferdi Meyer

Published by: Plaas Publishing (Pty) Ltd
217 Clifton Ave, Lyttelton, Centurion, RSA
Private Bag X2010, Lyttelton, 0140, RSA
Tel: +27 12 664 4793 • www.veeplaas.co.za

Chief editor: Lynette Louw
+27 84 580 5120 • lynette@veeplaas.co.za

Sub-editor: Gerry van Niekerk
+27 12 664 4793 • gerry@veeplaas.co.za

Design & layout: Karien van Wyk
+27 12 664 4793 • karien@veeplaas.co.za

Advertising: Monique van der Walt
+27 71 893 3731 • monique@veeplaas.co.za

Accounts: Marné Anderson
+27 72 639 1805 • marne@veeplaas.co.za

Subscriptions: Rochelle Mabebe
+27 74 153 8380 • rochelle@veeplaas.co.za

Printed and bound by: United Litho
+27 11 402 0571

Oilseeds Focus, Plaas Publishing and its staff and contributors do not necessarily subscribe to the views expressed in this publication.

© Copyright: No portion of this magazine may be reproduced in any form without the written consent of the publishers.

Published on behalf of:
Protein Research Foundation
PO Box 1564, Rivonia 2128

Tel: 011 803 2579 • Fax 011 803 2287 / 086 634 8067
Enquiries: gkeun@proteinresearch.net

To subscribe

Oilseeds Focus is a magazine aimed at addressing issues that are relevant to the canola, soya bean, sunflower and peanut industries. To subscribe please contact Tanasha Moonsamy at 012 664 4793 or email tanasha@veeplaas.co.za. Subscriptions are free.



CONTENTS

- 1 Preface
- 2 Editor's note

AGRONOMY

- 4 White leaf spot in the Western Cape
- 7 Increasing soya bean yield

CHEMICALS & FERTILISER

- 11 Herbicide-resistant weeds in soya beans

PROCESSING

- 15 Choosing the right no-till implements
- 18 Saturated and unsaturated lipids

MARKETS

- 20 Price outlook for grain and oilseeds

LOGISTICS

- 23 Crop quality survey results for 2014/2015
- 26 Soya bean to control herbicide resistance

QUALITY

- 29 The value of canola meal in swine diets



15



18



29





By PJA Lombard and L Nowers, Directorate Plant Sciences, Western Cape Department of Agriculture

Mature lesions that sporulate.
(Photograph: P Lombard)

WHITE LEAF SPOT

in the Western Cape

White leaf spot is caused by the fungus *Pseudocercospora capsellae*. White leaf spot or grey stem is a disease that is widespread in Western Canada and Australia (Canola Council of Canada, 2014; Department of Environment Primary Industries or DEPI, 2010; and Marcroft and Hind-Lanoiselet, 2009). The disease occurs in Canada when the crop is ripening, but it is usually too late in the season to significantly affect crops. In Australia this disease occurs during autumn and winter.

In 2013 the Directorate Plant Sciences at Elsenburg Agricultural College positively identified the disease on canola in the Malmesbury district in the Western Cape. In 2014 the same symptoms were observed over a large area in the province, including the Overberg. It was again positively identified as white leaf spot, but this time by the Department of Plant Pathology at the University of Stellenbosch.

In 2015 only a few isolated outbreaks of the disease were observed. In our winter rainfall area the disease occurs earlier in the season than in Canada and Australia, rendering canola more prone to yield losses from white leaf spot, due to the extended period for disease development in our climate.

Disease symptoms

In Canada canola is planted in spring and the disease consequently appears in summer, while in the Western Cape symptoms appear in winter and as early as mid-July. Severe lesions on leaves can lead to premature leaf loss (Canola Council of Canada, 2014; DEPI, 2010; Marcroft and Hind-Lanoiselet, 2009).

White leaf spot forms grey-white to brown leaf lesions, often with a brown edge, especially in an advanced stage. It is important to note that no pycnidia (black fruiting bodies), as is the case with blackleg, are produced in the lesions. These two diseases could, however, occur together on the same weakened plant.

Leaf spots can be up to 1cm in diameter. They often join together to

form large dead areas. The older leaves turn brown and fall off first, and the younger leaves typically follow as the disease develops. Cultivars that are susceptible to white leaf spot can suffer a complete loss of leaves. In severe epidemics, infections can defoliate susceptible varieties. According to the Department of Agriculture and Food of Western Australia (Dafwa), crop losses due to this disease vary, but it is rarely economically justifiable to apply chemical control under these conditions.

The fungus survives on canola stubble as thick-walled mycelia and produces wind-borne spores.

The observation in the Western Cape is that since the disease occurs very early in the growing season, the resulting defoliation hampers photosynthesis to such an extent that nutrients cannot be translocated to the pods.

Canola crops that suffer a nitrogen deficiency seem to be more susceptible

to white leaf spot. When the plants ripen, large purple and grey lesions form on pods and stems.

Laboratory identification of the disease can be done by the Plant Disease Clinic at the University of Stellenbosch and the Directorate Plant Sciences of the Western Cape Department of Agriculture.

Life cycle

The fungus survives on canola stubble as thick-walled mycelia and produces wind-borne spores. This is the sexual stage of the fungus, called *Mycosphaerella capsellae*. During prolonged wet weather conditions in autumn and winter, these spores infect canola plants. After infection

has taken place, the fungus, now in its asexual phase, causes the development of white to pale yellow spots on the lower (older) leaves.

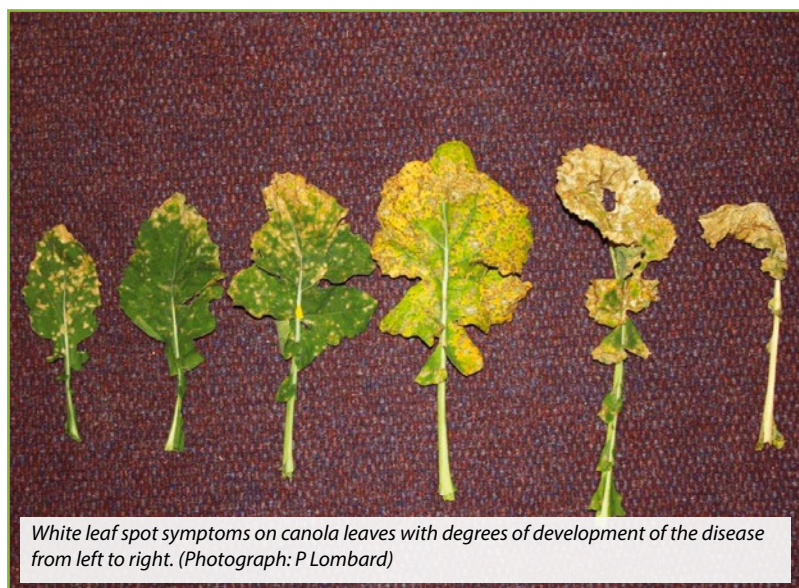
The fungus now produces wind-borne conidia that cause the disease to spread rapidly. The optimum temperature for the development of the disease is 13 to 18°C at high humidity levels. Therefore, white leaf spot usually develops after periods of heavy rain.

The disease is not usually seed-borne, but can spread infected debris with or on the seed. Farm-retained seed poses a great threat. The disease has a wide host range (mainly the

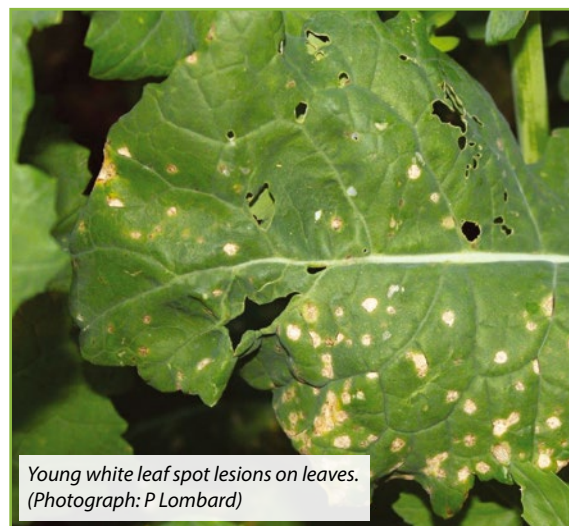
mustard- and wild radish-type weeds) in Canada, but unfortunately no such information is available for the Western Cape.

Chemical control

No fungicide is presently registered for the treatment of white leaf spot on canola.



White leaf spot symptoms on canola leaves with degrees of development of the disease from left to right. (Photograph: P Lombard)



Young white leaf spot lesions on leaves. (Photograph: P Lombard)

Management tips

- Follow a rotation system where canola is planted only every four years. This allows sufficient time for infected residues to break down.
- Plant clean seed. Farm-retained seed can be contaminated with infected debris.
- Plant canola as far away as possible (500m) from the previous season's planting to decrease the risk of infection by wind-borne spores.
- Keep the direction of the prevailing autumn and winter winds in mind, to prevent planting canola upwind of contaminated fields.
- It can be beneficial to destroy widely infested stubble, although the practice is detrimental to soil health. Stubble can also be heavily grazed as an alternative.
- Plants under stress are more easily infected by white leaf spot, therefore good crop practices should be followed (*Canola Production Manual*).
- The control of volunteer canola, wild radish- and mustard-type weeds aid in the prevention of the disease.



Lesions on stems just before and during harvest. (Photograph: P Lombard and Canola Council of Canada)

Contact Piet Lombard at pietl@elsenburg.com for more information and references. 🌱



LINK SEED

Sojaboon-pakket

Sojabone – die bobaas wisselbougewas

Kort, Vinnige Groeiseisoenklas
Groep 4.4 en Groep 4.0

LS 6444R en LS 6240R

- *Wyd aanpasbaar
- *Uitstekende staanvermoë en uifers geskik vir nou rye
- *Goed aangepas vir droëland en besproeiing
- *Goeie peulhoogte vir 'n vinnige groeiklas
- *Uitstekende opbrengs potensiaal



Groep 4.6 en Groep 4.8
Groeiseisoenklas

LS 6146R en LS 6248R

- *Wye aanpasbaarheid en goeie opbrengs vermoë
- *Goed aangepas in veral die koel en gematigde dele
- *Goeie staanvermoë en peulhoogte

Medium
Groeiseisoenklas
Groep 6.1

LS 6161R en LS 6261R

- *Smalblaar kultivars, goed aangepas vir droëland en besproeiing
- *Uitstekende staanvermoë
- *Wye aanpasbaarheid
- *Uitstekende opbrengs
- *Korter, regop groeiwyse

Medium
Groeiseisoenklas
Groep 6.4

LS 6164R

- *Uitstekende agronomiese eienskappe
- *Baie goeie peulhoogte
- *Verkies gematigde tot warm gebiede

Groep 6.6
Groeiseisoenklas

LS 6466R

- *Baie goeie peulhoogte
- *Goed aangepas in gematigde en warm produksie gebiede

Kontak:

Tel: (033) 417 1494

Faks: (033)413 1057

E-pos: linkseed@linkseed.co.za



Roundup Ready® is 'n geregistreerde handelsmerk en gelisensieer deur Monsanto Beperk



By Wessel van Wyk, contractor at
the Protein Research Foundation

Increasing

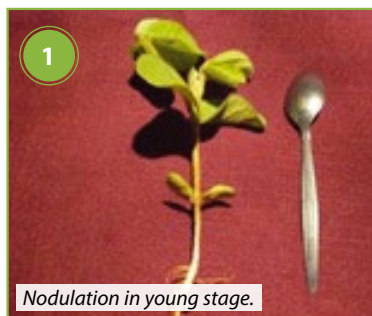
SOYA BEAN YIELD

With substantial research on soya bean cultivation, yields of above 5,5t/ha and even above 6t/ha are often achieved under irrigation nowadays. There is, however, still room for improvement and if the farmer can correctly follow the basic principles, yields can increase even further. The five main cultivation factors in order of importance are:

- Good inoculation.
- Good weed control.
- Good planting techniques.
- Good soil fertility.
- Good disease and pest control.

Inoculation

Soya beans should be properly treated annually with quality *Bradyrhizobium* inoculant from reliable suppliers – whether with inoculant on the seed or in the furrow, or both in the case where soya beans are cultivated for the first time or when extreme heat conditions occur during planting.



When soil contains little or no residual nitrogen, up to 20kg N/ha can be applied at planting to bring about initial more rapid growth. Early nodulation (plants between 8 and 10cm high) is ideal and on bigger plants the nodules should be arranged widely and around the taproot (Photos 1 and 2).

Weed control

There should never be a weed larger than 2,5cm on soya bean fields. Since soya is already planted at tremendous high densities, it should not also have to compete with weed. Pre-emergence weed control with a good broad-spectrum herbicide is non-negotiable. With good initial weed control it is only necessary to do at most one glyphosate spray application (Photos 3 and 4).



It is advisable to also avoid ever planting in weeds. In Photo 3 it can be seen that the soil behind the irrigation pipe is cultivated better than where the proof is located in the foreground. Notice the excellent weed control that was obtained – sedges exclusively in this case. In Photo 4 good

pre-emergence control was done with no other follow-up weed control at this stage.

Planting techniques

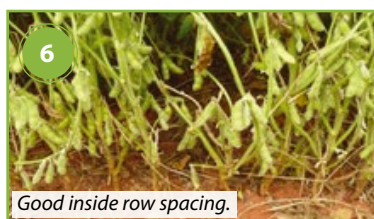
Factors that play a huge role at planting time are:

- **Planting depth:** Plant between 2 and 4cm, depending on the soil's moisture content.
- **Planting speed:** Plant at less than 7km/h for better placing of seed.
- **Emergence of plants at the same time:** From breaking ground until all the plants are out, growth has to take place within 24 hours and this is achieved with even planting depth and seed size.
- **Plant population and row width:** Use Table 1 to determine which plant population is optimal with different row widths. Cultivars differ with regards to optimal plant stand. It is advisable to contact the seed company for more information. Early determined growers that usually have an upright way of growth, are planted at plant stands of 400 000 and more. Undetermined growers with more bushy growth can, depending on the number of side branches that are formed, have as few as 180 000 plants/ha as final plant population.

It is generally advisable to have at least 240 000 plants/ha as final plant population. It is important to always plant approximately 10 to 15% more seed than the intended plant population, depending on the germination vigour of the seed and on weather conditions.

Inside row spacing: More than 23 plants per running metre causes interplant competition to occur, giving rise to the suppression of certain plants that then eventually have no or little contribution

to final yield. Compare *Photo 5* (farmer) with *Photos 6 and 7* (ideal) where plant populations are close to identical, but poor inside row spacing by the farmer has led to poor yields.



Soil fertility

Good inherent fertility of the soil where soya beans are planted is essential. The soya on *Photo 8* was planted without any fertiliser, but the soil fertility is high and residual nutrients were effectively utilised. It is, however, vital to always fertilise soya beans and to ensure that the soil's nutritional status is kept at an optimal level.



The nutritional needs of soya beans are high and each ton of grain removed per hectare will withdraw the following quantities of nitrogen (N), phosphorus (P), potassium (K) and sulphur (S) from the soil.

- Nitrogen (N): 75–105kg N/ha.
- Phosphorus (P): 8–9kg P/ha.
- Potassium (K): 25–40kg K/ha.
- Sulphur (S): 9kg S/ha.

An ideal soil analysis should resemble the following:

- A pH (water) of between 5,8 and 7,2.
- P value of more than 25mg/kg (Bray 1 method).
- K values of above 80mg/kg for sandy soils with less than 15% clay, above 100mg/kg for loam soils with clay percentages of between 15 and 25% and above 120mg/kg for clay soils with clay percentages above 25%.
- S value of 25–125mg/kg.

Phosphorus and potassium

Soya beans are able to make good use of residual P and K in the soil. It is therefore

Table 1: Choice of plant population for certain row widths.

	Population					
	150 000	200 000	300 000	400 000	500 000	600 000
Row width	Number of seeds per metre with distance between seeds (cm)					
38cm	6 (16,6)	8 (12,5)	11 (9,1)	16 (6,25)	19 (5,3)	23 (4,38)
45cm	7 (14,3)	9 (11,1)	14 (7,14)	18 (5,55)	23 (4,35)	27 (3,70)
52,5cm	8 (12,5)	11 (9,1)	16 (6,25)	22 (4,55)	26 (3,85)	32 (3,13)
60cm	9 (11,1)	12 (8,33)	18 (5,55)	24 (4,17)	30 (3,33)	36 (2,78)
76cm	11 (9,1)	15 (6,67)	23 (4,35)	30 (3,33)	38 (2,63)	46 (2,17)
90cm	14 (7,14)	18 (5,55)	27 (3,70)	36 (2,77)	45 (2,22)	54 (1,85)

Legend:

Recommended Problem escalates Maximum/minimum Not recommended

Notes: The number of seeds per running metre should preferably not be more than 30 (optimum 23) and not fewer than 10. Seeds closer than 3cm from each other cause excessive inside row competition, and further than 10cm will not emerge properly.

Row width therefore determines choice of plant population. Plant population as recommended by seed company.

Quick upright types – plant population of more than 400 000 seeds/ha.

Bushy types – plant population of 180 000 to 350 000.

Plant density signifies number of seeds planted and plant population means number of seedlings.

crucial that in case soya is planted for the first time on a field, the fertility levels of especially these two elements have already built up to optimal levels as mentioned earlier.

The best method of application of these elements (broadcasting versus band placing) is still being researched, especially since it is clear that soya beans prefer P in the entire volume of soil in which they grow but that K is better absorbed in a high concentration band according to the literature.

There are good critical values for all the macro- and micro-elements in both the soil and leaves and they can be put to good use in a fertilisation programme.

Band placing should be properly done at least 5cm away (left or right) and 5cm below the seed to prevent 'fertiliser burn'. With the broadcasting of these elements, conventional tilling will provide 'speedier' results than under no-till systems (especially with P that moves very little in soil).

The time of application is still a contentious discussion point. However, since soya reacts well to residual fertilisation it should be irrelevant, with the provision that optimal levels of P and K are maintained in the soil.

The practice of the past which is often still followed of better fertilising the preceding crop (for example maize) and thereby making provision for 'transfer fertilisers', should be treated with caution for soya, since maize yields have increased tremendously in recent times and therefore much more nutrients are removed by the maize harvest itself.

Leaf supplements

Soya bean plants cannot be nourished with leaf applications of the three primary (N, P and K) and three secondary elements (Ca, Mg and S). These elements should preferably be applied in the soil. Under excessively low (<5,5) and high (>7,5) pH conditions, plants will respectively absorb Mo and Mn, Cu, Fe, Zn and B with difficulty through the roots, and it is desirable to practice supplementation as a result of soil and especially leaf analysis.

There are good critical values for all the macro- and micro-elements in both the soil and leaves and they can be put to good use in a fertilisation programme.

Disease and pest control

Nematodes and *Sclerotinia* (Photos 9 and 10) are responsible for great losses in large parts of the country, and unfortunately there are still few resistant cultivars against nematodes and none that control *Sclerotinia*.



Roots infected with root knot nematode.



Advanced stage of *Sclerotinia* infection.

Sandy soils are indeed more prone to nematodes, but they also occur in heavier soils. Root knot nematode is the main species in South Africa and although there already exist cultivar varieties offering some degree of resistance, most cultivars are highly susceptible. In other countries such as Argentina there are already available cultivars that are resistant and some of these could soon also become available in South Africa. They would have to be tested first to determine resistance to all the nematode species in the country. Good nodulation and healthy plants often decrease the nematode problem.

Sclerotinia is a disease that develops under cool conditions (night temperatures of below 15°C for ten consecutive nights) and wet or damp conditions under the foliage of soya beans. Sclerotia (the fruit bodies of *Sclerotinia*) will 'germinate' in above-mentioned conditions to form so-called 'apotecia' (mushroom-like structures) that then produce and release spores through lesions on the soya such as where flowers sprout, thereby infecting the plants. From germination

up to contamination takes roughly 20 to 30 days. All cultivars in South Africa are susceptible to the disease.

Sclerotinia is combatted with great success on the Highveld by making use of quick cultivars with a particular way of growth. Before the foliage closes and thus creates favourable conditions for the disease to develop, the cultivar would have already flowered and would already be in the pod-filling stage that then significantly reduces the risk of infection. These quick-acting cultivars are not readily recommended for warmer irrigation regions, since the yield potential thereof are lower than in cooler regions.

Night irrigation, which is commonly practised and with good reason in the warm irrigation regions, contributes towards the fact that night temperatures can drop below 15°C under the foliage, and *Sclerotinia* contamination can therefore even occur in these areas.

Contact the author at email: zenzele@netactive.co.za for more information and references. 📧

Beskerm jou gewas, verseker jou wins.



Koste effektiewe, Omvattende Gewasbeskerming

- ONKRUIDDODERS
- INSEKDODERS
- SWAMDODERS
- PLANTGROEIREGULEERDERS
- BYVOEGMIDDELS
- BLAARVOEDING

- Toonaangewende verskaffer van kwaliteit plaaslik en internasionaal geformuleerde produkte.
- Jaarlikse multimiljoen rand beleggings in navorsing en ontwikkeling.
- Meer as 200 geregistreerde produkte, spesifiek ontwikkel vir plaaslike omstandighede.
- Vir meer as twee dekades u bondgenoot in suksesvolle gewasproduksie.



Kontak jou plaaslike landbouchemiese raadgewer

Villa Crop Protection (Pty) Ltd | Reg nr 1992/002474/07

Hoofkantoor: Botesweg 65, Glen Marais, Kempton Park, Suid-Afrika | Tel: (+27 11) 396 2233 | Tel: (+27 87) 740 3490 | Faks: (+27 86) 677 3175

Kempton Park depot: Friedweg 69, Glen Marais, 1619 | Tel: (+27 11) 396 2233 | Tel: (+27 87) 740 3490 | Faks: (+27 11) 396 1943

Kaap depot: Marchandstraat 3, Wellington, 7655 | Tel: (+27 21) 873 6892 | Faks: (+27 21) 873 6173

www.villacrop.co.za



DEO GLORIA

By Dr Charlie Reinhardt, academic head at Villa Academy

THREAT OF HERBICIDE-RESISTANT WEEDS IN SOYA BEANS:

Prognosis for South Africa in light of global trends

Weed resistance to herbicides registered in soya beans in South Africa was briefly discussed in the July 2015 edition of *Oilseeds Focus* in an article entitled 'Weed control in soya beans – make-or-break herbicide choices'. We will now deal with this exceedingly vital issue in more detail.

MoA groupings

Herbicide groups, which are based on mechanism of action (MoA), currently registered for use in soya beans are listed in *Table 1*. A total of 24 different herbicides belong to the eight MoA groupings. This represents a healthy situation with regard to diversity in herbicide MoA, because the use of herbicide combinations representing multiple MoA is universally regarded as one of the cornerstones of a successful resistance management strategy.

Of the eight MoA available to soya bean producers, only one (Group 1 in *Table 2*) is not linked to weed resistance anywhere in the world. The six acetamide (acetanilide) herbicides inhibit long-chain fatty acid synthesis in many grass weeds, and to a lesser extent also in yellow (*Cyperus esculentus*) and purple nutsedge (*C. rotundus*).

The implication is that all the herbicides in the other seven MoA groupings are associated with weed resistance to a lesser or greater extent (*Table 2*). Even more disconcerting is the fact that all those herbicides that control mainly broadleaf weeds have a record of resistance on one or another weed species somewhere in the world.

Moreover, many of those weeds are damaging to crop production in this country as well (*Table 2*).

From the information presented in *Table 2*, it is clear that herbicides with a single site of action (Groups 2, 3, 4, 5, 7 and 8), in particular a single protein or enzyme, are especially prone to the evolution of resistance. The reason for this is that even a slight mutation of the particular enzyme, which might not alter the enzyme's natural function in the plant, is sufficient to render ineffective the herbicide attacking that site.

Summer- and winter-rainfall

Although no proven cases of weed resistance to any of the herbicides listed in *Table 2* have hitherto been reported in the summer-rainfall region of the country, many of the weeds mentioned in *Table 2* as having evolved resistance in other parts of the world include our toughest weeds. One fierce weed, the flax leaf fleabane or 'kleinskraalhans' (*Conyza bonariensis*) has proven resistance to both glyphosate and Paraquat in the Western Cape (Pieterse, 2010). This weed is highly competitive and often dominates weed communities in all the key crop-producing regions of South Africa.

The question that arises is why the summer-rainfall region has apparently been spared the scourge of herbicide-resistant weeds which is so prevalent in the Western Cape. At least part of the answer can probably be found in the historical greater dependence on mechanical weed control (ploughing and secondary tillage) in the summer- rather than in the winter-rainfall region.

This apparent advantage is fast disappearing, as reduced tillage is gaining ground in the summer-rainfall region. Reduced dependence on mechanical weed control increases dependence on herbicides. This situation can be managed without undue risk, provided that there is judicious use of herbicides and adherence to resistance management strategies.

Managing herbicide resistance

- Keep weed numbers low. Reduce the '1 in 1 000 000' chance that an individual weed plant in a population could evolve herbicide resistance in a natural way.
- Prevent weed seed production, as resistance is genetically inherited and is spread through seed.
- Do not rely on a single herbicide or a single MoA. Employ more than one herbicide MoA. Success is achieved with formulated herbicide and tank mixtures.
- Avoid under- and overdosing, since both promote resistance.
- Integrate different weed control methods where applicable.

Table 1: Summary of herbicide mechanisms of action registered in South African soya beans.

MoA (= plant process inhibited)	Number of herbicides per MoA	Number of herbicides per weed category		
		Mainly grass	Mainly broadleaf	Grass and broadleaf
1. Long-chain fatty acid	6	6	0	0
2. Photosystem II	2	0	0	2
3. Carotenoid	1	0	0	1
4. Acetyl-CoA carboxylase (ACC)	6	6	0	0
5. Acetolactase synthase (ALS)	4	0	4	0
6. Cell division	2	2	0	0
7. Protoporphyrinogen (PPO or Protox)	2	0	2	0
8. Enolpyruvylshikimate-3-phosphate synthase (EPSPS)	1	0	0	1
	Total: 24			

Table 2: Global herbicide resistance scenario for herbicides registered in South African soya beans.

Herbicides grouped according to MoA	Weed spectrum	Global weed resistance history
1. MoA: Inhibit fatty acid synthesis		
Acetochlor	Grasses/sedges mainly	No cases reported.
Alachlor	Grasses mainly	No cases reported.
Dimethenamid-P	Grasses/sedges/broadleaf	No cases reported.
Metazachlor	Grasses mainly	No cases reported.
Metolachlor	Grasses/sedges mainly	No cases reported.
s-Metolachlor	Grasses/sedges mainly	No cases reported.
2. MoA: Inhibit electron transport in photosystem II		
Bendioxide (= Bentazone)	Broadleaf/sedges	One weed, <i>Amaranthus hybridus</i> in Canada.
Metribuzin	Broadleaf/grasses	Multiple weeds (22 cases), e.g. <i>Chenopodium album</i> , <i>Eleusine indica</i> .
3. MoA: Inhibit carotenoid biosynthesis (DOXP enzyme 1-deoxy-D-xyulose5-phosphate synthase)		
Clomazone	Broadleaf and grasses	Few weeds (two cases), e.g. <i>Echinochloa crus-galli</i> in USA.



Weed resistance to herbicides is a research focus at the University of Pretoria, with Dr Charlie Reinhardt as project leader. To learn more, visit the website www.up.ac.za/sahri. Dr Reinhardt is an extraordinary professor of weed science at the University of Pretoria and dean of the Villa Academy. Contact him on 011 396 2233 or email creinhardt@villaacademy.co.za, or visit www.villaacademy.co.za for more information.

Table 2: Global herbicide resistance scenario for herbicides registered in South African soya beans.

4. MoA: Inhibit acetyl-coenzyme A carboxylase (ACCase)		
Cycloxydim	Grasses	Multiple weeds, e.g. <i>Digitaria sanguinalis</i> .
Fluazifop-p-butyl	Grasses	Multiple weeds, e.g. <i>Digitaria sanguinalis</i> , <i>Sorghum halepense</i> , <i>Eleusine indica</i> .
Haloxifop-R-methyl	Grasses	Several weeds, e.g. <i>Sorghum halepense</i> .
Propaquizafop	Grasses	Several weeds, e.g. <i>Digitaria ciliaris</i> , <i>Sorghum halepense</i> , <i>Eleusine indica</i> .
Quizalofop-P-ethyl	Grasses	Multiple weeds, e.g. <i>Digitaria sanguinalis</i> , <i>Sorghum halepense</i> .
Quizalofop-P-tefuryl	Grasses	Limited to few winter grass weeds.
5. MoA: Inhibit acetolactase synthase (ALS or AHAS)		
Imazethapyr	Broadleaf weeds	Multiple weeds (>100 cases), e.g. <i>Xanthium strumarium</i> , <i>Bidens pilosa</i> , <i>Parthenium hysterophorus</i> , <i>Ambrosia artimisiifolia</i> , <i>Euphorbia heterophylla</i> , <i>Sorghum halepense</i> , <i>Sorghum bicolor</i> , <i>Chenopodium album</i> , <i>Digitaria sanguinalis</i> .
Chlorimuron-ethyl	Broadleaf weeds	Multiple weeds (53 cases), e.g. <i>Xanthium strumarium</i> , <i>Bidens pilosa</i> , <i>Parthenium hysterophorus</i> .
Diclosulam	Broadleaf weeds and nutsedge	Few weeds (four cases), e.g. <i>Ambrosia artimisiifolia</i> , <i>Euphorbia heterophylla</i> .
Flumetsulam	Broadleaf weeds	Several weeds (14 cases), e.g. <i>Amaranthus hybridus</i> , <i>Lactuca serriola</i> , <i>Euphorbia heterophylla</i> .
6. MoA: Inhibit cell division		
Pendimethalin	Grasses mainly	Several weeds (nine cases), e.g. <i>Eleusine indica</i> , <i>Echinochloa crus-galli</i> , <i>Poa annua</i> , <i>Sorghum halepense</i> .
Trifluralin	Grasses mainly	Multiple weeds (25 cases), e.g. <i>Eleusine indica</i> .
7. MoA: Inhibit protoporphyrinogen oxidase (PPO or Protox)		
Flumioxazin	Broadleaf	Single case of <i>Ambrosia artimisiifolia</i> .
Fomesafen	Broadleaf	Several weeds (nine cases), e.g. <i>Ambrosia artimisiifolia</i> , <i>Euphorbia heterophylla</i> , <i>Amaranthus hybridus</i> .
8. MoA: Inhibit enolpyruvylshikimate-3-phosphate (EPSP) synthase		
Glyphosate	Pre-plant burndown and in glyphosate-tolerant soya bean	Multiple weeds (32 species, 242 cases), e.g. <i>Conyza bonariensis</i> . Note: Certain populations of <i>C. bonariensis</i> in the Western Cape are resistant to both glyphosate and Paraquat. Many other populations of this weed are either highly tolerant or resistant to glyphosate in that region.

Source: www.weedscience.org

Note: Listed weeds also occur in South Africa, but no cases of resistance have yet been recorded in the summer-rainfall region. 🌱

Farmwise offers a comprehensive brokerage service with a diverse client base which includes producers, consumers and speculators from a wide geographical area.

This enables us to keep an 'ear to the ground' at all times. We have a low client to broker ratio, which ensures prompt and efficient service.

The company has developed an internet based trading system that enables our clients to monitor the market in real time, as well as placing electronic orders.

Farmwise was one of the founding members of the AMD Division of SAFEX, so we have stood the test of time.

T +27 11787-3666
info@farmwise.co.za
PO Box 3660, Randburg, 2125
www.farmwise.co.za

Farmwise

grains

Specialised services offered by Farmwise:

- **Trading on the South African Futures Exchange (SAFEX)**
We have a highly skilled team of professionals that provide market-based solutions to all participants.
- **Currency futures trading**
Farmwise is a member of the Yield-X division of the JSE. Allow us to hedge your currency risk.
- **Spot trading**
This market encompasses a wide variety of feed grains and other specialty products. To ensure successful trading in this environment in-depth knowledge of the marketplace, the counter parties involved and the risks inherent to these activities are required.
- **In-silo grain financing** provides our clients the financial flexibility to make considered marketing decisions. Cash flow constraints should not force a market participant into a marketing decision and Farmwise provides the where withal to ensure this.
- **Regular workshops and in-house training**, ensures that staff and clients remain on the cutting edge of all new developments in the marketplace.



EXTRUDE your own soya

**Modular installations from
250 kg per hour.**

**Extruders, oil presses and ancillary
equipment also available.**

www.bronto.ua



South African support on world leading Ukrainian machines

VALTRA



Jeantil



Tractors with
Loaders
Front linkage

Bean &
peanut
harvesters

Manure spreaders
Silage trailers
Slurry tankers

Self-propelled
and trailed
sprayers

No-till planter
Disc harrows
AST matic

Ploughs
Disc harrows

Mowers
Rakes, tedders
Self-loading trailers

Forage
harvesters, Fert.
spreaders

No-till planters

Reitz: **Koos** 082 940 1696
Parys: **Alfred** 076 981 8654
Harrismith: **Jaap** 082 824 6440
North West: **Tom** 082 923 5387
Mpumalanga: **Jeff** 083 288 5003
Pietermaritzburg: **Joe** 082 303 2391

VALTRAC
TRACTORS • IMPLEMENTS • SERVICE • PARTS

HEAD OFFICE: 056 817 7308

www.valtrac.co.za

Independent dealers:
Middelburg: **Christo** 082 922 2358
Bela-bela: **Heinrich** 084 786 0039
Riversonderend: **Hans-Jurie** 083 557 1386
Wellington: **Schalk** 083 407 7740
Winterton: **Bernard** 083 228 6196

By Johan Eyssen

Choosing the right

NO-TILL IMPLEMENTS

Although conservation farming is still in its infancy, it is gaining ground against traditional cultivation methods, especially in respect of grain. When a producer, however, wishes to produce no-till grains or other crops, the choice of the right planter and its correct use is of utmost importance.

Wynn Dedwith of Valtrac Implements and a grain farmer from Parys, says soil compaction should first be lifted before commencing with conservation farming. It does not matter whether it is done mechanically or with strong plant roots, although it is worth noting that the latter takes longer. With a ripper one should leave as many plant rests as possible on the fields to form a blanket.

The fields should also be prepared chemically to correct the soil's pH balance. Lime cannot be worked into the soil at a later stage. If the pH balance is correct, lime or gypsum can be spread on the fields and will gradually penetrate the soil.

Making the right choice

Dewald Barnard, manager of Rovic Leers in Pietermaritzburg, sheds some light on the properties of the right no-till planter for pastures. To prevent wastage of expensive inputs such as seed and diesel, it is vitally important that the right planter is purchased.

It is especially important that the planter units of a no-till planter are suitable to the conditions. The planter unit should be able to manoeuvre through the plant residues without becoming clogged. The weight of the planter also plays an important role, as it contributes to the planter unit's pressure on the soil.

One should firstly determine the size of seed that the planter can handle. Preferably use a planter that can plant different sized seeds. This makes it versatile for use in various applications such as planting soya beans in summer, pastures in autumn and wheat in winter. Ensure that the planter has separate seed boxes for fine seed to prevent it from falling through during planting.

"Make sure the planter is durable enough for all applications under your

farming conditions. It also makes sense to pay attention to the planter's number of moving parts and ease of maintenance," Dewald warns.

According to Wynn, the planter should place the right amount of seed and fertiliser correctly into the soil. "The seed must be placed in firm, moist soil and the soil on top of the seed should not be compacted. The seed must be 'pinched' from the sides so that it makes proper contact with the soil and at the same time



A field of lupins planted according to the no-till model.

STRIKE THE KNOCK-OUT BLOW WITH STRONGARM™ 840WG



- A product with excellent residual weed control that can be used on all soybean and groundnut cultivars
- Great tool for problem weeds such as Ipomoea and Commelina
- Controls wide variety of grass and broadleaved weeds
- Well suited for crop rotation systems with no carry over risk to important follow up crops
- Safe and easy to use water soluble sachet packaging

For more information please contact the registration holder: Dow AgroSciences Southern Africa (Pty) Ltd. Reg. No. 1967/007147/07
Paarl (021) 860 3620 • Pretoria (012) 361 8112 • Emergency No. (032) 533 0716 | 082 887 8079 • Private Bag X 160, Bryanston, 2021 • www.dowagro.co.za

ALWAYS USE ACCORDING TO LABEL RECOMMENDATIONS • Strongarm™ 840WG contains diclosulam (triasolopirimidien sulfoonanilied) 840g/kg (Caution)
Reg. No. L8663 • Act No. 36 of 1947

Strongarm™ is a registered trademark of Dow AgroSciences LLC



Dow AgroSciences

Solutions for the Growing World

® TM Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

the soil on top of the seed should be loose to aid the seedlings in reaching the soil surface."

Depth control is key

Dewald says depth control when planting pastures is vital, as it will determine how fast the seed will germinate and grow. Note the adjustment availability on the planter, the ease of making the adjustments and its accuracy. No-till conditions typically vary between fields, and adjusting the depth should be a simple task.

The planter should cause minimal disturbance to the soil surface to prevent furrows from forming.

The gauge wheel fulfils a key role. In certain planters this wheel is not only responsible for firmly compacting the soil, but also for depth control. Enquire about the wheel's pressure on the soil.

"Since different crops are planted at different depths, the gauge wheels should be adjustable to cover the seed in the correct manner. The distance between



A no-till planter in action.

the gauge wheels should be adjustable in order to place the seed in the right spot. The deeper the seed, the further apart the wheels and the higher the pressure should be. The pressure of the gauge wheels should therefore also be adjustable," Wynn says.

Soil surface

Therefore it is necessary that the gauge wheels, which control the seed unit depth, must be as close as possible to where the seed tube penetrates the soil. It is also crucial that the gauge wheels move independently in case one of the wheels runs over a rock or clod, so that it does not have a major effect on the planting depth.

"The planter should cause minimal disturbance to the soil surface to prevent furrows from forming. Furrows cause soil surface compaction through heavy rains, thus preventing seedlings from sprouting. It can also result in water flowing through the furrows, causing soil erosion, especially on sloped fields. Crop residues should also not be covered by the planting action, because they can bend like a hairpin, again causing a poor

plant stand.

"The planter should space the seed correctly for an even plant stand. Vacuum planters are less sensitive to seed size than plate planters. The latter

are very effective if the seeds have been properly sieved. Plate planters are also especially effective when planting soya beans, resulting in great savings," Wynn says.

Correct planting speed

According to Wynn, the planting speed is also important. If the speed is too high, the planting depth and evenness will differ. This is due to the seed 'bouncing' when it hits the soil at a high speed. The soil is also displaced – just like water by a ship's bow. The ideal planting speed is 7km/h or slower.

Also ensure that fertiliser placement can be adjusted independently from the seed unit in respect of depth and spacing. A depth control wheel on the fertiliser unit is a good option, because fertiliser can be placed in the correct space in relation to the seed. Rippers are preferred where some compaction takes place due to farmers grazing their fields. Problems arise when farmers attempt to break underground compaction with a fertiliser applicator.

Wynn says a plant's roots cannot penetrate from soft to hard soil. Roots do not drill through soil, but press through it by lengthening of the root. An even soil profile that is free of soft and hard soil layers, is therefore important.

Coulter size

The cutting coulter at the front of the planter is also important. It should be big enough to cut through crop residues and should not simply press it into the soil.

Quality planters are distinguished by their accuracy and ease of calibration. Planters that can be calibrated by making a few adjustments produce desired results.



The seed tube behind the coulter of the no-till planter is clearly visible.

For more information, contact Wynn Dedwith on 082 554 9202 or wynn@valtrac.co.za, and Dewald Barnard on 082 320 9228 or dewaldb@rovicleers.com.

NUTRITIONAL VALUE

of saturated and unsaturated lipids

There are numerous studies on the possible harmful breakdown products of deep-frying oils and the consensus reached is that it is a complex matter. Internationally and locally regulations have been established to control the over-utilisation of frying oil and two analytical methods, namely the total polar components and the total polymerised triglycerides, were chosen for control.



The oils and fats research team at the Council for Scientific and Industrial Research (CSIR) conducted several industrial frying studies and applied traditional quality tests. A comparison of different oils under deep-frying conditions was made and the tests continued to indicate that the frying oils rarely weaken to such an extent that the discard point is reached.

Various studies have been done for the Oilseeds Advisory Committee (OAC) and they indicate that sunflower oil, as representative of the polyunsaturated oils, does not reach the discard point at the end of the frying test.

This means that the two mentioned regulatory methods are not sufficiently sensitive to monitor frying oils' possible harmful properties. However, there are strong indications from industrial trials that monounsaturated oils are more resistant to oxidation than polyunsaturated. There is also unquestionable evidence that savoury snacks must be produced in monounsaturated oil, otherwise they cannot successfully sustain their shelf life.

Latest information

The November/December 2014 edition of *Inform* reported on a study by Martin Grootveld and collaborators who applied nuclear magnetic resonance techniques to separate and quantify lipid oxidation products.

This study highlights the primary (nine compounds) and secondary degradation products (22 compounds) of frying oil, and particularly points out the nine different aldehydes that can be formed. Aldehydes, namely the group of extremely reactive oxidation products, react with other molecules during the frying process and can also react with amino acids and peptides after absorption in the human body.

The best known is acrylamide, which has already been studied thoroughly and for which tolerance levels are determined. Examples of nuclear magnetic resonance analyses of different types of oils are available, as shown under deep-frying conditions and graphically demonstrating the dramatic difference between sunflower and olive oils, for instance.

It has also been proved that shallow frying in a pan causes even

greater degradation of frying oil than is experienced during deep-frying. The explanation for this is that there is significantly more oxygen present during shallow frying, while only limited exposure to air and oxygen occurs during deep-frying.

The article provides information on the number of lipid oxidation reactions that can occur in human food and what the toxic and/or pathogenic consequences could be. The author is not qualified to express an opinion on these aspects and wishes to obtain the opinions of medical researchers on these matters. The chemical analyses are indeed reliable, and the author believes that the observations stating that polyunsaturated oil produces substantially more reactive aldehydes than monounsaturated oil, are indeed credible.

This article also offers potential solutions and it is of practical value at this stage that consumers should preferably use monounsaturated and saturated fats or oils for deep-frying, and especially for shallow frying. This means that olive oil, high-oleic oilseed oils, palm oil and coconut oil are given preference. Even animal fats may be used for this purpose.

Polyunsaturated vegetable oils, such as sunflower, canola, maize and others, remain crucial for the provision of essential fatty acids, tocopherols and sterols, but should not be used for deep or shallow frying.

These guidelines will undoubtedly have an impact on the oilseeds industry and influence existing markets. Fortunately, there is already diversification in progress in oilseeds and vegetable oil products and in case the food industry has to adapt, alternatives are available.

Controversial expert opinions

The June 2015 edition of *Inform* contains the article 'Big fat controversy' by Laura Cassidy. Certain aspects of the article are summarised below, with an attempt to highlight the main trends affecting the oilseeds industry.

The article graphically illustrates that the consumption (kg/person/year) of butter, animal fats and margarine has changed from

1909 to 1999 in the United States. It is especially butter intake that dramatically dropped after 1939, and margarine and plant fats which dramatically increased. The consumption of vegetable oils (soya, cotton and maize) also increased dramatically.

The key to this growth was the use of hydrogenation in the liquid vegetable oils to convert them to fat and increase their stability at the same time. The consumption of soya oil increased a thousandfold and margarine consumption twelvefold. The consumption of butter and animal fats declined by roughly fourfold. Since the 1960s, the culprits, saturated fat and cholesterol, have gradually been replaced by carbohydrate foods (pasta, cereals, sugar, fruit and starch) to currently represent an estimated 50% of energy intake.

It is explained that the effect of dietary lipids on the harmful low-density lipoprotein (LDL) cholesterol and the beneficial high-density lipoprotein (HDL) cholesterol has limited diagnostic value, and that the ratio of total to HDL cholesterol in serum is a better risk indicator. It is currently assumed that saturated fats in the diet have little effect on the total to HDL cholesterol ratio. This suggests that no relationship between heart disease and saturated fat intake exists.

Polyunsaturated fatty acids (linoleic acid, for instance) do, however, lower the total to HDL cholesterol ratio. At the same time, it was found that monounsaturated fatty acids (such as oleic acid) reduce the ratio even more. This result has confirmed the position of monounsaturated vegetable oils, such as olive and high-oleic oils, as healthy oils. There is also confirmation that trans-monounsaturated fatty acids significantly increase the ratio of total to HDL cholesterol, and

therefore this type of fatty acid is classified as unhealthy.

The author expects that the *Dietary Guidelines for Americans*, the United States government's main source for nutrition advice, should soon reflect the findings of the past five years. However, the opinions of experts discussed in the article suggest that there are strong differences of opinion.

There are certainly indications that oilseed producers in the United States, with encouragement by food manufacturers, will implement the conversion of normal polyunsaturated soya, canola and sunflower to monounsaturated (high-oleic) types of products. It therefore represents a midway that should satisfy most nutritionists.

Regulations for trans-fatty acids

In this regard, South Africa has advanced beyond the United States and already had regulations in place two years ago. The United States Food and Drug Administration (FDA) issued its final statement on the presence of partially hydrogenated fats in food on 16 June 2015.

This also seems to be a thorny issue in the United States, and according to the 24 June 2015 edition of *Inform Smartbrief*, the weekly email newsletter for fats and oils professionals, there was a webinar discussion arranged on the same date with FDA legal experts to reflect on the matter.

Contact Dr LM du Plessis at lourensdup@kleinfontein.net for more information and references. 🌱



Raw material price outlook for GRAIN AND OILSEEDS

The possible occurrence of an El Niño effect is currently creating various uncertainties in terms of weather conditions and planting intentions in the Southern Hemisphere. This creates significant price volatility within the commodity markets.

In terms of soya beans, the total global production is estimated at 319 million tons, which is less than 1% lower than the previous year's record production.

This will result in a two million ton higher carry-over stock, which will be 49 million ton. The expected United States (US) crop is higher than the previous year and will end at a level of 108 million ton against the previous season crop of 106,8 million ton.

International markets

Currently all eyes are on the Southern Hemisphere in terms of oilseed production. At the beginning of the season the prospects of a good planting did not seem promising due to drought. This was especially the case in the central parts. However, this changed at the end of October. At the beginning of November the conditions looked fairly good, especially in the southern parts of Brazil. Thus it currently looks as if El Niño will not have a great impact on Brazilian crops.

In Argentina the political scenarios should come to an end and the elections will have a significant effect on agriculture. The possible winner of the elections promised to remove trade barriers, which means that a significant amount of soya bean will be traded between January and July 2016. The prospects are also that the peso will be devaluated. The increase in

selling will mean that there will be much more oil meal available for exports and will also put some pressure on prices.

Ample soya meal stocks will be available in the market and the current global oil meal consumption is to be at 306 million ton. This is almost four million ton higher than the previous season. Global traders expected prices to decrease slightly in order to facilitate the buying of meal.

At the beginning of November, the demand for soya bean and meal were exceeding expectations. In October the five biggest oilseed-producing countries experienced a four million ton increase in disposals on a year-on-year basis. The most significant increase was in terms of net exports, which increased from 9,8 million ton to 13,5 million on a year-on-year basis for October.

Sunflower production

Sunflower production currently looks promising in Ukraine and Russia. The expectation is that Russia will produce 9,1 million ton and Ukraine 10,7 million. This combined represents 2,1 million ton more than in the previous season. The main question is: What will the impact of export duties be?

Prices in the international market are expected to move sideward with a risk of decreasing. It will be crucial to monitor the planting progress in the Southern Hemisphere, and prices will be sensitive in terms of changes within the production prospects.

Table 1: Main oilseed prices (US\$/ton and R/ton).

Product	29 October 2015	October 2014	% change
Soya beans (US CIF Rotterdam)	372	425	-12
Soya beans (Brazil)	380	451	-16
Sunflower seed (EU)	470	419	12
Groundnuts (US 40/50)	1 150	1 342	-14
Palm oil (Malaysia)	552	693	-20
Soya oil (US)	681	811	-16
Sunflower oil (Argentina)	765	842	-9
Soya meal (Argentina)	370	461	-20
Fishmeal (Peru)	2 000	1 940	3
Rand/\$	13,82	11,08	25

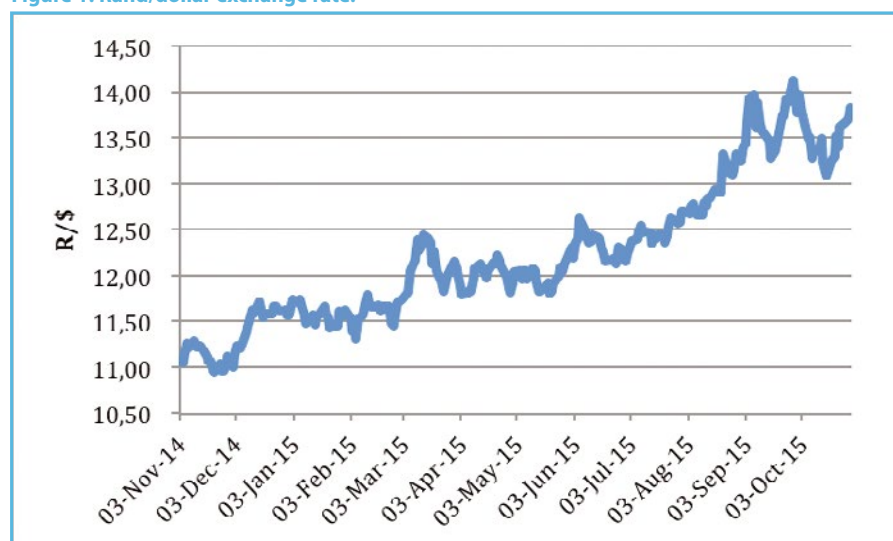
Source: Oil World

Local market

Currently the economy is growing at a slow pace and hard commodities are under severe pressure. This has an impact on our exchange rate, which has an impact on our commodity prices. The exchange rate has weakened substantially over the last year and this supports our commodity prices. The future prospects of the rand are volatile and would be a key variable to monitor in the coming production season.

However, the overall view is that the rand will not weaken further, given that there are no new fundamental shocks within the macro environment (Figure 1). There is no new information indicating that the currency will strengthen in the short term.

Figure 1: Rand/dollar exchange rate.



Source: SA Reserve Bank

Weather conditions

Current prospects do not look promising in respect of weather conditions, with the expectation of an El Niño weather pattern. South Africa is struggling with yet another year of drought conditions, and soil moisture is limited. Mpumalanga is already late with soya bean planting, which will certainly put pressure on the local supply.

The Crop Estimates Committee's (CEC's) planting intentions indicate that increased hectares for sunflower seed and soya beans will be seen. However, this is still highly dependent on weather conditions. Sunflower planting will increase, with the

largest stretch of land being 38 000ha. This is mainly due to the current price premium sunflowers have above soya beans, and the fact that producers are struggling to obtain credit. Sunflowers assist with this barrier due to its low production cost, which results in obtaining credit more easily.

In respect of groundnuts, the intentions indicated are that there would be a 23% decrease in planting. Given the expansion of crushing capacity and the increase in the crushing of local soya beans, there exists ample demand for oilseeds. It would be essential to monitor sunflower supply levels and due to an expected increase in local supply combined with international supply, a slightly bearish market can be created later in the season.

It is also important to examine the derived prices, which indicate that sunflower seed prices are very high on the spot market. This is mainly driven by low vegetable oil stock for which sunflower oil is a substitute, which means a higher demand for the crushing of sunflowers globally.

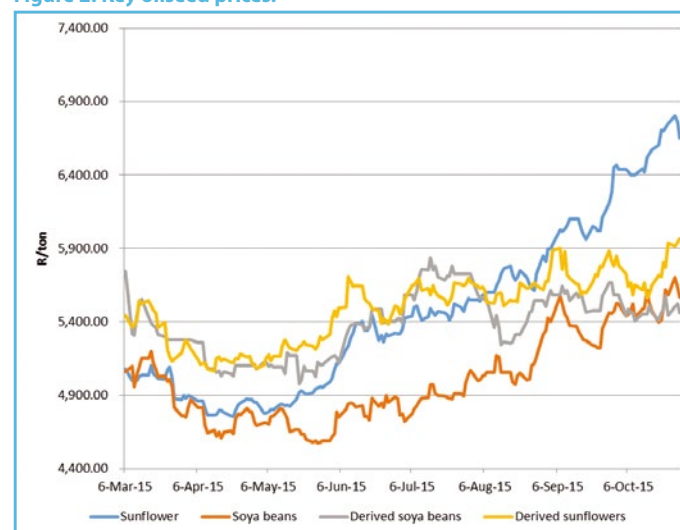
Conclusion

In summary, the international market currently has ample stock and prospects for good production. This will mean that prices will move sideward and can even place pressure on prices. It would be vital to monitor the production process in the Southern Hemisphere.

In respect of groundnuts, the intentions indicated are that there would be a 23% decrease in planting.

In the local market various uncertainties exist due to weather conditions. However, if the weather becomes more favourable, prices can decrease especially in terms of sunflower. It would be essential to monitor the local production process as well as the exchange rate, which will have an impact on import-export parity levels. 🌱

Figure 2: Key oilseed prices.



Source: Safex and Grain SA



RE Groundnuts – Our roots are in agriculture

The Rhys Evans Group is a fourth-generation, family-owned agricultural business. The roots of the group go back to the early 1900s, when the Evans family started farming in the Viljoenskroon district of the Free State. With an early focus on cash crop production and cattle farming, the group has, over the past few decades, diversified its operations to become one of the leading farming businesses in South Africa.

Company structure

The group is made up of three subsidiaries: Rhys Evans Group – farming, RE Groundnuts – groundnuts and Huntersvlei Farms – abattoir.

Farming

Rhys Evans Group (Pty) Ltd makes up the farming division, with interests in crop and cattle farming.

Crops are planted on 2 700ha of arable land. Maize (2 000ha) is planted in

rotation with groundnuts (150ha) every third year and sunflower (450ha) every second year, as well as forage sorghum (50ha).

The renowned Huntersvlei Sussex Stud forms part of the cattle farming component with a 150-strong cow herd. The other components include a Sussex-type commercial herd and a feedlot.

Groundnuts

RE Groundnuts Pty (Ltd) consists of RE Groundnuts Shelling, which produces hand-picked Spanish-type peanuts for export to Europe and Japan, as well as supplying to the local market, and RE Groundnuts Processing produces delicious and nutritious Nutty-P peanut butter and roasted peanuts for the South African market. The Nutty-P range is distributed countrywide and is renowned for its high quality. RE Groundnuts is known for taking hands with its farmers and supports them with interest-free

seed and chemical finance, market-related prices, payment within seven days, drying facilities and bulk handling infrastructure. The company prides itself in its HACCP certification and level five BEE compliance.

Abattoir

Huntersvlei Farm Fresh carcasses have a reputation for quality and shelf life. The business emphasises traceability and, through efficient service, we form long-term relationships with our customers.

We are an export-approved abattoir and take pride in the high health and hygiene quality standards with HACCP and ISO certification.

We are predominantly a pork abattoir, but also process beef and lamb.

For more information, phone 056 343 3311, send an email to info@re.co.za or visit the website www.re.co.za.

RE GROUNDNUTS (PTY) LTD



Jou vennoot in die grondboonbedryf

- Aankoop en verkoop van grondbone
- Alle groottes en tipes
- Finansiering van saad en chemiese middels rentevry
- Drogingsfasiliteite beskikbaar
- Massahantering van grondbone

Betroubare diens en weeklikse uitbetaling aan produsente.

Vir meer inligting:

Epos: koos.nienaber@re.co.za • Tel: +27 (56) 3432892 • Faks: +27 (56) 3432893 • Sel: +27 (83) 632 3303
www.re.co.za
 Posbus 41, Viljoenskroon 9520



© Plaas Publishing

By Jolanda Nortjé, laboratory manager, Southern African Grain Laboratory NPC

Preliminary soya bean and sunflower crop quality survey results for the 2014/2015 season

The Crop Estimates Committee's (CEC's) final production estimate for the 2015 season confirmed the negative impact of the drought conditions experienced over large parts of the production areas. Although the area utilised for soya bean production has increased by 37% compared to the previous season, the crop increased by only 12% to 1 059 850 ton. Both sunflower production and area decreased by 20% and 4% respectively.

During the 2015 harvesting season, a representative sample of each delivery of soya bean and sunflower at the various silos throughout the production areas was taken according to the prescribed grading regulations. Composite samples per class and grade per bin were forwarded to the Southern African Grain Laboratory (SAGL) NPC for analysis. These samples represented the third and fourth annual crop quality surveys for sunflower and soya beans respectively.

Please note that all averages mentioned in this article are weighted.

Soya bean sample analysis

All 150 samples, according to the project proposal approved by the Oil and Protein Seed Development Trust (OPDT) and the Oilseeds Advisory Committee (OAC), have been received

at the SAGL. To date, 81% (121) of these samples have been graded.

Of these, 17 samples were downgraded to class other soya beans (COSB) and 86% of the samples were graded as Grade SB1. Six of the 17 samples were downgraded as a result of the percentage other grain present in the samples, exceeding the maximum permissible deviation of 0,5%. Seven samples were downgraded as a result of the presence of poisonous seeds exceeding the maximum permissible number. One and two samples respectively were downgraded as a result of the percentage sunflower seed and foreign matter exceeding the maximum permissible deviation.

Grading was done according to the industry-wide dispensation (Ref no 20.4.14.1 Dispensations, dated 6 March 2015), granting permission for the use of the 1,8mm slotted sieve in conjunction with the prescribed 4,75mm round hole sieve. The maximum allowable percentage foreign matter was therefore increased from 4 to 5% and the combination of foreign matter and *Sclerotinia* was increased from 6 to 7%.

No wet pods were observed in any of these samples. Based on the samples analysed so far, *Sclerotinia* has not posed any problems. *Sclerotinia* was, however, observed in 11% of the samples, with the highest percentage in a sample being 0,2%, which is well below the maximum permissible level of 4%. The national average this season



Parts of a soya bean sample which passed through the 4,75mm roundhole sieve (prior to dispensation).

is 0,01%, similar to the 0,03% over the previous three seasons.

The nutritional component analyses have been completed on 99 of the samples. The crude protein, fat, fibre and ash components have been reported as percentage (g/100g) on a dry/moisture-free basis (db) for the current as well as the three previous surveys. For comparison purposes the 'as is' basis results are provided in brackets. These 'as is' values were calculated using the weighted national average values.

The average crude protein content of the 2014/2015 season is 39,71% (37,0%) compared to the 39,84% (37,01%) of the previous season. The average crude fat percentage of 19,1% (17,8%) decreased from 19,7% (18,3%) in the 2013/2014 season. The average crude fibre content is 6,4% (6,0%) compared to 6,1% (5,7%) last season. The ash content is 4,61% (4,29%) and varied only 0,05% over the last four seasons.

Sunflower sample analysis

All 176 samples, according to the project proposal approved by the OPDT and OAC, have been received at the SAGL. To date, 97 (55%) of these samples have been graded.

The average crude protein content of the 2014/2015 season is 39,71% (37,0%) compared to the 39,84% (37,01%) of the previous season.

Of these samples, 84 (87%) were graded as Grade FH1, and 13 of the samples were downgraded to class other sunflower seed (COSF). In the previous season 82% of the samples



were graded FH1. Nine of the samples were downgraded as a result of the percentage of either the screenings, the collective deviations or a combination of both exceeding the maximum permissible deviations of 4 and 6% respectively.

Each of the four remaining samples was downgraded as a result of one of the following: The percentage foreign matter and collective deviations, the percentage damaged sunflower seeds or the number of poisonous seeds exceeding the maximum permissible deviations or due to the presence of stones.

The average percentage screenings present was 1,82%, compared to

the 1,69% of the 2013/2014 season. *Sclerotinia* was observed on only six of the 97 samples. The highest percentage present was 3%, which is still below the maximum allowable level of 4%.

The nutritional component results are reported on an 'as received' or 'as is' basis. These analyses have been completed on 58 of the samples. The average crude protein content of the current season is 16,92%, which is 0,77% higher, while the average crude fat content equals the 39,2% of the previous season. The average percentage crude fibre content is also similar to the 2013/2014 season (20,1% vs 20,2% previously). The ash content decreased slightly from 2,66 to 2,53%.



A damaged sunflower seed sample cut lengthwise with a blade.



A sunflower seed sample shelled with a barley pearler.

Value addition

The SAGL is continuously striving to improve the effectiveness of its services by developing improved

time-consuming process.

A 20g average sunflower sample consists of approximately 462 sunflower seeds as counted on a

operational procedures. One of these improvement projects relates to the shelling of sunflower seeds. According to the grading regulations, the determination of damaged sunflower seed is done on a 20g working sample, obtained from a screened sample free of foreign matter and *Sclerotinia*. This sample is then shelled to retain the nucleus portion of the seeds. Consequently, the grading of sunflower seed is a tedious and

Numigral seed counter. Cutting each kernel in the sample lengthwise in half with a carpet knife blade to enable inspection of the nucleus, typically takes a grader more than 20 minutes.

As an alternative to hand shelling, the SAGL has investigated the effectiveness of a barley pearler to shell sunflower seeds. To shell a 20g sample using this device takes less than two minutes. Based on this positive outcome, the SAGL has purchased a barley pearler which will assist, among others, with more timeous publication of crop survey grading results to their website.

With gratitude to the OPDT for financial support of these annual surveys and to the members of Agbiz Grain for providing the crop samples.

Detailed results of these as well as the previous season's surveys are available on the SAGL website at www.sagl.co.za. The annual crop quality reports in PDF format are also available for download. 📄

The effective technology

Farmet

SPECIALIST FOR PROCESSING OF OILSEEDS, VEGETABLE OILS AND FEED EXTRUSION

We produce and supply professional machines and technologies with wide power range.




- Oilseeds pressing
- Feed extrusion
- Vegetable oils filtration
- Refining

PRODUCE YOUR OWN OIL AND FEED WITH FARMET MACHINES






Farmet a.s.
Jiřínková 276, 552 03 Česká Skalice
Czech Republic
Phone: +420/491 450 116
Email: dtd@farmet.cz
www.farmet.eu

Biodiesel Technologies *
21 President CR Swart Street; Reitz
Free State, South Africa, 9810
Phone: +27 (0) 82 783 9402
Email: info@biotechsa.net
www.biotechsa.net

VGM

VAALHARTS GROUNDNUTS MARKETING CC

CK 1998/028606/23

- Uitvoer van Grondbone
- Aankoop van Grondbone
- Verwerking van Grondbone
- Massa Grondbone kan hanteer word
- Droging fasiliteite van Grondbone beskikbaar





Kontak: Paul van Wyk +27 83 629 3648

Tel: +27 53 474 1121

Faks: +27 86 756 4730

E-pos: vgm@groundnuts.co.za
Webadres: www.groundnuts.co.za

Plaas 2E5
Posbus 420
HARTSWATER
8570

SOYA BEAN:

An opportunity to control herbicide resistance in weeds



Dr Wynand van der Walt.

Herbicide-tolerant crops have had a major impact on food production. They have reduced the negative impact of weed competition, reduced persistent chemicals in the soil, brought about less mechanical farm operations and have been a driver of conservation agricultural practices to improve soil health.

Impact of GM crop

From 2001 to 2013 the beneficial impact of genetically modified (GM) herbicide-tolerant soya bean in South Africa compared to the conventional crop was US\$13 million (R186 million) more farm income, 1,2% less herbicides and 17% less environmental impact measured in environmental impact quotient (EIQ) load (Brookes and Barfoot, 2015).

Yet, continuous application of the same herbicides on the same crops to combat the same weeds will eventually lead to weeds developing tolerance to certain herbicides. Unlike humans and animals, weeds cannot react emotionally to stress, much less walk away from a

problem. Nature enables living organisms to maintain ongoing genetic variability through crossbreeding with similar or related species, as well as developing regular mutations, many of which arise by way of miniscule alterations in the genetic code. These variabilities also provide opportunities for tolerance to herbicides.

Scientists, having developed valuable herbicides, have now brought us food crop varieties with tolerance to herbicides so that spraying will only target and eradicate the weeds. The global biotechnology trend is to stack genetic traits, also for crop tolerance to herbicides. This facilitates extending weed control, rotating herbicides and crops, and tank pre-mixing of several herbicides.

Stacked herbicide-tolerant traits

This article endeavours to cover stacked traits, relevant herbicides' mode or mechanism of action and types of genetic tolerance to herbicides in soya beans. Here, mode refers to plant symptoms after application. Mechanism signifies the actual biochemical site of herbicide action. The onus remains with producers to obtain technical information and guidance from technology developers and suppliers.

Certain stacked herbicide-tolerant traits are approved internationally for

A soya bean field in the Bapsfontein district which is almost ready for harvest, and not a single weed thanks to glyphosate herbicide application. (Photograph: Dr Wynand van der Walt)

soya beans. Herbicide stacks: Tolerance to gluphosinate + glyphosate + 2,4-dichlorophenoxyacetic acid (2,4-D) in one variety, gluphosinate + 2,4-D, glyphosate + isoxaflutole (IFT), glyphosate + sulphonurea, glyphosate + dicamba and gluphosinate + mesotrione.

Herbicide plus other traits: Glyphosate + sulphonurea + modified oils (just approved in Argentina), gluphosinate + *Bacillus thuringiensis* (Bt) insect resistance, sulphonurea + modified oils, glyphosate + modified oils, glyphosate + enhanced photosynthesis and glyphosate + omega-3 stearidonic acid.



A close-up shot of ripe soya bean in the Delmas district. (Photograph: Dr Wynand van der Walt)

Modes of action

Modes or mechanisms of action of relevant herbicides and GM soya beans' tolerance to certain herbicides are described below. Developing genetic tolerance to herbicides requires different approaches, as herbicide modes of action differ and as soya bean technology developers may employ different genetic routes to obtain the same result. Tolerance to specific herbicides is achieved by inserting into soya bean varieties a novel gene or genes that reduce the herbicidal binding affinity to sites where it is active, or disarming the herbicide's function, or impairing or eliminating herbicidal functions.

2,4-D: This well-known herbicide acts on the plant's growth by mimicking the function of auxins, which are natural plant growth-regulating hormones. The synthetic chemical is absorbed mostly in foliage, little of which is translocated to roots, and results in abnormal above-ground growth. GM soya bean tolerance to 2,4-D: The AAD-12 protein produced by the AAD-12 gene catalyses part of the 2,4-D chain, rendering it ineffective.

Dicamba: This widely used chemical is rapidly absorbed into roots and then translocated to shoot tissue with resultant distortion of leaves, in a similar mode to the 2,4-D effect. GM soya bean tolerance to dicamba: Comparable to 2,4-D tolerance.

Isoxaflutole: It is a synthetic chemical for pre-emergence, soil-applied herbicide. It becomes systemic in roots and leaves

to which it is translocated. The chemical affects plant membranes, halting cell division and impairing plant growth. GM soya bean tolerance to isoxaflutole: The hppdPf gene reduces the specificity of the herbicide's bioactive constituent.

Gluphosinate-ammonium: This is another well-known chemical used globally. It affects only the parts of the plant on which it is applied and is effective against a range of annual and perennial weed species. It is a structural analogue of glutamate with the ability to inhibit glutamine synthesis to the detriment of plant growth. GM soya bean tolerance to gluphosinate: Herbicidal activity is eliminated by the N-acetyl transferase enzyme of the bar gene.

Glyphosate: The active ingredient is a glycine (the smallest amino acid) derivative that binds to and blocks 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), which leads to deficiencies in key amino acids that are the building blocks of proteins, thereby starving the plant. GM soya bean tolerance to glyphosate: The CP4 EPSPS gene decreases the binding affinity of glyphosate to its action site. Tolerance can also be achieved by way of a double mutant enzyme.

Mesotrione: This active ingredient in the herbicide is part of a class of triketones. Its action is to inhibit synthesis of amino acids and carotenoids. (Beta-carotene is the precursor of Vitamin A.) Mesotrione

will eradicate weeds that are tolerant to sulphonurea, acetolactate synthase (ALS) herbicides and triazines. GM soya bean tolerance to mesotrione: An avhppd-03 gene transferred from oats provides tolerance in soya bean to mesotrione by way of p-hydroxyphenylpyruvate.

Sulphonurea: This member of the ALS group was discovered in 1975 and has been sold since 1981. Its herbicidal chemical properties are variable, dependent upon the target weed species. It acts by inhibiting ALS enzymes that control the synthesis of major amino acids. GM soya bean tolerance to sulphonurea: A modified ALS enzyme from a modified *csr1-2* gene confers tolerance to the imidazolinone herbicide group which includes sulphonurea.

The above information does not contain reference to technology owners or trade names. Stacked traits may contain genes from different technology owners and some similar stacks may have been developed independently by different companies. Minor genetic alterations may yield the same traits, but with improved efficacy.

Some of the mode and mechanism of action information has been sourced from extension services of the Oklahoma State University, Purdue University, Florida State University and the Weed Science Society of America, with genetic mechanism data obtained from the International Service for the Acquisition of Agri-biotech Applications (ISAAA) database. 🌱



minispec Benchtop NMR Oil Seed & Algae Analyzer

● % Oil, % Moisture

- Measurement in seconds
- Entire bulk, no solvents needed
- Dark color, shells: no problem
- Easy calibration & no drying step

The value of CANOLA MEAL IN SWINE DIETS

Current data clearly indicates that diets containing canola meal, when properly formulated, will support high levels of efficient growth performance. The nutritional value of canola meal for swine is being understood increasingly well, and the major limitation for value and inclusion is the available energy content, especially when measured as nett energy (NE).

Improper feed quality evaluation information for digestible nutrients in canola meal has resulted in certain problems with poorer pig performance in the past. Ultimately, the relationship between ingredient cost and nutrient content will determine the appropriate level of inclusion of canola meal in well-formulated diets.

Feed intake

The effect of a feed ingredient on the feed intake of pigs is difficult to evaluate objectively, given the numerous factors involved (Nyachoti *et al.*, 2004). Variables such as basic palatability of the ingredient,

dietary inclusion level and other ingredients in the feed mix, feed energy, fibre content (bulk density) and feed mineral balance will influence feed intake.

For canola meal, several factors with the potential to reduce feed intake exist, such as glucosinolates, tannins, sinapine, fibre and mineral balance. Certainly, glucosinolates represent a major negative influence on feed intake in pigs. Aside from their anti-nutritive effects, glucosinolates have a bitter taste to many animals. Canola meal produced in Canada, with its very low levels of glucosinolates (4,2µmol/g), has a very neutral taste. Other causes than glucosinolates likely

play a role in situations in which reduced feed intake of canola meal diets is observed.

Landero *et al.* (2012) conducted feed preference trials with weaned pigs given the choice of either soya bean meal or canola meal. A strong preference was observed for soya bean meal, which agrees with previous literature; however, when no choice was given, canola meal could be included at up to 20% in the diet without impacting feed intake or growth performance. Additionally, Sanjayan *et al.* (2014) successfully fed increasing levels of canola meal with excellent performance results.

Sonneblombasters waarop mens verlief kan raak...

Skakel gerus ons Potchefstroom-tak
vir verdere inligting: 018 294 7470

Agsun 8251
Agsun 5264
Agsun 5278

Plant in die kol, plant


agricol
aan die groei

 **Clearfield**
Production System

 **Clearfield Plus**
Production System

Canola meal is often considered as a poor source of energy for swine diets, due to the high amount of fibre and a complex carbohydrate matrix with limited digestibility. Diet formulation based on NE allows for the proper inclusion of canola meal in swine diets so as to not impact performance.

Energy values published by the National Research Council (NRC) in 2012 are given in *Table 1* and are based on historical information. Recently, Maisson *et al.* (2015) determined digestible energy (DE) values of 3,378Mcal/kg of dry matter (DM) and 3,127 Mcal/kg of DM for metabolisable energy (ME).

Table 1: Available energy values of canola meal (12% moisture basis for swine).

DE (kcal/kg)	3,154
ME (kcal/kg)	2,903
NE (kcal/kg)	1,821

Source: NRC, 2012

Amino acid digestibility

A key to using high levels of canola meal in swine diets is to balance them correctly for digestible amino acids. The digestibility of key amino acids in canola meal is lower than in soya bean meal. As a result, when canola meal replaces soya bean meal in the diet, the overall levels of digestible amino acids, especially lysine and threonine, will decrease if the diet is balanced to total amino acid levels only.

Diets in earlier feeding trials with canola meal were balanced to the same levels of crude protein, total essential amino acids and energy. However, a lower growth rate compared to soya bean meal-fed pigs was observed because levels of digestible lysine decreased as canola meal inclusion level in the diets increased.

Presently, swine diets are routinely formulated to levels of digestible amino acids rather than total amino acids. Recent feeding trials with canola meal in starter, grower and finisher pigs, in which the diets were balanced to the same levels of digestible lysine, resulted in a growth rate equivalent to what is typically found with soya bean meal as the primary protein source, even at very high inclusion levels of canola meal.

Enzyme addition

Enzyme addition is an avenue to increase the available energy in diets that include canola meal. Multicarbohydrase enzymes have been developed and used as a means to extract energy from the cell wall of non-starch polysaccharides. Sanjayan *et al.* (2014) included multi-carbohydrase enzymes in the diets of weaned pigs fed increasing inclusions of canola meal. Growth performance was not improved, but enzyme addition did increase apparent total tract digestibility (ATTD) of crude protein at 20 and 25% canola meal inclusion in experimental diets.

As with many oilseed meals, much of the phosphorus in canola meal is bound by phytic acid. Phytic acid reduces the availability of the phosphorus to between 25 and 30% of the total (NRC, 2012). It is common practice to add phytase enzyme to diets for pigs and poultry to improve the availability of phosphorus.

Akinmusire and Adeola (2009) determined that the digestibility of phosphorus in canola meal increases from 31 to 62% when phytase is included in the diet. One study (Gonzalez-Vega *et al.*, 2013) also demonstrated that the addition of phytase enzyme increased the availability of calcium in canola meal from 47 to 70%, while increasing phosphorus availability to 63%.

Glucosinolate tolerance

Glucosinolates are animal anti-nutritional factors found in canola meal for swine. In the initial years of feeding canola meal, the maximum level of glucosinolates that pigs can tolerate in the diet was defined by several researchers. In a review of earlier research, a maximum level of 2,5µmol/g of glucosinolates in pig diets was suggested (Bell, 1993).

The maximum tolerable level of glucosinolates in swine diets remains of interest, and breeding efforts in canola have focussed on the further reduction of glucosinolates in canola seed. Current levels of glucosinolates are demonstrating few to no limitations for canola meal inclusion in grower-finisher diets.

Starting pigs (6 to 20kg)

Until recently, the most current available literature demonstrated reduced

performance in young pigs fed canola meal at levels greater than 5% (Bourdon and Aumaltre, 1990; Lee and Hill, 1983). However, new research has brought to light a very different view on canola meal inclusion in the diets of weaned pigs.

The relationship between ingredient cost and nutrient content will determine the appropriate level of inclusion of canola meal in well-formulated diets.

Landero *et al.* (2011) demonstrated that canola meal can be fed to weaned pigs, with an initial body weight of 8,1kg, at levels of up to 200g/kg without negatively impacting performance. This was demonstrated again in 2014 by Sanjayan *et al.*, where canola meal was included at 25% of the diet in weaned pigs (initial body weight of 7,26kg), with highly acceptable performance results after the first week of the trial. The main difference concerning these two studies when compared to earlier research, is that both research groups formulated diets based on NE and standardised ileal digestible (SID) amino acids.

Finishing pigs (20 to 100kg)

In the growing and finishing phases of pig growth, canola meal can be used at high dietary levels and will support excellent performance. An array of studies have shown that when diets are balanced for NE and SID amino acid levels, performance is the same as with soya bean meal with dietary inclusion levels of canola meal up to 25%.

The Canola Council of Canada sponsored a series of feeding trials with growing and finishing pigs in Canada, Mexico and the Philippines to demonstrate that balancing the diets to digestible amino acids will improve

performance results. Smit *et al.* (2014b) fed grower-finisher pigs, with an initial weight of 29,9kg, five-phase diets containing varying levels of canola meal of up to 240g/kg, while also including 150g/kg of dried distillers' grains (DDG) with solubles in all diets.

Pigs fed 240g/kg versus those fed 60g/kg reached their market weight three days later, but showed no difference in carcass traits. Smit *et al.* (2014a) then fed growerfinisher pigs canola meal at up to 300g/kg. There was a slight reduction in performance and carcass traits between pigs fed 200g/kg and those fed 300g/kg, although feed efficiency was improved.

Breeding swine

Canola meal has been readily accepted in diets for sows and gilts, both in gestating and lactating periods. Flipot and Dufour (1977) found no difference in reproductive performance between sows fed diets with or without 10% added canola meal. Lee *et al.* (1985) found no significant difference in the reproductive performance of gilts through one litter.

Studies at the University of Alberta (Lewis *et al.*, 1978) have shown no difference in the reproductive performance of gilts through two reproductive cycles when fed diets containing up to 12% canola meal. More recently, levels of 20% canola meal did not affect the performance of lactating sows (King *et al.*, 2001).

The results suggest that canola meal may represent the main supplemental protein source in gilt and sow diets for all phases of reproduction. Canola meal may be restricted in sow diets that are formulated to maximum fibre levels in order to limit hind gut

fermentation. For the most part, however, producers are now accepting canola meal as an appropriate alternative supplemental dietary protein source for sows. Still, there is some unfounded concern over the daily feed intake of nursing sows fed canola meal-based diets. These concerns, however, are not supported by research.



Feeding canola expeller meal

Canola expeller meal is an excellent source of energy and protein in swine rations. Bran *et al.* (2001) studied the effects of adding canola expeller cake to the grower-finisher rations. The diets were composed of as much as 29,2% expeller meal. No effects on feed intake, feed conversion or live weight gain were found, indicating that the meal is an effective ingredient.

In 2012, Landero *et al.* fed increasing levels of expeller-pressed canola meal to young pigs one week post weaning, and determined that when diets were formulated to equal NE and SID values, expeller meal can replace soya bean meal at a level of 200g/kg. As is the case with other species, it is important to have the fat content of the meal analysed prior to formulation and the energy content assigned accordingly.

The fat content of expeller meals varies between and within sources, therefore the product should be routinely tested and the energy value adjusted accordingly. Woyengo *et al.* (2009) determined there was a DE of 4,107kcal/kg for expeller canola meal, with 12% fat on a DM basis. The energy content of the meal in kcal/kg can be

calculated as $DE = 2,464 + (\%fat \times 63)$, $ME = 2,237 + (\%fat \times 62)$, and NE can be calculated using the following equation: $1,800 + (\%fat \times 70) = \text{kcal/kg}$. For example, a meal with 10% fat would have an NE of $1,800 + (10 \times 70) = 2,500\text{kcal/kg}$. Woyengo *et al.* (2009) likewise assessed the SID of amino acids in expeller canola meal.

Feeding canola seed and oil

Canola oil is routinely fed to all types of pigs. Crude canola oil is often an economical energy source as well as a dust suppressant in the feed. Canola seed is also fed as a protein and energy source, although it is usually limited to 10% dietary inclusion, since higher levels will result in softer fat in the carcass (Kracht *et al.*, 1996).

Canola seed should be ground before feeding. It can be effectively fed raw, although heat treatment may prove beneficial as long as excessive heat is not used during processing, which will reduce amino acid digestibility. A nutrient analysis should also be conducted on canola seed, as it may be seed that is unsuitable for canola processors.

Montoya and Leterme (2010) estimated an NE content of full-fat canola seeds of 3,56Mcal/kg (DM basis), but noted a possible underestimation due to a demonstrated reduction in feed intake and performance at dietary inclusion levels above 10% for growing pigs.

Practical inclusion levels

The recommended practical inclusion levels for canola meal in swine diets, together with the reasons, are given in Table 2.

Table 2: Recommended practical inclusion levels (%) of canola meal in pig diets.

Animal diet type	Inclusion level	Reasons for inclusion level
Pig starter	20	High performance results reported at 20% inclusion.
Hog grower/finisher	25	High performance results reported at 25% inclusion.
Sow lactation	20	No data available beyond 20% inclusion.
Sow gestation	–	No data available.
Boar breeders	–	No data available.

Visit www.canolacouncil.org for more information. 

Big stems, bigger roots, biggest leaves.
Biggest yield with Bellis®



Bellis® - The newest addition to the BASF AgCelence® portfolio not only ensures effective disease control for Sunflowers, it also gives additional physiological benefits for the optimum yield. We call it the AgCelence® effect:

- Increased plant growth efficiency with better photosynthesis efficiency, better use of nitrogen and increased bio-mass development
- Increased tolerance to stress in situations such as drought by inhibiting ethylene production

Get the AgCelence® advantage with Bellis®

 **BASF**
We create chemistry



If you are a modern agriculturalist, you are also in the business of saving money and conserving nature... SO ARE WE!

Our CENTRE PIVOTS have many features doing exactly that!

- The more expensive I-Wob sprinkler packages installed on every SENTER 360 centre pivot is standard equipment. It is proven by independent water scheduling professionals to get more water in the ground than most other centre pivot sprinklers available today. It is saving you money by not unnecessarily losing expensively pumped water to the atmosphere through evaporation or run-off. Contact us for more detail.
- I-Wob sprinklers operate at their best at only 1 bar pressure, thereby saving energy.
- Due to a SENTER 360 world-first patent that is fitted as standard to every SENTER 360 centre pivot, we constantly keep your SENTER 360s' last sprinklers clean. As a result you DO NOT lose the outside hectares of your expensively planted and fertilised crop anymore as is commonly "accepted" worldwide by centre pivot manufacturers and irrigation farmers alike due to blockages during the irrigation cycle.
- The extremely strong (strongest in the business) and balanced pipe structure will last you longer through those unexpected gale forces and trying conditions that nature so often throw at us.
- Our standard, accurate and intelligent direct millimetre adjustable speed control unit ensures that you apply the exact millimetres required every time, not guessing, over- or under-irrigating.
- Our optional, accurate, multi-level soil moisture measuring devices empower you to determine and irrigate the exact amount needed for your crop, proven not only to save you water and preserve your fertiliser, but also to ensure higher yields. Independent tests show less water used and higher yields achieved every time.



Corporate



Technical



It's not only another centre pivot... it's a SENTER 360!

Tel: +27 18 469 1331
Email: info@senter360.co.za
www.senter360.co.za