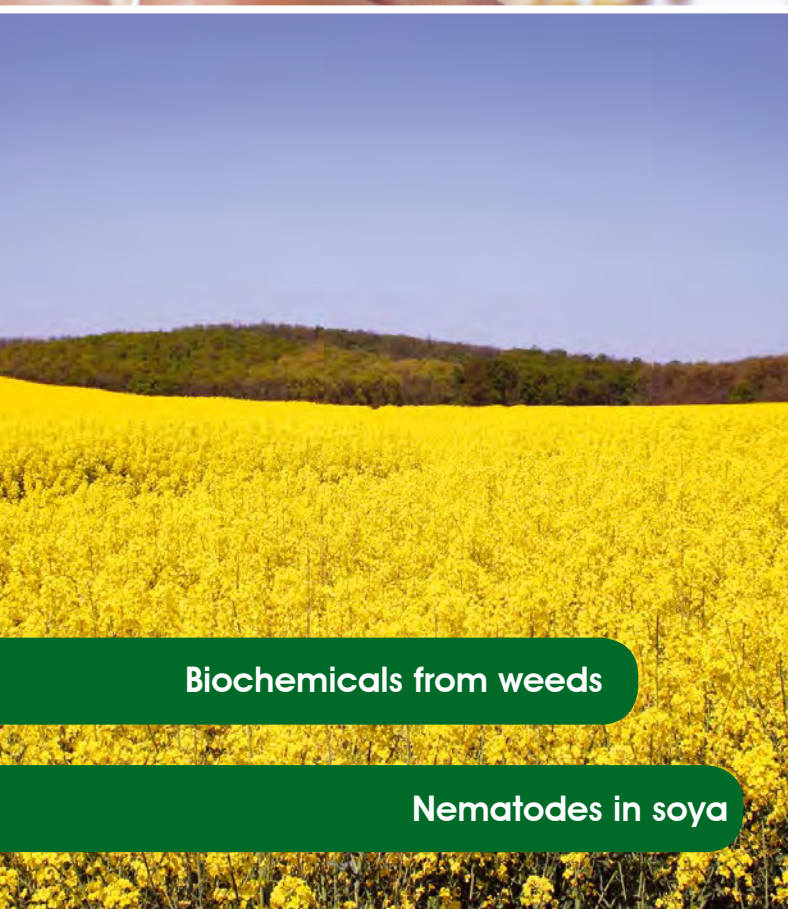


OILSEEDS

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By Prof Ferdi Meyer, director of the Bureau for Food and Agricultural Policy (BFAP)

THE COMPETITIVENESS OF THE OILSEED VALUE CHAIN

The rapid growth of the South African soya bean crop over the past five years was achieved through an annual average expansion of 21% in hectares planted and an average yield increase of 4% per annum.

The canola industry has exhibited similar growth rates with its area under production, expanding by an annual average of 22%, with average yields increasing by approximately 8% per annum. With the soya bean crop estimated to have surpassed the one million ton mark in the recent summer season and the canola crop estimated to come in at approximately 110 000 tons, both industries have been able to expand and intensify the local crop.

Potential for expansion

With the rapid increase in the local feed market and the demand for oilcake, the majority of oilcake has to be imported amid the lack of local crushing facilities. The country is also a net importer of vegetable oil. With significant potential for expansion in the supply of feedstock and product markets, an attractive opportunity has been created for investment in crushing facilities. Numerous companies identified this need and new crushing facilities have become operational.

The total soya bean crushing capacity in South Africa is now estimated at 1,75 million tons. Considering the additional plants now able to switch between soya bean and sunflower crushing, this capacity could be expanded to over 2,5 million tons if dual capacity plants were to crush soya beans only. The local crushing capacity of canola has also expanded with the growth in local production and is estimated at 140 000 tons.

Crushing capacity utilisation

International comparisons indicate that long-term crushing capacity utilisation tends to remain below 85%, with 80% being the benchmark for modern crushing facilities. Applying a benchmark utilisation rate of 80% to future soya bean crops, as projected in the latest *Bureau for Food and Agricultural Policy (BFAP) Baseline 2015*, certain dual crushing capacity facilities will need to convert to soya bean crushing after 2017. By 2024, all of the dual capacity facilities will have to be utilised for soya bean crushing, if the projected crop of 2,2 million tons is to be crushed without further capacity expansion.

South Africa currently has a major surplus of crushing capacity with utilisation rates at some crushing plants being relatively low, due to a shortfall of domestically produced soya beans as well as technical challenges in newly constructed plants. This has placed crushing margins under significant pressure.

While some soya bean imports have been forthcoming over the past two seasons, domestic soya bean prices remain well below import parity levels, as they are derived from the price of oil and oilcake. Crushing margins tend to come under immense pressure when the cost of beans increases to import parity levels.

Utilisation rates are projected to improve in the next decade, with domestic soya bean production set to expand by more than 100 000 tons per annum on average. Consequently, only a limited volume of soya beans will be imported.

Global competitiveness

South Africa remains a small player in the global oilseed market. With multinational companies actively involved in the local market, the industry faces a competitive environment. Structural adjustments in price discovery are also occurring.

Whereas the local soya bean seed

price used to be mainly driven by supply and demand and traded closer to export parity levels, it is now derived from the underlying fundamentals in the cake and oil market. Soya bean seed prices now tend to trade in the middle range between import and export parity. This structural shift has boosted the relative competitiveness of soya beans compared to maize. BFAP's projections indicate that the soya bean-to-maize rotational cropping pattern will likely shift to a 40:60 ratio over the next decade.

**Crushing margins
tend to come under
immense pressure
when the cost of
beans increases to
import parity levels.**

The soya bean and canola industries are linked to a long, integrated value chain. Expansion in production and processing has major implications for role-players, due to upstream and downstream linkages. Role-players are also undergoing a period of adjustment which is critical to improve industry competitiveness and sustainability. Profit maximisation is occurring at every level. If chicken or oilcake can be imported at a lower price, mills, traders and retailers will consider this option.

The basic principles of competitiveness link to the farm gate, where yield improvement and more efficient farming practices form the foundation for further expansion. It is encouraging to observe the latest results from the soya bean elite cultivar trials supported by the Protein Research Foundation (PRF), which indicate that significant yield improvements can be expected from the introduction of new cultivars in the local market. 🌱

Innovation and application of technology

One of the major challenges facing the oilseed industry, is the innovation required to meet the ever-increasing demand for oilseeds in an economical and sustainable way. This can only be achieved by using the latest technology and applying best management practices.

Research in South Africa

South Africa is a country that can pride itself on producing world-class researchers within the multiple disciplines surrounding oilseed production – from seed development to agronomy, quality control and human or animal consumption.

There is, however, some concern that young, new researchers who will need to replace the vast experience of our existing structures are in fact in short supply. Institutions that were once focussed on research are in many cases scaling down, while in-house research in private companies continues to increase.

It is critical for the oilseeds industry that technology be sourced globally from countries and institutions where the capacity has already been established. The challenge is to then transfer new technology from these sources to the producer, where the information is most needed.

Progress

Making use of symposia such as the recent Protein Research Foundation (PRF) Soya Symposium as well as industry days, make an important contribution to the field of technology transfer. The industry forums also create the platform where information can be exchanged in respect of the main aspects that are restraining production, in order for these problems to receive attention. The onus rests on the entire supply chain – from seed, chemical and fertiliser companies, to producers and researchers – to ensure that we achieve the rapid progress required for the development and exceptional production within the South African oilseed industry.

We also trust that this magazine can assist towards this technology transfer and to highlight the critical research that is being done and still needs to be done.

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.

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Cargill reports \$51 million net loss

Cargill reported a net loss of \$51 million in the fiscal 2015 fourth quarter ended 31 May 2015, compared to earnings of \$376 million in the same period during the previous year. Fourth-quarter revenues were \$28,4 billion, compared to \$36,2 billion in the previous period.

For the full fiscal year, Cargill earned \$1,58 billion, a 13% decrease from \$1,82 billion in the prior year. Revenues decreased by 11% to \$120,4 billion. Cash flow from operations totalled \$3,82 billion, up 1% from fiscal 2014.

"While several Cargill businesses generated very strong earnings in fiscal 2015, we lagged results from the prior year and did not meet our own expectations," says David MacLennan, Cargill's president and CEO. "The economic environment remains sluggish in many emerging markets where we have invested significantly over the past several years. Even so, we aim for growth and profitability through these cycles."

The animal nutrition and protein segment posted increased profits for the full fiscal year, with strong performances in global animal nutrition, Central American poultry, and US pork, turkey and egg further processing. – *Press release*

The cost of SA's worst drought in 23 years

SA's worst water shortages in 23 years have caused a decline in farming output that will lower its GDP and cause food price increases. The drought devastating parts of South Africa will cause the country's farmers to lose up to R10 billion this year.

Worst affected are KwaZulu-Natal, the Free State, Limpopo, North West and the Northern Cape, where farmers growing white maize, yellow maize, soya beans and sunflowers have incurred major losses.

A report released by the UN's food and nutrition working group found this drought – the country's worst since 1992 – had caused a decline in maize production that had already led to an increase in food prices of 6,4%.

Agricultural business chamber, Agbiz, CEO John Purchase said the cost of the drought was difficult to quantify. "Just the maize crop is down from 14,25 million tons [worth R25,4 billion] last year to an estimated 9.84 million tons this year. This alone translates to a loss in income of close to R10 billion. The total loss amounts to [several] billions [more]," he says.

Grain SA chief executive, Jannie de Villiers, warns that the country would have barely enough white maize for its own consumption, and would need to import about 700 000 tons of yellow maize to feed livestock, which would cost farmers R1,96 billion.

De Villiers says: "From May this year to January next year, we can expect an additional increase of between 15 and 20% in the maize meal price.

Figures from the Studies in Poverty and Inequality Institute (SPII) indicate the effect could be even worse. – *News 24*

Canadian producers warned about jimsonweed

Growers and agronomists in Canada have been warned to keep an eye out for jimsonweed in their crops. However, the statement reads that, health concerns around potential toxicity in canola oil are unfounded.

"While jimsonweed itself can be poisonous, the heating process in canola oil and meal processing denatures toxic alkaloids, so there isn't a health concern in processed canola products," says Curtis Rempel, vice president of crop production and innovation at the Canola Council of Canada (CCC). "It is also important to remember that it is the dose that makes the poison, and the high LD50 of scopolamine, the major toxic alkaloid in jimsonweed, even further supports the fact that this weed isn't a concern in canola oil or meal."

Rempel notes that there are still legitimate health concerns upon ingestion of the actual jimsonweed plant or seeds themselves by humans or other animals, as all parts of the plant contain the toxic alkaloids.

Jimsonweed (*Datura stramonium*), also known as devil's trumpet, is a naturalised annual herb found across most of southern Canada. "It thrives in hot, dry climates and is a common ornamental in parts of the prairies and Eastern Canada, and grows all over the US," notes Rempel. – *Canola Council of Canada*



China to buy millions of tons of US soya beans

A Chinese delegation is expected to sign deals to buy 'several million' tons of US soya beans at a ceremony in Iowa on 24 September during President Xi's upcoming state visit, according to a source that will be travelling with the group accompanying the Chinese leader. More than 20 Chinese companies, including some of the country's largest, such as COFCO, Sinograin, the Heilongjiang Jiusan Group, and China's once-largest soya buyer, the privately held Sunrise Group, will be included in the delegation.

This would not be the first time China has signed such deals. During Xi's first state visit to the United States, as China's vice-president in 2012, a Chinese delegation agreed to buy more than 12 million tons of US soya beans in a record-breaking single deal.

Even though deals such as these are veiled political gestures, nevertheless, they could help boost the US soya sector as prices are at a six and a half year low, and US soya sales face their slowest sales in seven years due to a strong dollar and a market glut from South American supplies.

Because of the country's economic slowdown, China's total soya imports are expected to grow by only 1 million tons in 2015/16, and the country is expected to buy a total of 27 million tons of US soya beans over the 2015/16 marketing year

down from 29,6 million tons the previous year according to a report issued by the China National Grain and Oils Information Centre. – www.oilseedandgrain.com



European countries ban GMO crops

Latvia and Greece have chosen the "opt-out" clause of a European Union rule passed in March that allows member countries to abstain from growing GM crops, even if they are authorised by the EU. Scotland and Germany also made headlines recently for seeking a similar ban on GMOs.

According to Reuters, in many European countries there is widespread criticism against the agribusiness giant's pest-resistant crops, claiming that GM cultivation threatens biodiversity.

Monsanto said it would abide by Latvia's and Greece's request to cease growing the crops. The company, however, accused the two countries of ignoring science and refusing GMOs out of "arbitrary political grounds."

In a statement, Monsanto said that the move from the two countries "contradicts and undermines the scientific consensus on the safety of MON810."

Monsanto also told Reuters that since the growth of GM crops in Europe is so small, the opt outs will not affect their business.

"Nevertheless," the company continued, "we regret that some countries are deviating from a science-based approach to innovation in agriculture and have elected to prohibit the cultivation of a successful GM product on arbitrary political grounds." – *EcoWatch*

NSF International launches suite of GMO transparency services

Responding to industry and consumer demand for non-GMO certification options, NSF International, the not-for-profit public health and standard development organisation, has launched NSF Non-GMO True North.

NSF International's newest certification offering expands its suite of GMO transparency services for retailers, manufacturers, suppliers and producers. The new non-GMO certification, available through NSF International's Consumer Values Verified™ Programme, is offered in addition to non-GMO project verification.

NSF Non-GMO True North

certification utilises elements of global and domestic GMO labelling regulations, including EU and Vermont GMO labelling requirements. – *SeedQuest*



Sunflower seeds cap best two-day rally

South African sunflower seeds posted the biggest two-day advance this year (on 31 August 2015) as drought damaged crops and demand reached the highest level in eight months.

The Free State, a province that produces most of the country's crop, did not receive enough rain during planting, and estimates from the government's Crop Estimates Committee (CEC) suggest output will be 21% less than last season. Local demand for sunflower seeds rose to 77 472 metric tons in July, 16% more than the previous month, according to data on the South African Grain Information Service (Sagis) website.

Sunflower seeds for delivery in September increased 2% by 31 August, increasing the daily limit for a second day, to R5 840 a metric ton on the South African Futures Exchange (Safex). Prices were the highest since March 2014.

Soya beans also rose by the daily limit. Futures for delivery in December increased by 2,1% to R5 335 a ton, rising for a fifth day. Demand rose 17% in July to 129 940 tons, the highest since at least 1998, according to Sagis. – *Bloomberg News* 🟢



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DEO GLORIA

BIOCHEMICALS

released from weeds can inhibit crop development

It is common knowledge that plants compete for the basic resources required for plant growth and development, namely nutrient elements, water and sunlight. A far lesser known fact is that long after plant-plant competition was accepted by ecologists to be the sole determinant of plant-plant interactions, a new phenomenon in plant ecology was discovered.

Although demonstrated by a few botanists in the 18th century, it was poorly understood until the 1930s, when the term allelopathy was coined to describe it. Today, it is generally accepted that the phenomena of allelopathy and competition together contribute to plant-plant interference (allelopathy plus competition), which shapes plant communities in both natural and agricultural environments.

The term allelopathy is derived from the Greek word *allelos*, meaning mutual, and *pathos*, meaning harmful – hence allelopathy describes the phenomenon whereby plants wage biochemical warfare with the natural chemicals they produce. The definition of allelopathy used to be applied to higher plants only, but has since been expanded to also include fungi.

Produced by all plants

All plants (weeds and crops) can produce and release these biochemicals, known as allelochemicals, through the processes of root exudation, leaching from leaf surfaces where allelochemicals can be sequestered in specialised glands, volatilisation (allelochemicals released in gaseous form) and plant residue decomposition.

The latter process involves microbial decomposition during which allelochemicals produced in the live plant are released unaltered, and/

or new allelochemicals may be produced in the process of microbes feeding on dead plant material.

Allelopathic interactions are all the more complex because different classes of biochemicals are involved, such as alkaloids, amino acids, carbohydrates, flavonoids, phenolic compounds, steroids and terpenoids, with mixtures of different compounds sometimes having a greater allelopathic effect than individual compounds alone.

Furthermore, physiological and environmental stressors such as pests and diseases, solar radiation, herbicides, nutrient deficiency, low moisture and high temperature can determine the level of allelopathic effect exerted, because there usually exists a positive relationship between increased production of allelochemicals and stress levels in plants.

Live and dead plants

Different plant parts, including flowers, seeds, leaves, stems, bark, roots, fresh plant litter and decomposed plant material, can produce different allelochemicals in varying amounts, and release them into the environment in different ways.

Scientific literature abounds with research reporting not only growth-inhibiting allelopathic effects of weeds on crops, but also of crops suppressing weeds through the release of allelochemicals into the soil, from where it is taken up by weeds.

It is important to note that allelochemicals are released from live plants, as well as from dead and decomposed plant material such as organic mulches and compost. A particular allelochemical can simultaneously act as a herbicide,



The deleterious effect of the weed (*Cyperus esculentus*) is the result of the interference phenomena of allelopathy and competition acting in unison. (Photograph: C Reinhardt)



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- Verkrygers in elke area.
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bactericide, fungicide or as an anti-feedant (feeding deterrent to insects and animals).

This multi-purpose nature of allelochemicals is not surprising if one considers that plants are not able to physically flee from threats as most other organisms are able to do. Most of the world's main weeds have been found to have allelopathic growth-inhibiting effects on a wide range of crops, and several crop species are known to suppress weeds in a similar way.

Annual weeds and crops

Annual weeds well known for having allelopathic potential, to name but a few, *Amaranthus* spp. (pigweed group), *Bidens* sp. (blackjack group), *Chenopodium* spp. (goosefoot group), *Conyza* spp. (fleabane group), *Cynodon dactylon*, (couch grass), *Cyperus* spp. (yellow, purple nutsedge), *Digitaria* spp. (finger grass), *Tagetes minuta* (khaki weed), *Senecio consanguineus* (John Deere bossie), *Sorghum halepense* (Johnson grass), *Striga* spp (witch weed group of plant parasites) and *Xanthium strumarium* (cocklebur).

One study demonstrated the significant inhibition of sunflower and various other crop plants where fresh material of *Chenopodium album* (white goosefoot) was incorporated in soil (1% mass/mass).

Annual crops with proven allelopathic potential include maize (low potential), sunflower (high potential), legumes

(moderate to high potential), small grains (high potential), rice (high potential) and sorghum (high potential). Among the oilseeds crops, sunflower and canola stand out regarding their ability to suppress weed growth and development, irrespective of whether it is effected during active growth of the crop or by means of an organic mulch consisting of these crops' residues.

Sunflower and canola plant litter is well known for its ability to strongly suppress weed emergence and growth, and unique biochemicals (allelochemicals) with herbicidal properties have been identified in these and several other annual crops, and found to have reproducible allelopathic effects on weeds.

The principle through which crop litter can suppress weeds rests on the premise that allelochemical concentration is directly related to plant litter biomass, thus explaining the observation that a minimum load (biomass) of plant mulch is required for effective weed suppression. This is a key consideration in reduced tillage systems where crop residues have other valuable purposes, such as

preventing soil erosion, and promoting water infiltration and retention of soil moisture.

Optimum biomass

Knowing the optimum crop litter biomass for weed suppression purposes is important, because whereas a lower than optimum biomass will likely

fail to suppress weeds, a higher than optimum biomass might be detrimental for the crop itself (autotoxicity is the term used to describe same-species allelopathic effect, or a crop can be allelopathic to other crops).

Producers of soya bean and other legumes that are dependent on N-fixing bacteria should be mindful of not only the direct allelopathic effects which live and/or dead weeds may have on crop growth and development, but also of indirect allelopathic effects due to inhibition of N-fixing bacteria by those same allelochemicals.

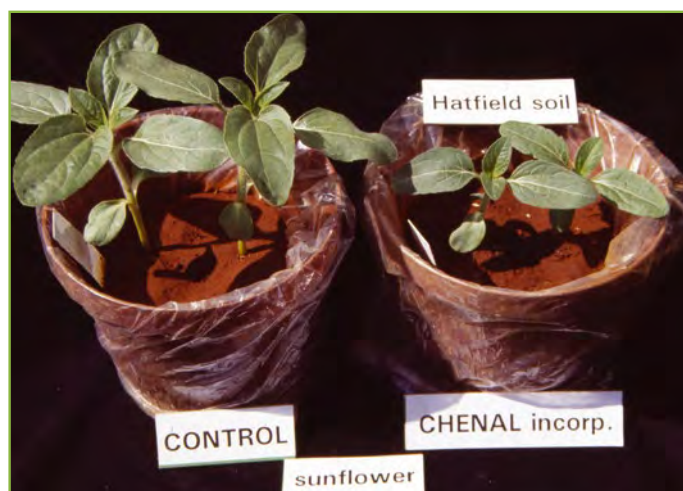
A scientific study has found that residue of *Chenopodium murale* (nettle-leaved goosefoot) releases phenolic allelochemicals, which deleteriously affect the growth and nodulation of chickpea and pea. It is known that members of the *Fabaceae* plant family produce flavonoid compounds that signal to symbiotic rhizobia and encourage root nodule formation where symbiotic dinitrogen fixation occurs.

Because it is impossible to predict which type of allelochemicals and in what amounts it will be produced and released by a weed at any stage of its lifecycle, either before or after its death, the safest option is to keep weed numbers (weed biomass) as low as possible.

For more information and references, contact Dr Charlie Reinhardt, extraordinary professor of Weed Science at the University of Pretoria and dean of Villa Academy, on 083 442 3427 or email dr.charlie.reinhardt@gmail.com.



Soya bean plants showing varying degrees of nodulation. (Photograph: John McIntyre, Villa Crop Protection)



Suppression of sunflower by allelochemicals released from 1% (mass/mass) soil-incorporated foliage material of the weed *Chenopodium album* (white goosefoot). (Photograph: C Reinhardt)

INSECTS

and their influence on canola production

Beneficial insects, such as pollinators, predators and parasites, contribute greatly to successful canola production, according to the Canola Council of Canada (2013). It is, however, important to realise that most of the beneficial insects and organisms also occur here in South Africa. Chemical control of insects has in many cases resulted in beneficial insects being killed. This article gives a short overview of insects and organisms that can be beneficial and others that are harmful for canola production.

Beneficial organisms can be divided into different groups, namely:

- Predators (e.g. lion hunting deer).
- Parasites (e.g. ticks on cattle).
- Pathogens (e.g. diseases that are caused by fungi, viruses, bacteria and nematodes).
- Pollinators (honey bee).

Predators

The most well-known insect predator in the Western Cape is the ladybird. It feeds on aphids and other soft-bodied insects such as the bagrada bug. It is important to realise that the larvae and adult ladybirds act as predators (Visser, 2004; Hatting, 2014).

Other possible predators include hoverflies. These flies can resemble

bees or wasps. Adult flies hover in a stationary position between plants. Adult flies feed on nectar, honeydew and pollen, while their larvae feed on aphids (Visser, 2004; Hatting, 2014).

Parasites

Parasites are insects that lay their eggs inside or near other insects, and in doing so the prey insect serves as food for their offspring (Visser, 2004). The different wasps and flies fall in this group. Wasps resemble small hornets and parasitise on aphids and diamondback moth larvae (Hatting, 2015; Smith and Villet, 2001; Canola Council of Canada, 2013).

Wasps lay their eggs inside aphids, which are then eaten from the inside by

the larvae which parasitise on the host. Certain flies of the family *Tachinidae* occasionally parasitise on the American bollworm larva.

Pathogens

Insects are, just like people, attacked by various diseases. The organism or microbe that causes the disease in the insect is called an insect pathogen. These pathogens include fungi, bacteria, viruses, protozoa and nematodes. This is a research field that holds much potential for biological control. It is classified under biological control methods which can help to address insect problems within an integrated control programme, along with chemical agents (Hatting, 2014).

Recommendations for the producer:

- Use chemical agents with discretion.
- Apply chemical control only if threshold values are reached.
- Only apply control in areas where insects are a problem.
- Manage the field in such a way that the population of favourable organisms increases, such as leaving stubble on the field to promote survival.
- Lucerne in crop rotation or a neighbouring crop can create an environment for favourable organisms to multiply and survive.
- Take precautionary measures so that as few as possible pollinators (e.g. bees) are killed with chemical insect control.

Harmful insects

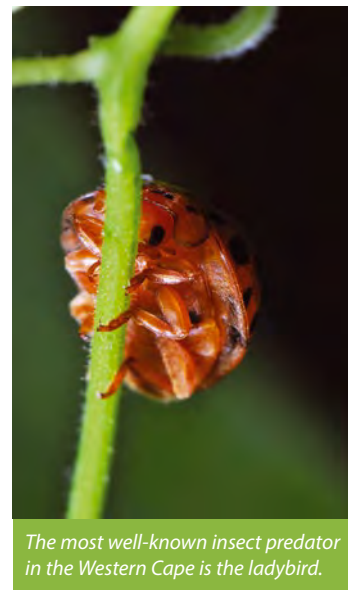
The cabbage webworm (*Hellula undalis*) is common in the Western Cape. It is mainly a problem with cabbage crops. The insect has in the past occurred sporadically on canola and has again been observed in 2015. However, it did not require any chemical control in the past. The cabbage



An adult parasitoid wasp laying eggs inside the aphid.



Cabbage webworm larva on a leaf.



The most well-known insect predator in the Western Cape is the ladybird.

webworm prefers temperatures that are warmer, such as in autumn (Kerr, 2015).

The mature larva is yellowish-grey and has five stripes with a black head and yellow to brown hair. Larvae spin threads in the crown of the canola plant where they feed. They can damage the growth point of the plant, but the plant then creates new growth points.

Chemical control of the cabbage

webworm is problematic, since the larvae produce a lot of silk, in which they form webs on leaves for protection (Photo 6). Better control is obtained if larvae are chemically controlled when they are still small.

References are available from the author.

For more information, contact Piet Lombard on pietl@elsenburg.com.



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October 2015 • OILSEEDS focus

11

Water scheduling



– save water and improve peanut production

By Tjaart Myburgh

Water management in peanut production can be defined as the most critical factor to increase production. It is clear that the water-plant interaction across different irrigation conditions, is the main determinant of plant health and primary production.

Water scheduling in irrigation regions – and consequently production and nutrient cycling – has become more imperative, as the competition of high-production crops is proving to make the selection competition tough for sustainable peanut production. This factor makes the percentage of choice grade improvement and re-establishment of good quality peanuts in irrigation fields more crucial.

Farmer aims

Changes in cultivars can dramatically influence the production potential, dry-matter production and nutrient cycling. Irrigation farmers need to achieve high-quality, choice-grade peanut production, but with a decline in both aspects, effective water usage might be the solution. The aim for each peanut farmer should be to keep his farm in optimal condition in order to obtain sustainable annual production.

Something drastic has to be done, since certain farmers are increasingly withdrawing soils intended for peanut production, and applying it for cash crop production. It is suggested that future long-term studies on more effective farming practices, with more profitable cultivars, will be GWK's main focus in 2016. The export market for Spanish-type



As the plant grows, the water consumption changes and irrigation practices need to adapt to ensure optimum production.

peanuts looks promising, especially with the current export exchange in the upcoming season.

Soil characteristics

The infiltration rate is often not considered to be vital in certain farming practices. Water infiltration should not be confused with the saturated water conductivity of the soil, and needs to be well managed to obtain high production potential in peanut farming.

In peanut production, the soil dynamics change as the pods beneath the soil surface grow. This change in soil characteristics sheds more light on effective water scheduling. The balance between a full soil profile and saturated water conductivity becomes the main aspect in deciding on when to irrigate and irrigation intensity. As the plant grows, the water consumption changes and irrigation practices need to adapt to ensure optimum production.

Effective water usage might be the

solution to numerous other problems in peanut farming. A high and persistent soil moisture content increases the risk of *Sclerotinia* infection. Plants that grow high and topple over easily are also more susceptible to *Sclerotinia*. GWK has also found that nematode-related problems increase with poor water management. An improved and more effective usage of the profile might lessen the run-off, save water and render a proper yield. This is GWK's main aim for peanut production in 2016.

Good quality peanuts are scarce, and therefore the current pricing will be better than in the 2014/2015 season. The market for high-quality, tasty peanuts requires a sustainable annual supply and thus a constant commitment from the farmers. GWK continuously strives to improve and has a quality research programme in place to ensure the best outcomes in cultivar development.

For more information, visit the website www.gwk.co.za.

By Prof Driekie Fourie, Akhona Mbatyoti and Melissa Agenbag

NEMATODE PESTS

that cripple local soya bean production

The adverse impact of plant-parasitic nematodes, root-knot (*Meloidogyne* spp.) in particular, on local soya bean crops has been continuously experienced by producers. Parasitism of soya bean, by *Meloidogyne incognita* and *M. javanica* in particular, is posing problems for producers and related industries.

Producers should inspect growing soya bean plants by removing them from the soil and looking for knots/galls on their root systems. Small areas in fields with plants showing non-optimal growth, which may be represented by either stunted plants and/or those with yellow leaves, should be identified and investigated for the presence of root-knot nematodes.

Annual yield losses

The estimated annual yield losses in local soya bean crops, as a result of parasitism by root-knot nematode pests, is reported to range between 25% and an ultimate 100%. In South Africa, *M. incognita* and *M. javanica* are regarded as economically the most important and predominant nematode pests, occurring in monospecific as well as mixed populations in soya bean production areas.

Although this scenario also applies to

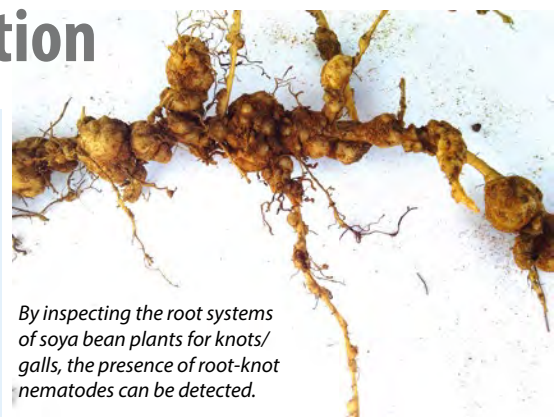
areas where maize was traditionally grown and into which soya bean is progressively being planted, *M. arenaria* was also recently identified (using molecular techniques) in maize roots received for diagnostic analyses from the Bothaville and Kroonstad districts.

Threat to rotation crops

These root-knot nematode species therefore pose a threat to the production of soya bean and other rotation crops. According to information gathered and knowledge generated from research efforts over the past two decades in particular, root-knot nematodes are most probably one of the major constraints resulting in substantial yield losses in soya bean crops.

The use of chemically-derived nematicides is generally not regarded as an economically viable strategy to control root-knot nematodes on soya bean globally, with no nematicide being registered locally for the crop. However, the use of genetic host plant resistance is the most popular and cost-effective tool used worldwide to protect soya bean crops against nematode pests.

Although this strategy represents an environmentally-friendly tool to protect



By inspecting the root systems of soya bean plants for knots/galls, the presence of root-knot nematodes can be detected.

soya bean crops against economically significant root-knot nematode species, only two known and tested commercial cultivars with resistance to root-knot nematode pests are presently available. These are the conventional cultivar Egret and genetically modified/Roundup® Ready cultivar DM6 2iR.

Increased infestations

Due to the increasing root-knot nematode infestations being recorded from local soya bean fields, it has become imperative to evaluate exotic cultivars for their host status to local root-knot nematode populations.

During 2015, nine exotic cultivars as well as a susceptible (LS6248 R) and resistant cultivars (LS5995 and Egret) were evaluated for their host status to *M. incognita* and *M. javanica* in separate greenhouse experiments. Reproduction factor (Rf) values obtained from greenhouse screenings of <1, indicating resistance to *M. incognita*, were recorded for the resistant standard cultivars LS5995 and Egret and seven of the exotic cultivars.

With regard to *M. javanica*, Rf values <1 were only recorded for the resistant standard LS5995 and three of the exotic cultivars. Should such poor-host exotic cultivars be adapted to environmental conditions in South African soya bean production areas, they could contribute substantially to alleviate root-knot nematode problems experienced by producers. 🌱



Soya bean fields showing non-optimal growth can lead to annual yield losses.



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2015/SOYBE/16

SOYA cultivar selection



Choosing the right soya bean cultivars to plant is a crucial decision. Unadapted cultivars can supply yields of up to 20% less than the top producer in national cultivar trials (Table 1). With low profit margins in crop production, great losses can be experienced with the wrong cultivar. Taking into account that the best cultivar supplies up to 580kg/ha higher yield at R4 500/t, losses can amount to as much as R2 610/ha.

Table 1: Differences in average yield of the best compared to the poorest performing cultivar in the national soya bean trials for 2013–2014.

	Cool regions	Moderate regions	Warm regions
Average yield (t/ha)	2,54	2,51	3,48
Highest yield cultivar (t/ha)	2,87	2,75	3,94
Lowest yield cultivar (t/ha)	2,21	2,21	3,27
Difference in yield (t/ha)	0,66	0,54	0,67
Percentage difference	26%	22%	17%

Source: AS de Beer and N de Klerk, 2014

Available cultivars

There is a large number of soya bean cultivars available on the market. The improvement in yield over the last 34 years amounts to 1,2% per year. This makes sufficient information available to select the right package. The competition between seed companies is intense and each company carefully selects the best cultivars to sell. They utilise modern production and cultivation techniques to supply the best quality seed.

The Agricultural Research Council's (ARC) national cultivar trials are the best place to start when a cultivar has to be selected. Avoid cultivars that are not included in the trials.

Production regions

South African production regions are divided into three primary ones: Cool, moderate and warm.

Elsewhere in the world soya bean production regions are determined by the relative distance from the equator, but in South Africa they are determined by height above sea level. The cool production regions are in the eastern highlands and characterised by a shorter production season, with moderate summer days and a relatively high rainfall.

The moderate production regions have a longer production season, with warmer

days and an average rainfall. The warm production regions have a long growth season with warm days and a low rainfall, and soya beans cultivated under irrigation.

Every farmer should know in which of the production regions his fields are located, and also what the production potential is.

Considering research

Seed companies conduct substantial research so that the correct cultivar can be identified for each region and data can be obtained to aid in the decision-making process. It is also necessary to study local comparative strip trials undertaken by research groups and farmers. Once all this information has been gathered, three to

five cultivars will stand out.

Growth classes

The next step is to select between the various available growth classes. To spread risk, plant a package comprising of different cultivars. By arranging cultivars in different growth classes, one is able to select the best from each. Thus risk can be optimally managed.

In low-rainfall years, the 4.5 to 5.5 growth classes will perform better than the 5.5 to 7.5. The opposite is true if the second half of the season gets good rainfall. Over the long term, growth classes 5 and 6 deliver the most stable results (Table 2) and the biggest part of the package should be constituted from these.

Table 2: Performance of growth class groups over 34 years in South African production regions.

Growth class groups and regional combinations average (t/ha) for 34 years (1978–2011)			
Growth class	Cool regions	Moderate regions	Warm regions
4–4.9	1,65 ^b	2,40 ^b	2,61 ^b
5–5.9	2,35 ^a	2,47 ^a	2,83 ^a
6–6.9	1,52 ^b	2,48 ^a	2,95 ^a
7+	1,98 ^b	2,31 ^c	2,91 ^a
LSD (95% accurate)	0,28	0,08	0,09

Where the alphanumeric symbol is the same in a column, the difference in yield is not significant. Source: AS de Beer and MA Prinsloo, 2013

Highlights from the PRF WEED CONTROL SYMPOSIUM

The growth of soya bean production over the past ten years has been significant. In the 2004 production season, only 150 000ha were planted, resulting in a production of 223 000 tons compared to the previous season's 687 300ha planted with a production of more than one million tons. This means good news for South African producers, resulting in a decreased demand for soya beans and soya bean meal imports.

Soya bean is a remarkable crop, not only capable of obtaining its own nitrogen, but also known to increase maize yield by more than 10% when planted after soya bean in a normal production season. Despite all the positive characteristics of this crop, there is still a long way to go before achieving the Protein Research Foundation's (PRF) goal of one million hectares planted, with an average yield of 2,5t/ha by the year 2025.

One of the limiting factors in achieving this goal is improved weed control in soya bean fields. To this end, the PRF presented two symposia during July this year, one at Delmas and another at Nampo Park – attended by 270 people, consisting mostly of producers and agricultural advisers. The PRF Weed Control Symposium highlighted a few aspects of paramount importance for producers.

Timing is key

Prof Stephen Knesevic of the University of Nebraska in the United States, who is an international expert on weed control, presented alarming figures on the amount of income lost due to delayed

weed control. A general figure of 2,5% yield loss is predicted for a delay in weed control between successive vegetative growth stages.

These growth stages, when one set of leaves is followed by the next, can take between five and seven days, depending mainly on daily temperatures. The type and number of weeds will, however, play a major role and can increase this number. This predicted percentage is only applicable for the period where weeds and soya beans grow simultaneously.

**The growth stage
of weeds will
determine the
efficiency of weed
control.**

In South Africa, especially under dry land conditions, stored soil moisture is of paramount importance. Any weeds on a field prior to planting will reduce stored soil moisture and thus increase the risk of poorer yields for the following crop.

The importance of crop rotation and the positive role it can play in addressing the difficulty to control weeds was also highlighted, especially where conservation agriculture is practised. In this case, chemical weed control is the only viable option to ensure weed-free fields.

Know your herbicide and weeds

It is critical for effective weed control, to be familiar with the appropriate herbicides registered for use in soya bean production. Prof Charlie Reinhardt from the University of Pretoria emphasised the fact that although several formulations exist, there are less than ten modes of action available to combat weeds. Producers need to take note of this, as well as be aware of weed species present in a field. The growth stage of weeds (weed size) will determine the efficiency of weed control. The larger the weeds, the less effective control will be.

Great emphasis was placed on the importance of reading and understanding the information on a herbicide product label. Any deviation from the labelled instructions will inevitably result in poor or no weed control.

The growth stage of soya bean needs to be taken into account before any herbicide should be applied. A good example is where glyphosate is applied during flowering stages, which may cause crop damage and consequent yield loss. It is equally important to comply with any waiting periods as specified on all herbicide labels.

Herbicide resistance

Several speakers emphasised the looming problem of certain weeds becoming resistant to known, widely used herbicides such as glyphosate. This is mostly due to the excessive use of a single product. To avoid this problem, producers are advised to rotate herbicides and use different modes of action (i.e. different groups of herbicides).

Allelopathy

A warning was raised by Prof Reinhardt that allelopathy (the secretion of chemicals from weeds into the soil) may affect soya beans more than most producers realise. One of the major culprits is yellow nutsedge (*Cyperus esculentus*) that may have a detrimental effect on soya bean growth when infestation levels are high. A generally unknown fact is that the common

radiatorbossie (*Senecio consanguineus*) may even affect nitrogen fixation as well as causing allelopathy.

Water quality

Dr Brian de Villiers of Villa Crop Protection emphasised

the need to ensure that the water quality should be optimal when mixing herbicides. A great concern was raised for where glyphosate is mixed with high pH water, containing high levels of carbonates ('hard water'). Glyphosate molecules will bind to the carbonates and thus reduce the efficiency of the herbicide.

To overcome this problem, ammonium sulphate has to be added to the water. The optimal pH level for herbicides is between four and six, and an excessively low or high pH can have a negative effect on herbicides. It was emphasised that the purity of ammonium sulphate is critical and that only products from reliable companies should be used, and specially formulated to mix with herbicides.



Poor weed control costs you more than you think. (Photograph: Wessel van Wyk)

Optimising agricultural practices

From a practical point of view, it was stressed that any herbicide tank mix should be applied immediately and should not stand overnight to be applied the following day.

The need for every producer to optimise agricultural practices for the successful production of soya bean is vital, according to Cobus van Coller, a soya bean producer from the Viljoenskroon district. It is of paramount importance to overcome problems or obstacles by modifying implements to enhance efficiency. Van Coller has modified his spray equipment to accommodate some labour on the sprayer operating tabs, in order to spray patches of hard-to-control weeds such as couch grass (*Cynodon dactylon*).

The influence of wind and dust during herbicide application was also highlighted. It is essential not to spread lime or apply herbicides when wind speeds are excessively high.

Van Coller's philosophy is to eradicate all weeds, where possible, during winter to ensure a clean seedbed at planting time. Where moisture is a limiting factor, as experienced in most parts of South Africa where soya beans can be produced, a weed-free seedbed holds significant advantage to preserve soil moisture.

The symposium offered numerous thought-provoking ideas to soya bean producers and agricultural advisers. It is now up to all the relevant individuals to apply what they have learnt and for agricultural advisers to spread the message. 🌱



Proper weed control ensures top yields. (Photograph: Wessel van Wyk)

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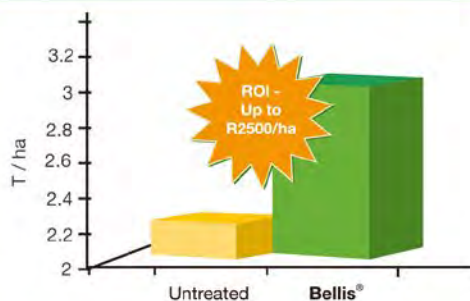
Sunflower field: Treated with **Bellis®** (Right top), in comparison to the untreated, showing high levels of disease infection (bottom left)

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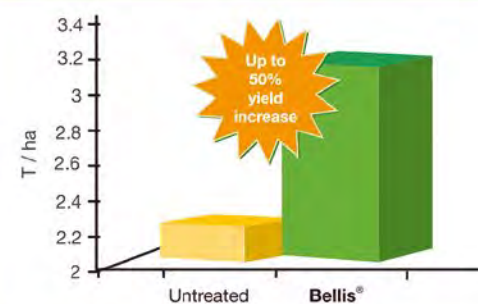
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Sunflower yield results - **Clearfield®** seed variety



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Sunflower yield results - Conventional seed variety



Trial results: BASF internal trials 2013/2014 - **Bellis®** 2 x 600 g/ha

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Improving yield AND QUALITY

Dr Steve Oosthuyse of HortResearch SA has developed a method of improving crop stand yields, as well as the quality of the produce. The method is entirely empirical, not relying on assumptions. In essence, data is collected from a stand and analysed. Multivariate analysis techniques are used in view of the nature of the problem at hand.

excess or are deficient. However, it is only those factors which growers can influence that are relevant.

When considering the mineral nutrient status of the soil, interactions exist in respect of plant uptake, both in the sense of synergism and antagonism. Most well-known is the antagonistic effect of soil calcium excess on root uptake of magnesium and potassium, the antagonism of excess potassium on the uptake of calcium and magnesium, and the antagonism of excess magnesium on the uptake of calcium and potassium. Interactions are far more complex in reality. Mulder's chart (Figure 1) documents certain of the well-known interactions between nutrients.



The initiator of the remedial measures technique, Dr Steve Oosthuyse of HortResearch SA.

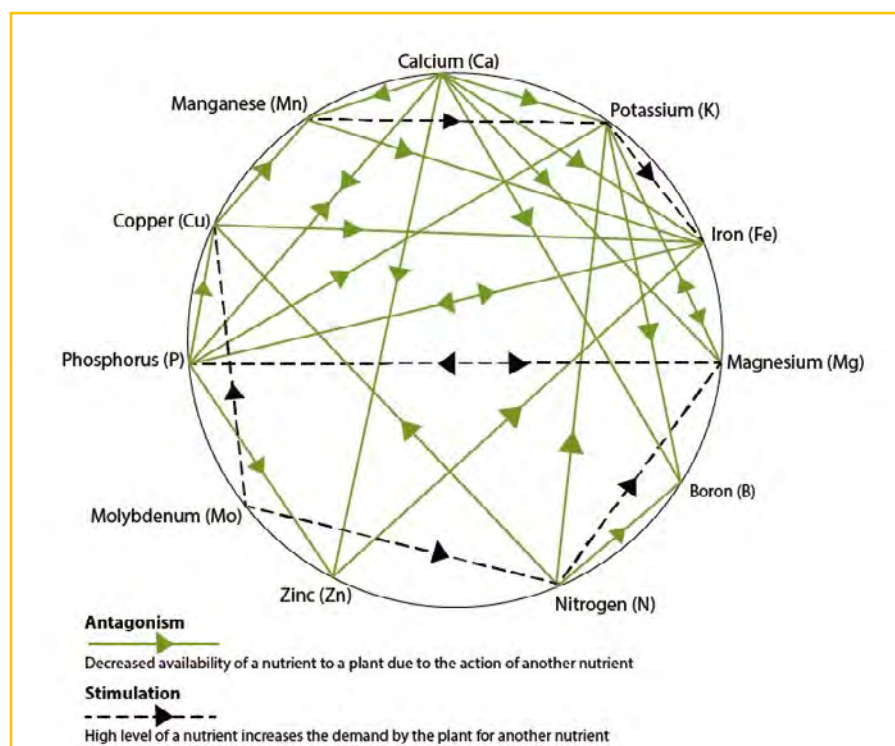
Manipulation of variables

Crop stands or regions can only be improved by manipulating variables under the control of growers. Water availability is the primary factor. Water application and its distribution are in nature's hands, where growers cultivate dry land. This is the case for most soya bean growers in South Africa.

Soil condition and fertility is also of prime importance. When considering fertility, the mineral nutrient balance of the soil is important. Invariably, excess and deficiency exist initially or develop over time, these imbalances being counter-productive.

Soil condition relates more to structure, drainage, organic matter content, pH and the content clay, silt and sand. Condition also relates to sodium and chloride levels, and the types of clay minerals present, whether 2:1 or 1:1 lattice clays. The method directly identifies imbalances limiting productivity, whether they are in

Figure 1: Mulder's Chart documenting certain interactions existing between nutrients in the soil, in respect of root uptake capacity.



Besides the interactions between mineral nutrients in respect of uptake, organic matter content, clay level, clay type, microbial activity and soil pH, a myriad of other factors influence and further compound the issue. When considering the soil, it might be concluded that factors affecting growth – either positively or negatively – are multiple, interactive and impossible to clearly define. Furthermore, to quantify these interactions is not objectively possible.

Simple premises

Field agronomists have no choice but to rely on simple premises, and then to ascertain whether actions taken were advisable or unwise in evaluating responses subsequently noted, and to then make adjustments accordingly. In essence, recommendations of nutritional practices to follow can often be effective, but can generally be non-ideal, due to failure to truly account for occurring interactions and the degrees to which interactions exist.

The empirical approach clearly elucidates actions favouring or disfavouring yield and quality.

In discerning the problem at hand, we are left with no alternative but to quantify what we can and determine



A new method was developed to improve crop stand yields.

what relationship exists with that which is financially significant, namely yield and quality. We can further endeavour to grasp the relationship by utilising our current knowledge. Irrespective of this, the empirical approach clearly elucidates actions favouring or disfavouring yield and quality. In essence, this is the Remedial Measures Technique, as documented by Oosthuysen in 1999 and 2009.

Statistical methods

Biometricians, i.e. statisticians developing and using statistical techniques directed at biological systems, have long mastered methods isolating causes for effects, whether direct or indirect. All statistical methods rely on replication, the unbundling of correlation and the provision of probabilities. The need of a concerned grower is a straightforward recommendation. His concern is accuracy, and not a detailed understanding of

the analytical methods involved.

In carrying out the procedure of sampling plots, at least 20 are isolated per site or location, and data of an independent and dependent nature is obtained from each site. An obvious prerequisite is representative sample plot distribution. The more variables that can be quantified the better, even if some cannot be controlled or altered by the grower.

In the case of soya beans, obvious dependent variables are plot yield, oil and protein content. Independent variables can be those generally made explicit in a soil analysis. Soil

pH, orthophosphate concentrations, boron and molybdenum concentrations, exchangeable nutrient cation saturations, clay contents, organic matter contents and nitrate and ammonium concentrations all suffice as independent variables.

The method is entirely objective, the input data imparting remedial measures without the processing agent having to make assumptions. The technique can be applied to a farm section, a farm or an entire region. The emphasis is on the accuracy and representativeness of the input data. One approach is to analyse a region, then to zone in on specific farms, and then sections of individual farms.

Questions concerning the technique or its implementation can be directed to Dr Steve Oosthuysen at hortres@pixie.co.za. Visit www.hortresearch.co.za for more information. 



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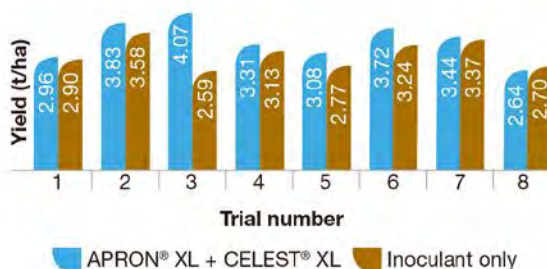
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By Prof GA Agenbag and Ms E Kempen, Department of Agronomy, University of Stellenbosch

BORON REQUIREMENTS OF CANOLA

*Soils of the canola-producing regions in the Western Cape often exhibit low boron contents (<5mg kg⁻¹ hot water extraction), and since boron is one of the eight essential micronutrients required for normal growth and development of most plants and canola (*Brassica napus*) has a high demand for it, boron may be a yield-limiting factor in these areas.*



For this reason, a field study was conducted during the period from 2012 to 2014 at Altona and Langgewens in the Swartland and Roobebloem in the Southern Cape. Foliar applications of 0,5, 1,0 and 1,5kg Solubor® (20,5% boron) were applied per hectare, at either 40 or 60, or at 40 and 60 days after planting and compared to control plots where no boron was applied.

Applications at 40 and 60 days after planting coincide in most years with the period from the start of stem elongation, until before the start of flowering.

Responses observed

In this study, conducted on sandy loam soil, plants did not indicate boron deficiencies during the flowering stage, despite low or even deficient boron levels in the soil. Although increases in plant boron content with boron applications were found on all localities, responses were variable and did not indicate a clear trend with increasing application rates or correlation with the boron content of the soil.

A possible explanation for this tendency may be because even the highest application rate of 1,5kg

Solubor®, at both 40 and 60 days after planting, adds up to only 0,62kg B ha⁻¹, which is low when compared to rates recommended in countries such as Canada and may also explain why no toxicity symptoms were reported on vegetative plants.

Foliar boron applications will aid in increasing the grain yield and oil content of canola produced in the Western Cape, on soil with low boron contents.

Boron (Solubor®) applications resulted in increased grain yields and grain oil content of canola, and optimum application rates varied between 0,5 and 1,5kg Solubor® ha⁻¹ for different years at the same locality.

Although rates of 2,0 and 3,0kg Solubor® (applications of 1,0 and 1,5kg at both 40 and 60 days after planting)

did not indicate clear signs of toxicity on the canola plants, it also did not consistently result in increased yields, and in some years even resulted in decreases. For this reason, an application rate of 1,0kg ha⁻¹ is generally recommended. Foliar applications should be done between 40 and 60 days after planting, but not later than the start of flowering.

Future research

Although these results clearly indicate that foliar boron applications will aid in increasing the grain yield and oil content of canola produced in the Western Cape on soil with low boron contents, future research may include soil applications at time of planting and higher application rates – as recommended in certain countries abroad.

Results of this study have already been presented at several farmers' days and contributed to the increased production of canola in the Western Cape, due to increased yields obtained by the use of boron. Results will also be submitted to the *South African Journal of Plant and Soil* as a scientific article.

For the full report, contact Prof Agenbag on gaa@sun.ac.za.

THE POSITIVE EFFECTS of soya bean on the blood lipid profile of women

A pilot study from QwaQwa

Cardiovascular disease (CVD) is a group of heart and blood vessel conditions, including stroke and heart attacks. CVD is currently responsible for 17% of all deaths in South Africa and it is estimated that 5,5 million South Africans older than 30 years are at risk of developing CVD. This could be attributed to raised total serum lipid (cholesterol, HDL-cholesterol, LDL-cholesterol and triglyceride) levels, among other factors.



In view of the crucial role of elevated levels of blood lipids, especially LDL-cholesterol, in the formation of atherosclerosis, dietary and therapeutic approaches to the treatment and prevention of CVD are very relevant for scientific and public health purposes. Lipid-lowering medicines are effective, but are usually accompanied by severe side-effects.

Epidemiological and experimental evidence as well as clinical trials have confirmed positive correlations between lifestyle and dietary factors related to blood lipid levels. Many studies have confirmed that low blood levels of LDL-cholesterol can predict the incidence of CVD and LDL-cholesterol therapy reduces CVD risk.

Strong relationship

On the other hand, HDL-cholesterol also has a strong relationship with CVD, as increased HDL-cholesterol levels guard against CVD. Studies have shown that soya protein can decrease total serum cholesterol, LDL-cholesterol and total serum triglyceride levels as well as mortality rates from CVD. Moreover, a meta-analysis demonstrated that

soya isoflavones have LDL-cholesterol-lowering effects.

As a result of the health benefits of soya protein, specifically the reported cholesterol-lowering function, the objective of this study was to compare the long-term effect (18 months) of at least 40g daily whole-bean soya consumption, consisting of 15g soya protein, on the blood lipid levels of hypercholesterolemic (high blood cholesterol levels) and normo-cholesterolemic (NC, normal blood cholesterol levels) freely living women in peri-urban QwaQwa.

Study method and sample

The study protocol was approved by the University of the Witwatersrand's Medical Ethics Committee for Research on Human Beings (M080931) and was conducted between March 2008 and November 2012. A total of 86 respondents were needed to obtain a statistically representative sample. Women were randomly selected from three tribes by the local community leader.

A baseline survey was conducted in March 2008. A household soya bean gardening programme was implemented

in 2009 and soya bean recipes were developed and tested for sensory acceptability in 2009 to 2010.

A total of 90 women were randomly recruited for the intervention study. Soaked (> 8 hours), minced whole soya beans were incorporated into 20 household recipes most frequently prepared in QwaQwa. Skills training included teaching the women how to prepare the soya bean recipes, containing 40g of whole soya beans per person per day, and how to include the recipes in the household menu planning in 2010.

Trials have confirmed positive correlations between lifestyle and dietary factors related to blood lipid levels.

The soya bean consumption intervention was undertaken over 18 months during 2011 and 2012. The researchers visited the women every month to measure compliance, checking

on the availability of soya beans and discussing problems regarding soya bean recipe preparation and side-effects. Dietary intake measurements were done and blood was drawn one week before and one week after the 18-month period. The procedures for data collection and analysis were done according to standardised scientific and statistical guidelines.

The results

The participants had a mean±standard deviation (SD) age of 46,5±12,9 years. The results show that 40% (n = 36) of the women were hypercholesterolemic based on LDL-cholesterol. The mean±SD age of the hypercholesterolemic group was statistically significantly ($p = 0,038$) higher (50,0±13,3 years) than the NC group (44,2±12,3 years). No statistically significant differences existed between the height, weight and body mass index (BMI) of the hypercholesterolemic and NC groups. In both groups, the mean BMI indicated the prevalence of obesity in these women.

Although no statistically significant changes were observed in BMI after the intervention, the prevalence of overweight in the hypercholesterolemic group was reduced from 36,1% at baseline to 27,8% at follow-up. No changes were observed in overweight of the NC group. In both groups, the prevalence of obesity increased from baseline to follow-up, but was not significant (Figure 1).

At follow-up, the hypercholesterolemic group had significantly improved HDL-cholesterol ($p = 0,000$) and total serum triglyceride ($p = 0,000$) levels, but with significantly increased total serum cholesterol ($p = 0,013$) and decreased LDL-cholesterol ($p = 0,032$) levels. A similar trend was observed in the NC group, however, no significantly improved total serum triglyceride values were observed.

Both groups showed abnormal mean values for all the lipid parameters at follow-up, except for the LDL-cholesterol levels in the NC group, with no statistically significant differences between the two groups. The HDL:LDL ratio is, however, a better indicator of CVD risk than the individual HDL- and LDL-cholesterol levels. The HDL:LDL ratio improved in both groups, but was only significant ($p = 0,027$) in the hypercholesterolemic group at follow-up. In both groups, the HDL:LDL ratio was still lower than the recommended >0,4.

Both groups had low macronutrient intakes, except for carbohydrates, at baseline and follow-up when compared to the estimated average requirements (EAR). No significant differences in macronutrient intakes were observed between the groups, except for a significantly ($p = 0,032$) higher dietary cholesterol intake in the hypercholesterolemic group at baseline and follow-up.

The total fat intake showed low intakes of less than 30% of total energy intake in both groups at baseline, but the NC group showed an improved fat intake at follow-up. According to the guidelines

for the prevention of chronic disease, all the fatty acid and linoleic acid intakes recorded percentages in line with the recommendations for both groups, whereas linoleic acid intake percentages were much lower than the recommended goal of 0,5 to 2% in both groups at both baseline and follow-up.

In both groups, the total energy intake improved significantly from 3 772 to 4 829kJ ($p = 0,007$) and 3 524 to 5 208kJ ($p = 0,013$) for the hypercholesterolemic and NC group at follow-up respectively. No significant increase in total protein was observed in both groups, but the hypercholesterolemic group showed a significantly ($p = 0,000$) higher plant protein intake at follow-up, whereas the NC group showed a significantly ($p = 0,046$) higher total fat intake. In both groups the carbohydrate intake showed a significantly higher intake at follow-up when compared to baseline.

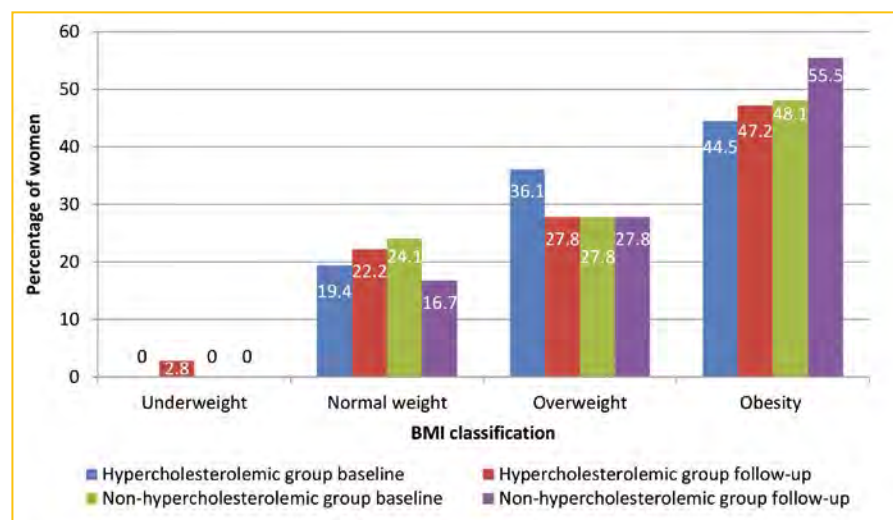
The Pearson correlation analyses revealed that age was significantly and positively co-related to total serum cholesterol at baseline ($r = 0,305$, $p = 0,003$) and follow-up ($r = 0,282$, $p = 0,007$), as well as cholesterol ($r = 0,257$, $p = 0,014$) at follow-up. A significant ($p < 0,05$) positive association existed between the total energy intake and all macronutrient intakes at baseline and follow-up.

No significant relationships existed between macronutrient or fatty acid intakes and serum lipid parameters at baseline. However, at follow-up a significant negative relationship existed between LDL-cholesterol and total protein intake ($r = -0,283$, $p = 0,036$), saturated fatty acid ($r = -0,287$, $p = 0,034$), mono-unsaturated fatty acid ($r = -0,318$, $p = 0,018$) and linoleic acid ($r = -0,285$, $p = 0,035$) intakes.

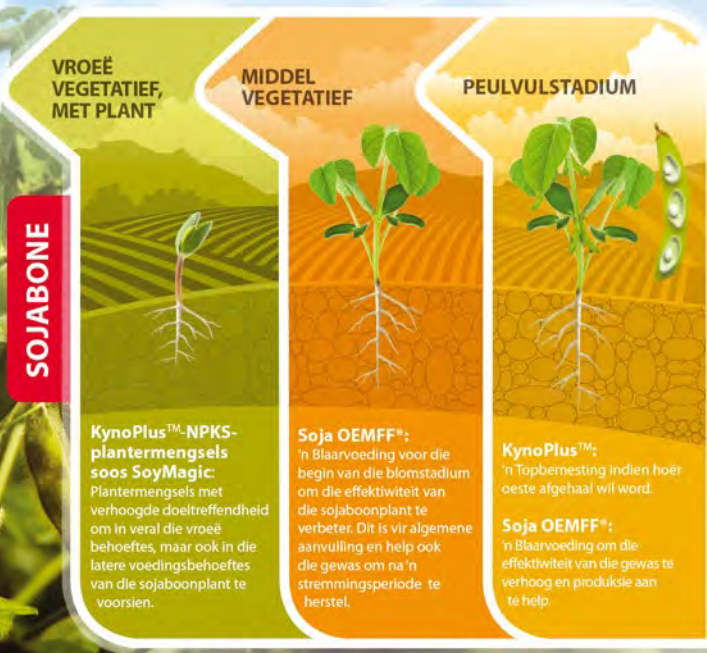
Cholesterol-lowering effect

Research has proved that soya protein consumption can reduce total serum cholesterol levels as well as LDL-cholesterol levels and increase HDL-cholesterol levels. As a result, the Food and Drug Administration (FDA) of the United States has recommend that 25g of soya protein should be consumed daily for a cholesterol-lowering effect. Furthermore, favourable blood lipid concentrations can be achieved

Figure 1: BMI classification of the women before and after the intervention.



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if at least 30g of soya protein is consumed daily for at least six weeks.

Conflicting reports exist in the literature regarding the effect of soya consumption on serum lipid levels. The results of this study showed that in both hypercholesterolemic and NC women, the HDL-cholesterol levels improved significantly after the intervention in both groups, but it was still lower than the recommended cut-off point of $>1,68\text{mmol/L}$.

This was consistent with the findings of Borodin et al. and Sacks et al., who found a significant increase in HDL-cholesterol levels of NC adults. The LDL-cholesterol levels were significantly lower in both groups at follow-up, however, the total serum cholesterol levels were raised by 5,9% in the hypercholesterolemic women compared to 39,6% in the NC women respectively.

These findings were not consistent with a meta-analysis of 38 studies that found that a daily consumption of 47g soya protein, mainly in adults with dyslipidaemia, resulted in an average reduction of 9,3% and 12,9% in total serum cholesterol and LDL-cholesterol respectively. Most of the studies included in the meta-analysis measured the short-term effect (≤ 4 weeks).

Positive effect

This study is the first to report on a comparison of the long-term effect of daily consumption of 15g soya protein on serum lipid markers in low-income black women, with and without hypercholesterolemia in South Africa. The inability of this study to prove a positive effect on total cholesterol levels after a long-term soya bean supplementation/consumption period, was consistent with another long-term (24 weeks) study in hypercholesterolemic adults. LDL-cholesterol, however, was significantly reduced in both groups at follow-up.

Total serum cholesterol can be influenced by changes in increased dietary cholesterol intakes, endogenous cholesterol synthesis, efficiency of cholesterol absorption or through other dietary intake factors. In this study, both groups showed low cholesterol intakes at baseline and follow-up, although, the NC women had a significant higher intake

of dietary cholesterol at follow-up when compared with baseline. However, no positive significant relationship between dietary cholesterol intake and total serum cholesterol was established in this group of women.

Furthermore, the dietary intake of the women in this study showed very low macronutrient intakes, specifically fibre. The effect of dietary fibre, especially whole-grain fibre, on cardiometabolic health has been established and it has been proved that dietary fibre can lower total serum triglyceride and LDL-cholesterol levels.

Cholesterol levels

Another dietary factor that is associated with total serum cholesterol and LDL-cholesterol levels is dietary SFA intakes. In this study both groups consumed less SFA than the World Health Organisation (WHO) recommended cut-off point of 10% of total energy intake. However, no positive significant relationship between dietary fibre or SFA intake and serum, total serum cholesterol and LDL-cholesterol could be established in this study, possibly because of the low dietary intake levels of these nutrients by both groups.

Although the total dietary fat intake for both groups was low, the dietary fatty acid intakes of the women in this study met the recommended guidelines, except for low linoleic acid intakes in both groups. The main sources of linoleic acid in the diet include vegetable oils such as sunflower oil, soya bean and maize oil, nuts and seeds. These are usually more available than the food sources of linoleic acid, including walnuts, linseed and rapeseed oil. This finding is consistent with another study among low-income black women in South Africa.

Both groups showed abnormal mean values for all the lipid parameters at follow-up, with no statistically significant differences between the two groups. The HDL:LDL ratio improved in both groups, but it was only significant in the hypercholesterolemic group. In both groups the HDL:LDL ratio was still lower than the recommended $>0,4$ and thus this group of women is at risk of CVD. These findings are consistent with a study conducted in a similar community in the Vaal region.

Beneficial effect

Dyslipidaemia, hypertension and obesity are well-known risk factors for CVD. In this study, 36% of the women presented with hypercholesterolemia, which was higher than the national prevalence, and 31,1% and 46,6% were overweight and obese respectively at baseline. Research also found that the mean total serum cholesterol concentrations increase with age, peaking among those from 55 to 64 years. Total serum cholesterol levels were positively significantly associated with age in this group of dyslipidaemia women.

It can be concluded that hypercholesterolemia and obesity were prevalent among this group of women. Although research has proved that soya protein has a beneficial effect on total serum cholesterol and LDL-cholesterol, the daily consumption of 40g of whole soya bean, equivalent to 15g soya protein, had no significant positive effect on total serum cholesterol, but had a beneficial effect on LDL-cholesterol of the hypercholesterolemic and NC women in QwaQwa. The HDL:LDL ratio was also improved in the hypercholesterolemic group, thus reducing the risk for CVD. It was thus proven that soya bean consumption has a beneficial effect on hypercholesterolemia in women.

Soya bean is a source of good quality protein and is often used in low-income households as a replacement for other more expensive protein sources. The use of soya bean should not be discontinued and further research is recommended to study the effect of daily soya bean consumption on hypertension, obesity and metabolic syndrome, also prevalent in this group of women. Research should also aim to determine the optimal soya protein dosage for the most favourable effect on these risk factors for CVD.

Wilna Oldewage-Theron is from the Centre of Sustainable Livelihoods at the Faculty of Human Sciences of the Vaal University of Technology and Abdulkadir Egal is from the Department of Nutritional Sciences, College of Human Sciences, Texas Tech University. The authors acknowledge SANPAD and the Vaal University of Technology for funding, as well as the women participating in the study and the fieldworkers for their assistance. 🌱

HIGH SOYA BEAN STOCKS and low vegetable oil supplies:

A recipe for price volatility

International soya bean and maize prices came under pressure with high volatility in mid-August 2015. The main reason for this is the higher than expected American crops and stocks predicted by the United States Department of Agriculture (USDA).

The USDA's *World Agricultural Supply and Demand Estimates (WASDE) Report* for August indicates that in 2015/16, US soya bean supplies and ending stock are at 470 bushels. This represents almost double on a year-on-year basis.

Global oilseed production for 2015/16 is projected at 529,1 million tons. However, there is still considerable scepticism among global traders about the reality of the report. On the contrary, the devaluation of the Chinese yuan has created new concern that Chinese imports of soya beans and other commodities could be reduced in the months ahead.

Given the high volatility and the large USDA crop revision, the market conditions are a reminder that global soya bean supplies are high and likely to remain as such in 2015/16.

Soya bean prospects

South American soya bean planting prospects are generally favourable. Brazilian soya bean plantings are expected to be further expanded to a new high of 32,8 million ha, representing a 3% increase, and benefitting from the decline in grain plantings and the devaluation of the Brazilian real, something which is making soya bean

exports more attractive.

The Brazilian currency is down more than 23% against the dollar since the start of the year, representing a 12-year low. Argentinian soya beans are likely to benefit from the sharply reduced plantings of wheat and maize in the major production areas.

Table 1 indicates the world soya bean production as estimated by international traders at 316 million tons. This value is lower than the previous production season. However,

there are still ample supplies available due to high opening stocks. The opening stock of 87 million tons, combined with production, provides the world with a total supply of 403 million tons against the previous production year's supply of 384 million tons.

Given the strong supply figures of soya beans, the world will depend on soya beans in terms of oilseed supplies. This is mainly due to the lower production figures of various other oilseed commodities.

Table 1: World oilseed and soya bean prices (million ton).

	15/16*	14/15	13/14
World oilseed stocks			
Opening stock	99,7	79,4	71,6
Production	509,6	519,7	487,3
Total supplies	609,3	599	558,9
Usage	509,3	499,4*	479,6
Ending stock	100	99,7*	79,4
Soya beans			
Opening stock	87,24	65,21	59,54
Production	315,78*	318,56	281,92
Total supplies	403,02*	383,77	341,46
Usage	313,8	296,53	276,25
Ending stock	89,22	87,24	65,21

Source: *Oil World*



Rapeseed

The world production of rapeseed and canola has decreased with 5,1 million tons for the current production season. The current Canadian canola crop estimate is at 13,3 million tons against the previous season's 15,75 million tons.

In terms of world supply and demand of rapeseed and canola, the expected production for the 2015/16 season is 63,38 million tons against the previous season of 68,47 million tons. This has resulted in an ending stock of 4,4 million tons, which is 1,46 million tons lower than in 2014/15.

Sunflower

The expected global production of sunflower seed is decreasing in countries such as Romania, Spain and France. This is due to adverse weather conditions, which has reduced yield in many countries. However, a large impact on this is mainly that producers are moving away from crops such as sunflower and rapeseed to soya beans and other crops. The shift in planting is due to vegetable oil prices being relatively weaker than oil meal prices in the last two years.

Due to the fact that soya beans are primarily a meal seed, the increase in soya bean crushing to substitute vegetable oil supply decreases, will create an oversupply of soya meal. The oversupply of meal will have a bearish impact in terms of soya meal prices.

The current expected global sunflower seed production is at 41,23 million tons. This will provide an ending stock of 2,6 million tons as opposed to last season's 2,71 million tons.

Groundnuts

Groundnut prices have come under pressure in the last year, among others due to a drop in vegetable oil prices. The main reason, however, is the abundant supply of groundnuts. World production of shelled groundnuts is forecast by international traders to increase by 5% in 2015/16 to a total of 28,4 million tons.

A large contributor to this increase is the United States, with an increase of 0,3 million tons, which represents a growth of 19%. Argentina is expecting a record crop of probably above 800 000 tons. However, China and India are struggling with poor production figures, which will assist in terms of the large supplies.

The fundamentals are also reflected in the international prices as indicated in Table 2. Soya bean prices decreased on a year-on-year basis, while sunflower seed

increased. Soya meal prices decreased by 25% from \$509/ton to \$384/ton year-on-year.

Local oilseed markets

The new planting season of summer crops in South Africa is at hand and various questions are being raised in terms of planting intentions and the distribution among crops. Global weather models are currently suggesting a strong El Niño scenario.

Given the low production of the previous season, the local maize price is relatively high and can be attractive for producers. This can place pressure on local soya bean production. Figure 1 illustrates that the soya-maize price ratio has decreased in the last year. Normally, a ratio of above 1,8 would be favourable for soya bean production. The current ratio, however, is 1,68.

Table 2: Key oilseed prices (US\$/ton and R/ton).

Product	13 Aug 2015	Aug 2014	% change
Soya beans (US CIF Rotterdam)	373	460	-19
Soya beans (Brazil)	401	535	-25
Sunflower seed (EU)	435	401	8
Groundnuts (US 40/50)	1 150	1 260	-9
Palm oil (Malaysia)	534	701	-24
Soya oil (US)	694	840	-17
Sunflower oil (Argentina)	790	939	-16
Soya meal (Argentina)	384	509	-25
Fishmeal (Peru)	1 380	1 748	-21
Rand/\$	13,17	10,59	24

Sources: Reserve Bank and Oil World

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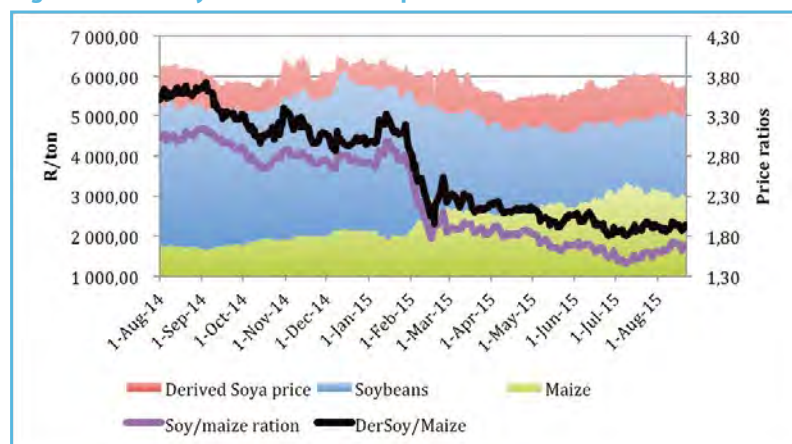
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Figure 1: Local soya bean and maize prices.



Sources: Grain SA and Safex

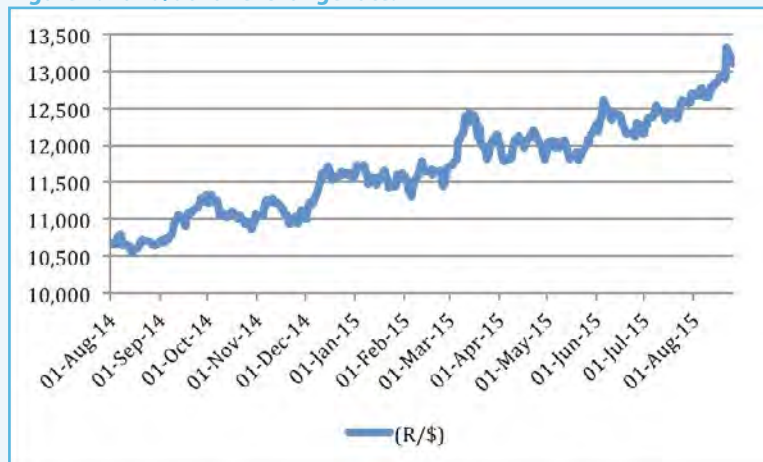
The main question for the new production season is whether this price ratio will be high enough in order for producers to sustain the year-on-year growth in soya bean production.

With the extensive expansion of the South African crushing capacity, price structures have moved towards a derived soya bean price. The ratio with a derived soya bean price is higher and currently at 1,94. The main question for the new production season is whether this price ratio will be high enough in order for producers to sustain the year-on-year growth in soya bean production.

In terms of sunflower seed production, the current relatively low global supply scenario and increase in prices will provide an incentive for producers to produce more sunflower seeds this coming season. An additional contributing factor is also that sunflower seed production has lower production costs, and given the previous dry season and financial risks, producers would move towards sunflower seed production in order to obtain easier credit.

A key factor to monitor over the next few months in terms of prices, is the exchange rate. The rand is under constant pressure due to the slow growth of global emerging markets and local uncertainties such as the power crisis. The weakening of the rand supports local oilseed prices in terms of the increase in import parity levels. The support of the weakening rand in terms of local against international prices, is reflected in *Tables 1* and *2*.

Figure 2: Rand/dollar exchange rate.



Source: SA Reserve Bank

Table 3: Local oilseed prices.

Crop	25 Aug 2015	25 Aug 2014	% change
Sunflower	5 650	4 245	33
Derived sunflower	5 631	5 583	1
Soya beans	5 008	5 320	-6
Derived soya beans	5 935	6 187	-4
Soil canola	4 300	4 300	0

Sources: Safex and Grain SA

Given the global and local scenario, we can expect pressure on soya bean prices in the coming season. It would, however, be of value to monitor the exchange rate and local planting intentions. In terms of sunflowers, the international market is currently in a bull market trend due to low stock levels. 🌱

ARBITRATION

under the spotlight



Any commercial arbitration process is designed to provide the parties entering into a commercial contract with a process that should be quicker, and overall less costly, than following the litigation route in a dispute situation. This does not mean (as some people believe), that the process is cheap, or the outcome of the arbitration process instant. The time and the costs applicable to a particular arbitration are, to a large extent, dependent on the complexity of the dispute, the financial value relating to it, as well as the willingness (or unwillingness) of both parties to achieve a speedy settlement of the dispute.

In certain instances one or other party (often the defendant) may attempt to slow down and delay, or even frustrate, the process as much as possible. It is the responsibility of the appointed arbitrator to manage the process to the best of his ability, as speedily and cost-effectively as possible, and impose and enforce time deadlines by which both parties must provide certain information, submissions etc.

Bear in mind that while two parties may be involved in an arbitration resulting from a dispute applicable to one particular contract, that does not keep them from continuing a normal business relationship and entering into other contracts with each other.

Overriding contract

Make sure you understand the contract contents. Most local, and to some extent cross-border, agricultural commodity related sales or purchase transactions are governed by the *South African Contract for*

Grain, Pulses and Oilseeds (Sagos Contract 1, Version 9), which became effective on 1 August 2012. Any parties, companies or entities still using earlier versions of the Sagos contract are strongly advised to update to the current version – details are available via a link on the South African Grain Information Service (Sagis) website.

Before signing any contract, it is essential that both parties have a copy and have read the Sagos contract.

The Sagos Contract was compiled (as were previous versions) to be fair and impartial to both parties entering into such contract (buyer and seller), and does include a crucial clause relating to dispute, and if a dispute arises, how it will be dealt with and the rules which will apply. In some instances, when two parties finalise a contract for the sale and purchase of a commodity, the actual Sagos contract format is used, with the applicable entries handwritten into the applicable spaces provided on the actual contract form.

However, in most instances one or the other party to a transaction where local or regional commodities are transacted, will issue their own in-house contract, part of which may state at or near the end “where not in conflict to the above, *Sagos Contract 1, Version 9* to apply, of which both parties to this transaction admit that they carry knowledge and notice” (or similar wording).

- Have you read the *Sagos Contract 1, Version 9* recently?
- Have you read the Arbitration Foundation of Southern Africa (Afsa) expedited rules that apply to this contract if a dispute arises?

Before signing any contract, it is essential that both parties have a copy and have read the Sagos contract, and fully understand the definitions and meanings contained therein – with particular reference to dispute resolution and the time limits that apply if a dispute should arise between the parties.

Failure by either party entering into any contract, not to fully investigate and understand the contract they are entering into in its entirety, prior to entering into such a contract, amounts to negligence. Such negligence could lead to significant negative and unintended consequences. If one party is unsure or fails to understand the contract being provided by the other party, then the onus is unquestionably on such party to ensure the party issuing the contract fully explains all the details contained in such contract.

Most transactions relating to imported or exported agricultural commodities (if not covered by the *Sagos 1, Version 9* contract) are governed by either the Grain and Feed Trade Association (Gafsa), the North American Export Grain Association (Naega) or the Federation of Oils, Seeds and Fats Associations (Fosfa) underlying contracts. Again, prior to signing a contract where reference is made to a particular Gafsa, Naega or Fosfa contract, both parties need to have seen, read and understood such applicable overriding contract.

Time constraints

Within the Sagos contract (also Gafta or Fosfa contracts), if a dispute does arise relating to a particular issue (product out of specification, non-delivery within the agreed delivery period etc.), there are specified time limits within which declaration of a dispute relating to one or other of these issues must be made.

It is therefore important for both parties who enter into such a contract, to know these time constraints or limits, and for any contract that they are involved in to monitor the progress of the contract against any such time constraints. If a problem or dispute arises, or is likely to arise, ensure you take the necessary action within the laid down time constraints.

In the case of a dispute, failure to properly act within the laid down time constraints could result in any arbitration being time-barred. The arbitrator, however, has discretion to waive time constraints if he deems it necessary and in the interest of justice to both parties. If, however, a time constraint has been ignored due to carelessness, and there is no justification for the arbitrator to exercise discretion to waive such constraint, it will remain.

The arbitrator is in no way obligated to waive a time limit. If a stated time limit within the overriding contract has been ignored or exceeded, it could be that the arbitration does not even take place, and no award can be made. However, some expenses may have already been incurred in the meantime, before this fact is determined.

The arbitrator

An arbitrator appointed to arbitrate in any dispute has to be completely impartial. If not, he would have to decline the appointment or withdraw himself from the matter as soon as he has identified any reason where it was not possible to act totally impartially.

Unlike an attorney, an arbitrator is not appointed to promote or defend the particular interests of one or other party to a dispute. He/she (or they in the case of a tribunal) are appointed to properly

and thoroughly establish the facts of the matter, administer the arbitration process efficiently and as fairly and effectively as possible, and to make an award based solely on the facts presented (in writing and if necessary, also orally in a hearing).

The arbitrator is appointed to arbitrate. He is not appointed as an expert on any technical aspects of a particular matter. If expert input is required, the arbitrator will call for expert opinion or input (whether legal or technical, relating specifically to the particular dispute). Obviously, it is helpful if the appointed arbitrator has an understanding of the particular business appertaining to a particular dispute.

An arbitrator is normally suggested or proposed by one of the parties to a dispute once it has arisen.

The arbitration process

In South Africa, all arbitrations fall under the *Arbitration Act, 1965* (Act 42 of 1965) and South African law applies, except if the parties agree at the time of contracting to be bound by some other jurisdiction and another country's laws (such as applies with Gafta contracts). Any dispute arising from a *Sagos 1, Version 9* contract will be administered by Afsa, and the proceedings will be confidential. (Neither the parties nor the arbitrator shall disclose to any third parties any information regarding the proceedings, the award or settlement terms, unless both the parties to the dispute otherwise agree in writing.)

An arbitrator is normally suggested or proposed by one of the parties to a dispute once it has arisen. Such proposal needs to be agreed to by the other party. However, if the other party does not agree to the suggestion, then the administrative body (Afsa) will appoint an arbitrator (or

arbitrators if it is a very large complex matter) on behalf of both parties.

The appointed arbitrator(s) will then call the parties to a pre-arbitration meeting as soon as possible and practicable, in order to determine whether there is in fact an arbitrable dispute. If in his opinion there exists an arbitrable dispute, the arbitrator will advise on the procedures that then need to be followed and the time table to be implemented, including the date of the actual hearing (if a hearing is required).

However, if in fact there is not an arbitrable dispute, the process cannot progress. It is essential, therefore, that prior to declaring a dispute, the party making such declaration is certain that there exists a dispute that can be progressed by way of arbitration.

The arbitrator(s) will require the parties to set out their respective claims, answers and counter claims (if any) in writing. If the dispute is not complex, the arbitrator – in order to reduce costs and minimise the time involved – will enquire from the parties if they would agree to a documents only arbitration. If the parties fail to agree or if the matter is complex, then a full hearing will be held at which all participants and any witnesses called will be requested to take the oath or affirmation to tell the truth (similar to court proceedings).

The award

The award is the culmination of the process and has to be provided to the parties, in writing, by the arbitrator(s) and within a predetermined time from the end of the hearing. The award must take into account the written submissions by each party, any evidence (either written or oral) provided and the arbitrator's findings and reasons for coming to his final decision contained and advised in the award.

The award can be made an order of the court, if one or either of the parties does not conform to the contents thereof.

For more information, contact Peter Watt on pwatt@mweb.co.za or 011 260 6807. 

INVESTIGATIONS into feeding full-fat canola seed and canola meal to poultry



Canola seed is used in animal nutrition either as full-fat seed or as the protein-rich residue canola meal. Both components are different in their composition and therefore also require different feeding strategies. The effective use of these feedstuffs in poultry feed was the aim of the investigations presented in this article.

Full-fat canola seed

The experiment with broiler chickens was conducted over six weeks using 360 day-old male fattening hybrids (Ross). The animals were divided into six groups. Full-fat canola seed was included in proportions of 0, 5, 10, 15, 20 and 25% of the compound feeds as a replacement for soya bean meal. The locally grown canola seed contained 22,1% crude protein, 43,1% crude fat in dry matter (DM) and 15,4 μmol glucosinolates/g seed.

The diets were based on wheat and were optimally supplemented with minerals and vitamins. They contained 29% crude protein and 14,7MJME_{N-corr} in DM. They were isoenergetic and isonitrogenous and adequate in all essential amino acids (Roth-Maier and Kirchgeßner, 1995). The criteria measured were the growth development, feed intake and feed conversion.

Selected results of the experiment are summarised in *Table 1*. This data indicates that increasing proportions of canola seed in the diet continuously reduce performance. The depressing effects of the seed already occurred after the first week and continued during the whole fattening period.

Table 1: Full-fat canola seed to fattening chickens.

Canola seed, %	0	5	10	15	20	25
Live weight, g	1 913 ^a	1 785 ^b	1 754 ^b	1 651 ^c	1 585 ^c	1 460 ^d
Feed intake, g	3 069 ^a	2 940 ^{ab}	2 980 ^{ab}	2 809 ^b	2 767 ^b	2 600 ^c
Feed conversion, kg feed / kg live weight gain	1,63 ^d	1,68 ^{dc}	1,73 ^{bc}	1,74 ^{bc}	1,79 ^{ba}	1,83 ^a

Laying hens (light white laying hybrids, 5 x 12 hens per group) were kept individually and were also fed isonitrogenous and isoenergetic diets with 0, 10, 15, 20 and 25% canola seed in the diet on a wheat, barley and soya bean meal basis. The diets contained 17% crude protein and 12,5MJME_{N-corr} in DM. The parameters were live weight, egg

production, daily egg mass, odour and flavour of the eggs, the fat content and the fatty acid proportions of the egg yolk (Roth-Maier and Kirchgeßner, 1995).

The performance data (*Table 2*) indicates that 10% canola seed in the diet already reduced performance, which was obvious in the distribution of the egg sizes in the soya bean meal group (control group).

Table 2: Full-fat canola seed to laying hens.

Canola seed, %	0		10		15		20		25	
Daily feed intake, g	127	a	119	ab	120	ab	115	b	116	b
Egg weight, g	71,6	a	69,0	ab	67,3	b	65,6	b	66,2	b
Egg production, %	83		80		81		79		82	
Daily egg mass, g	59,1		54,8		54,3		51,6		54,0	
Yolk fat, %	29,2		29,2		30,1		29,7		29,9	
Yolk fatty acids, g of 100g total fatty acids										
C18:0	9,8	a	9,0	b	8,4	c	7,4	d	7,2	d
C18:1	36,4	c	41,9	d	45,1	c	47,9	b	50,9	a
C18:2 n-6	24,4	a	20,5	b	18,3	c	17,2	d	14,8	e
C18:3 n-3	2,5	c	2,7	bc	2,9	ab	3,0	a	3,0	a
C20:4 n-6	1,7	a	1,6	b	1,5	b	1,5	b	1,4	c
C22:6 n-3	1,4	ab	1,4	ab	1,4	ab	1,3	b	1,5	a



The proportions of unsaturated and essential fatty acids in the eggs reflected the amount of intake and the composition of the canola oil.

Fifty five percent of the egg weights were in the range of >75–70g. With 10% canola seed, only 32% of the eggs reached this size and this effect continued in response to increasing canola seed quantities. With respect to the sensory quality, no difference occurred between the groups.

The proportions of unsaturated and essential fatty acids in the eggs reflected the amount of intake and the composition of the canola oil. Increasing canola proportions resulted in increasing oleic acid proportions, reduced linoleic and arachidonic acid proportions and significantly higher proportions of linolenic acid in the yolk.

Based on these experiments, it is concluded that even low amounts of full-fat canola seed in the diets have detrimental effects on poultry performance and use in feeding cannot be recommended. These effects may be explained by the contents of intact glucosinolates and also their degradation products, which may induce more metabolic disturbances than the degradation products of the residue canola meal.

Canola meal

The influence of feeding the protein feedstuff, canola meal, to broilers was tested in a fattening trial of five weeks (Roth-Maier and Kirchgeßner, 1987). Six groups, of 90 animals each, were given 0, 10, 15, 20, 25 and 30% canola meal as a replacement of soya bean meal in isonitrogenous and isoenergetic diets based on wheat, corn, animal fat blend, fishmeal, corn gluten and soya bean meal. The parameters measured were performance, sensory traits of the meat and weights of the thyroid glands.

Table 3: Canola meal to fattening chickens.

Canola meal, %	0	10	15	20	25	30
Live weight, g	1 523	1 510	1 458	1 444	1 417	1 358
Daily feed intake, g	68,6	68,3	65,9	63,7	63,5	60,5
Feed conversion, kg feed / kg live weight gain	1,62	1,63	1,63	1,59	1,62	1,61
Thyroid gland mg / kg live weight	91,70	109,6	120,2	145,3	150,0	143,5

The results (Table 3) indicate that proportions up to 15% canola meal can be used in diets for fattening chickens, because feed conversion was still similar as in the control group – although weight gains and feed intake were reduced by 4%. The sensory quality of the meat remained unchanged, even when 30% canola was given.

Similar recommendations for practical diets, including canola meal, can be given for laying hens. This was tested in a one-year experiment, starting at the beginning of the laying period of the hens (25 weeks old). 72 light white laying hybrids (LSL) were kept individually and divided into six groups with 0, 6,7, 10, 13,3, 16,7, and 20% canola meal (Roth-Maier and Kirchgeßner, 1988).

Table 4: Canola meal to laying hens.

Canola meal, %	0	6,7	10	13,3	16,7	20
Daily weight gains, g	0,53	0,59	0,62	0,48	0,81	0,52
Daily feed intake, g	110	105	108	107	106	101
Egg production, %	86	87	89	89	89	89
Egg weight, g	61,5	61,8	61,2	61,3	61,6	59,9
Egg mass, g	53,1	53,9	54,4	54,3	55,0	53,2
Feed per kg egg mass, kg	2,08	1,94	1,99	1,98	1,97	1,92

Table 4 shows selected results of this experiment. 20% canola meal reduced feed intake significantly. The other parameters were not influenced by the various canola meal proportions. However, the distribution of the egg weight classes was influenced in such a way that in response to the higher canola meal proportions, the production of lower-sized eggs increased.

In the control group, 34% of the

eggs were in the range up to 60g and 28% had egg weights >65g. However, in the 20% canola meal group, 53% of the eggs were in the range up to 60g egg weight and only 15% of the eggs weighed >65g. Odour and flavour of the eggs were not influenced by feeding canola meal.

From these results, it is concluded that canola meal can be utilised up to 15% of the diet for broilers and white laying hens. This recommendation, however, is valid only for laying hens that produce white-shelled eggs, because in brown layers the risk of tainted eggs cannot be ruled out.

References are available from the author. Contact Dora Roth-Maier at Roth-Maier@weihenstephan.de for more information. ☺

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THE PPECB LABORATORY

and its role in the South African groundnut industry

The PPECB Laboratory has been serving the South African groundnut industry for over 20 years. The laboratory, previously known as the Oil Seeds

Laboratory, was established in the 1960s under the auspices of the Oilseeds Board.

In 1994 the laboratory was privatised, but with the closure of the Oilseeds Board in 1997, the laboratory was transferred to the Perishable Products Export Control Board (PPECB). It serves as a central testing facility and is situated in Pretoria. The food safety services of the PPECB Laboratory are illustrated in Figure 1.

has traceability measures in place and forms part of international proficiency testing schemes to ensure that trade regulations and standards are met. In order to achieve this, the laboratory is ISO/IEC 17025: 2005 accredited (T0248) for chemical analysis since 2005, lending credibility to the accuracy of results generated and ensuring international compliance and recognition.

Testing methods

The laboratory has six technical signatories and is accredited for the following test methods:

Foods, spices, beverages and agricultural products

HPLC analytical techniques: Method LM102 for aflatoxin B1, aflatoxin B2, aflatoxin G1, aflatoxin G2, aflatoxin B1+B2+G1+G2 (total), aflatoxin M1, ochratoxin A (OTA), zearalenone (ZON), fumonisins, deoxynivalenol (DON) and patulin.



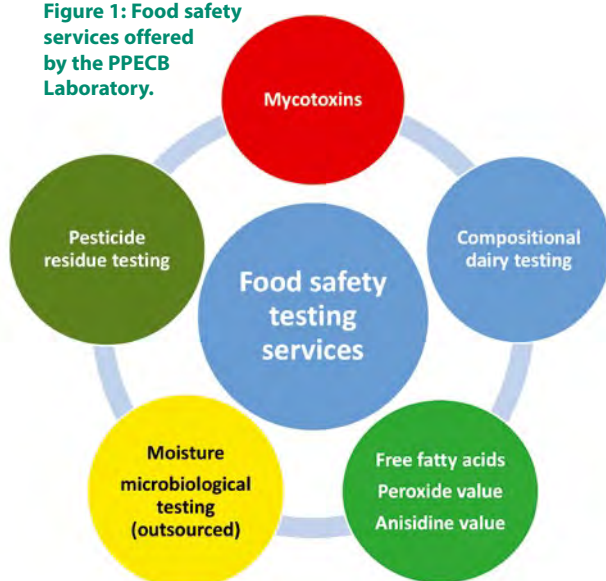
Cereal products, nuts and nut products / edible fats and oils, margarine and pet foods

Free fatty acids: Method LM108, titration; peroxide value method LM106, titration.

Quantitative determination of pesticide residue

Agricultural products of plant origin: Method LM126, GC MS MS.

Figure 1: Food safety services offered by the PPECB Laboratory.



The laboratory reaches pack houses from Hartswater to Viljoenskroon, Schweizer-Reneke and Pretoria via its satellite laboratories, where 20kg groundnut samples (representative of an 18–20 ton groundnut consignment) are processed before being express couriered for extraction, cleaning up and analysing at the laboratory in Pretoria.

The facility strives to function within internationally recognised compliance criteria and demonstrates competence,

Value propositions

The laboratory offers the following value propositions to the food and feed industry:

- Technical support, relevant information (European Union, Codex and South African legislation documents) and advice on result interpretation.
- Lead time of 8 to 24 hours for aflatoxins in groundnuts and 72 hours for all other service offerings.
- The capability of analysing large volumes (10kg samples).
- The capability of managing the homogenisation of samples at slurry points in satellite laboratories in different parts of the country.
- Accreditation for the analysis of mycotoxins in spices.
- Dairy compositional testing with a lead time of 24 hours.

The laboratory has also gone lean and green by implementing Just-in-Time (JIT), and the Laboratory Information Management System (LIMS) uses recycled paper to generate certificates of analysis and recycles printer cartridges, paper and glassware. The facility ensures compliance to good laboratory practices, continuously endeavouring to improve and optimise workflow processes, thereby re-engineering the way it conducts business.

For more information, contact the PPECB Laboratory at Lab@ppecb.com or www.ppecb.com.

IMPORTANT EVENTS: 2015 TO 2016



2015

DATE	EVENT	VENUE	ENQUIRIES
30 September – 01 October	Potatoes SA Congress	Lagoon Beach Hotel, Cape Town, South Africa	Hanrie Greebe Tel: +27 12 349 1906 Email: hanrie@potatoes.co.za Website: www.potatoes.co.za
30 September – 02 October	Oilseed and Grain Trade Summit	Hyatt Regency, Minneapolis, United States	Website: www.oilseedandgrain.com
10 – 14 October	Anuga	Koelnmesse GmbH Cologne, Germany	Natascha Schneider Tel: +49 221 821 2058 Email: n.schneider@koelnmesse.de Website: www.anuga.com
14 October	Afma Symposium	CSIR International Convention Centre, Pretoria, South Africa	Teresa Struwig Tel: +27 12 663 9097 Email: admin@afma.co.za Website: www.afmasymposium.co.za
15 October	World Poultry Science Association Day	CSIR International Convention Centre, Pretoria, South Africa	Alet Botha Tel: +27 33 260 6825 Email: Bothaa@ukzn.ac.za Website: www.wpsa.com
15 – 16 October	Agri SA Congress	St George's Hotel, Pretoria, South Africa	Thea Liebenberg Tel: +27 12 643 3400 Email: thea@agrisa.co.za Website: www.agrisa.co.za
23 – 25 October	PMA Fresh Summit	Georgia World Congress Centre, Atlanta, United States	Jamie Romano Hillegas Tel: +1 607 2123 Email: jhillegas@pma.com Website: www.pma.com/events/freshsummit
01 – 02 December	GFIA Africa (Global Forum for Innovations in Africa)	Durban International Convention Centre, Durban, South Africa	Nicola Davison Email: n.davison@turretme.com



2016

04 March	Afma Forum	Sun City, South Africa	Teresa Struwig Tel: +27 12 663 9097 Email: admin@afma.co.za Website: www.afmaforum.co.za
12 – 15 March	International Institute of Oilseed Products 82 nd Annual Convention	PGA National Resort and Spa, Palm Beach Gardens, Florida, United States	E-mail: niop@kellencompany.com Website: www.niop.org





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