

OILSEEDS

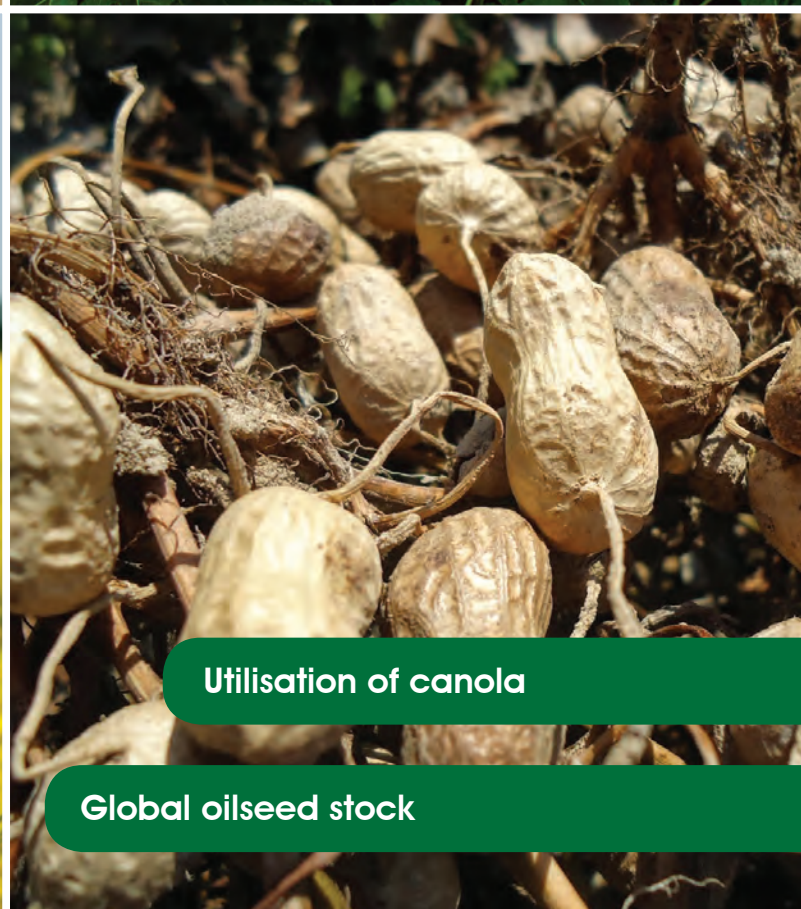
focus

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



Soya bean storage

High-oleic sunflower oil



Utilisation of canola

Global oilseed stock

Invitation to seminars and workshops

Quest Conference Estate, Vanderbijlpark, South Africa



Centre for Sustainable Livelihoods • Oil & Protein Seeds Development Trust • Oilseeds Advisory Committee

27 – 31 July 2015

Five-day seminar and practical workshop hosted by:

- The Centre of Sustainable Livelihoods (CSL) at the Vaal University of Technology (VUT)
- The Oil and Protein Seed Development Trust (OPDT)
- The Oilseeds Advisory Committee (OAC).

Be there!

- Come listen and exchange views with local and international speakers who will discuss the value of soya in human health and how it can be applied in various human-feeding schemes.
- Network and meet other interested parties.
- Learn about soya ingredients, food-product development.
- Get the opportunity to taste various soya foods.

The goal

To advance human soya consumption in Africa through evidence-based practical information on the role of soya to alleviate food security.

Practical information will be provided on soya production and processing as well as the role of soya in providing nutritious foods to support health. The opportunity will be utilised to showcase the ability of the soya industry in South Africa to lead the technological aspects of the programme.

International speakers will include:

- Dr Craig Gunderson from NSRL at the University of Illinois, USA.
- Dr Folake Samuel from the University of Ibadan, Nigeria.
- Prof Symon Mahungu from Egerton University, Kenya.
- Prof Roger Djoulde from the Higher Institute of the Sahel, Cameroon.

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LOOKING TO THE past AND THE future

By Gerhard JH Scholtemeijer

completely different role in agronomy. In short, the canola industry has a great need for inputs from all role-players, also to the advantage of the role-players themselves.

Peanut industry

The South African peanut industry was once a mighty, lucrative, international role-player with products that testified of quality. There is currently a major effort underway to restore its significant role, which will place high demands on the industry. It is probably the most lucrative of all the oilseeds and other grain industries.

Soya industry

The star among the grain and oilseed industries, however, is undoubtedly the soya industry. It plays a major role in all the links of the value chain, especially with regard to animal consumption (protein), but even more so in human nutrition.

The proposed development area of more than one million hectares earmarked for the production of 2,5 million tons of soya bean by 2020 – thus doubling the current position within the next six years – demands the input of all stakeholders in order to realise its goals. This magazine will be one of the most significant vehicles that can be applied to this end.

I would like to express my confidence that this magazine will fill a great gap, granting a wide variety of readers the opportunity to find what they are searching for in a more concentrated format. The latest industry information will be shared and the publication will give goods and services suppliers in the oilseed industry access to a very specific readership.

I hope that everyone will enjoy this reading experience.

Gerhard Scholtemeijer

Chairman: Protein Research Foundation

The establishment of *Oilseeds Focus* magazine is in many respects the realisation of an ideal that has also been a plea of the industry's many role-players over many years. Scientific writings, popular articles, the introduction of new developments – whether it entailed seed, chemistry, tools, implements, a new plant or publicity – all had to follow a different route in order to finally come to the attention of the role-players in the oilseed value chain. It is especially the sunflower and peanut industries that have experienced a long-desired need for this platform.

Background

In the early 2000s the Protein Research Foundation (PRF) considered establishing its own soya bean magazine to create a home for the growing giant residing under the oilseeds umbrella.

The project

was, however, put on hold. The PRF did create a quarterly magazine for the recently established canola industry, called *Canola Fokus*, but it has a limited scope and circulation.

The four oilseeds differ greatly from each other, which therefore presents us with a lot of room for contributions by all role-players in the various value chains. In doing so, we are now able to emphasise their respective positions and also promote, explain and highlight issues to the benefit of each industry.

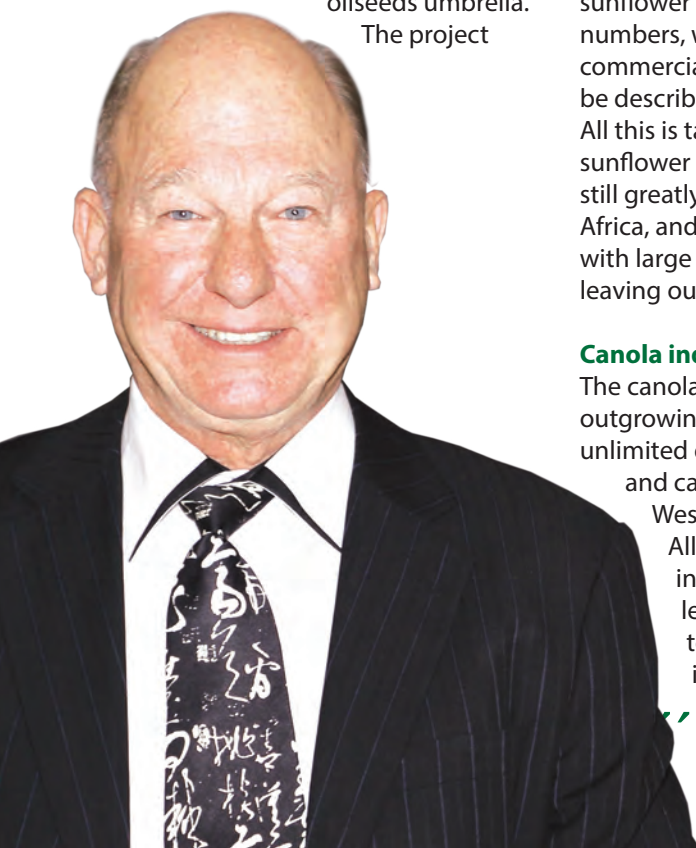
Sunflower industry

Although the sunflower industry is probably the oldest and most established of the oilseed industries, many changes have taken place internationally. These changes have only been partly, if at all, experienced in South Africa.

At the same time, developing agriculturalists are entering the sunflower industry in increasing numbers, while there are virtually no commercial producers left who can be described as sunflower farmers. All this is taking place while both sunflower oil and sunflower cake are still greatly undersupplied in South Africa, and are imported annually with large amounts of currency leaving our country in the process.

Canola industry

The canola industry is increasingly outgrowing its infancy with an almost unlimited demand for canola oil and canola oilcake, both in the Western Cape and nationally. All aspects of the canola industry have undergone a learning curve as opposed to the established sunflower industry, which fulfils a



EDITOR'S NOTE

Introducing an INDUSTRY FIRST

The oilseed industry in South Africa, based on sunflower seed, soy bean, canola, peanut and cottonseed, was in its infant stages before the 1970s. In this time the population consumed mainly animal fats in their diet. All other lipids for medicinal, cosmetic and industrial purposes, were imported.

The rapid and progressive change in the population's eating habits to consume vegetable oils, together with a booming requirement for vegetable protein for animal feeds, has stimulated the development of a vegetable-oil crushing industry.

Statistics

Over the past five years the growth of soya bean production in South Africa has been exponential, stimulated by the expansion of the soya bean crushing capacity from 600 000 in 2011 to in excess of 2 200 000 tons in 2015. Soya bean meal is the protein ingredient of choice of the animal feed industry due to its low-fibre and high-quality content. South Africa is expected to produce a record 1 148 950 tons of oilseed meal in 2014/15.

Imported soya bean oilcake volumes reduced from 922 499 in 2012 to 610 022 tons in 2014 due to the growth in domestic production. For the first time in history, South Africa has produced more oilcake in 2014/15 than was imported over the same period. South Africa could very well approach protein self-sufficiency by the year 2025.

Technology

In order to continue to grow in oilseed production, we need to make optimum use of progress in agronomic practices and exploit the genetic potential of new seed. Oilseeds need to be processed by making use of modern technology, in order to produce a quality source of protein that can be readily accepted by the animal feed and human food industries.

The implementation of technology will have a significant impact on the success of the oilseed industry. We trust that *Oilseeds Focus* magazine will play a vital role in this regard.

Dr Erhard Briedenhan

Please feel free to send us your contributions and suggestions to make *Oilseeds Focus* an enjoyable and worthwhile publication for the oilseeds industry. Contact Dr Erhard Briedenhan on 082 551 1634 or email erhardb@netactive.co.za.

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



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Inspection services implemented by DAFF

DAFF recently announced the implementation of inspections for fresh fruit and vegetables, feed products, grains and grain products including ornamental foliage and flowers, sourced from among others, national fresh produce markets, warehouses, silos, distribution centres and farms intended for export to African countries.

Consignments of 20kg or more of fresh fruit and vegetables, feed products, grains and grain products, and consignments of 10kg or more of ornamental foliage and flowers will be subjected to certain conditions and terms, among others that no consignment shall be released without having been inspected by the designated assignee, namely the Perishable Products Export Control Board (PPECB).

Prior arrangement for inspection of consignments will be made with the PPECB. Contact details are available on www.daff.gov.za – *Press release*

Syngenta introduces grain academy

Syngenta, a global agricultural business, recently launched its 2015 Grain Academy, a leadership development programme for young commercial growers to equip them to address the challenges the agriculture industry faces.

"In partnership with the University of the Free State and with the support of Grain SA, we proudly welcome the 25 dynamic growers to this year's programme, in particular the three female growers who have joined the team, highlighting the contribution made by women to our agriculture sector," says Antonie Delport, managing director of Syngenta SA.

After the programme's successful completion in 2013 and 2014, this year the Grain Academy will aim to benefit the individual on a personal and professional level and will contribute to the greater agricultural community.

Some of the themes that will be covered in the 2015 Grain Academy programme, include the changing and interactive future of agriculture, the art of leading, giving direction including systems thinking, valuing diversity and leading and facilitating change and transformation

Jannie de Villiers, CEO of Grain SA, said: "The continuation of the Grain Academy is in line with Grain SA's strategic objectives. We are excited to maintain our partnership with Syngenta on delivering this project. The future of sustainable production lies in our competitiveness and it can only be improved with ongoing development." – *Press release*

Cargill completes facility investment

The redevelopment and expansion of the animal feed vitamin and mineral premix manufacturing facility at Pietermaritzburg has been announced by Astral Foods Limited (Astral), a leading Southern African integrated poultry producer.

Following the acquisition of half of Astral's interest in Provimi SSA, Cargill became the majority (75%) shareholder in the company in 2012 and assumed managerial control. Astral owns the remaining 25% interest in the company.

Cargill and Astral announced approval of the redevelopment and expansion of the manufacturing facility in December 2012. The facility produces micronutrient blends used in the manufacture of compound animal feed.

The investment was driven by an increase in demand from customers throughout the region for animal feed products. Chris Schutte, CEO of Astral, stated that the expansion, which includes new equipment, technology and resources has increased the plant's efficiency and will ensure consistent product quality.

The state-of-the-art facility produces poultry, ruminant, swine and pet food, vitamin and mineral premix blends and base mix products for animal feed producers, which are marketed under the Provimi brand throughout sub-Saharan Africa. – *Press release*

Important events: 2015

Fertasa 55th Congress, Somerset West
Sansor 26th Annual Congress
Nampo Agricultural Show, Bothaville
Royal Show, Pietermaritzburg
AVI Africa, Emperors Palace, Johannesburg
AgriBusiness Africa Conference, Gallagher Estates, Midrand
PRF Soya Bean Symposium
Agri Mega Week, Bredasdorp
Sacota AGM
AMT Conference, CSIR, Pretoria
Afma Symposium 2015, CSIR, Pretoria
Agri SA Congress, St George's Hotel, Pretoria

13-15 April
7-8 May
12-15 May
29 May – 7 June
23-25 June
15-16 July
21 and 23 July
16-19 September
22 September
29 September
14 October
15-16 October

NWK and KZN mills join forces

The NWK Group's Noordfed Mill acquired a 100% interest in a mill in KwaZulu-Natal. Empangeni Milling, with established brands and a high volume market, complements the modern milling facilities and production capacity of Noordfed in Lichtenburg.

"Since 1 February 2015 Empangeni Milling/Noordfed has delivered the same service as before. We anticipate seamless integration with no effect on orders, product availability or deliveries," says Hendrik Roux, former CEO of Empangeni Milling who has been appointed CEO. Roux and his management team will manage the combined business.

"A modern mill, geographical location close to the material and our established market share in KwaZulu-Natal pave the way for Empangeni Milling/Noordfed to supply the best quality product," Roux said. Empangeni Milling, formerly in the Grindrod stable, has an established market within a radius of 200km from Empangeni. The new business will have the opportunity of geographically expanding this market. It also applies to expanding the client base in the Northwest Province, adjacent areas as well as national.

The new company supports and is committed to black economic empowerment and establishing a broad based BEE partnership. Discussions with Intshona Holdings, a company owned by black women, is in an advanced stage. – *Press release*

Partnership improves edible oil business

Global agricultural business leader, Louis Dreyfus Commodities, and agri-business, NWK Ltd, recently extended their partnership through Epko, a sunflower seed crushing plant in Lichtenburg.

Epko Oil Seed Crushing was established in 1997 in Lichtenburg as a wholly owned subsidiary of NWK. After a successful four-year crushing contract with Epko, Louis Dreyfus Commodities Africa (Pty) Ltd has now acquired 50% of NWK's shares in the company. NWK and Louis Dreyfus Commodities Africa as shareholders have agreed to modernise the plant and expand its capacity by 2016.

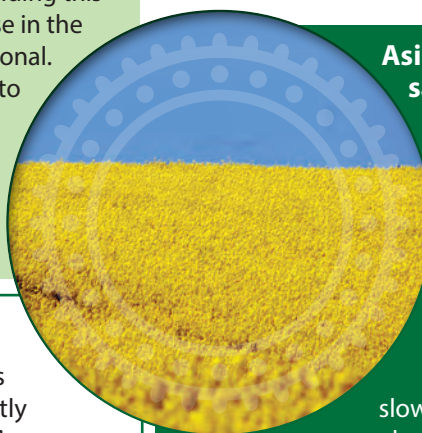
"As shareholders the two companies bring complementing skills to the table. Louis Dreyfus Commodities offers extensive experience in risk management and the marketing and distribution of edible oils, while NWK offers the best local knowledge in respect of production, storage, handling and industrial activities," said Danie Marais, managing director of NWK. "With these skills, combined with the plant's good location and strong expansion programme, Epko should be able to compete with other plants in its category." – *Press release*

Fertasa focuses on food production

Agriculture's greatest future challenge is to feed a estimated world population of nine billion people in 2050. This will be one of the key issues discussed at this year's Fertasa (Fertiliser Association of Southern Africa) congress, said Adam Mostert, CEO of Fertasa.

Hence the theme of the congress is "Food production for a growing population in Southern Africa". This coincides with the United Nation's celebrations of 2015 as the "International year of soils". The 55th Fertasa annual congress will take place from 13 to 15 April at the Lord Charles Hotel in Somerset-West.

Specialised guest speakers from various agricultural industries will address delegates. This includes Dr Guy Scott, former minister of agriculture and acting president of Zambia, Prof Nick Vink, chairman of the Department of Agricultural Economy at the University of Stellenbosch and Prof Ferdi Meyer, director of the Bureau for Food and Agriculture Policy (BFAP). – *Press release*



Asian appetite for oilseeds sapped

Steep declines in many Asian currencies against the US dollar mean that food importers in the region are unable to reap the benefits of benchmark grain and oilseed prices that have plunged to multi-year lows in recent months on US exchanges.

Weaker local currencies are slowing demand for wheat, corn and soya beans as price-sensitive Asian buyers make only hand-to-mouth purchases, taking fewer cargoes even as global production hits record highs.

Key producers Brazil and Argentina are forecast to churn out a record soya bean crop, adding to an all-time high US production last year. World corn output is estimated at a historic high of 991,3 million tons in the year 2014/15, the US Department of Agriculture has said.

Chicago wheat futures have gained just 2% in dollar terms since lows marked in October, while in rupiah value the market is up 10%. Corn has risen 30% in yen terms during that period, although the market is up 19% in dollar value. Despite these gains, corn prices are less than half their 2013 high of \$8 a bushel.

Furthermore, US dollar strength is also causing a shift in trade flows across Asia. "Dollar strength has allowed other origins to be more competitive than the United States," said Brett Cooper, senior manager of markets at FC Stone Australia. – *Reuters*

CANOLA PRODUCTION

and utilisation: **An overview**

Canola and rapeseed are collectively the second largest oilseed crops in the world and currently contribute close to 14% of the total global production of oilseeds. The total production of canola/rapeseed is close to 70 million tons of grain per annum, with a mean yield of approximately 1,9 tons of grain per hectare (see *Table 1*).

The main canola/rapeseed-producing countries are Canada, China and India. The highest mean yield of 4,14 ton per hectare was harvested in Germany, on 1 430 000 hectares of land during 2014/15. South Africa produced only 123 000t on 95 000ha in 2014, although it indicated that domestic production since 2010/2011 has tripled.

Table 1: Rapeseed/Canola world production, 2013 to 2015.

Country	Production (1 000t)		Yield (t/ha)	
	2013/2014	2014/2015	2013/14	2014/15
Canada	17 960	15 800	2,24	2,00
China	11 500	12 000	1,70	1,75
India	7 350	7 200	1,03	1,00
Germany	5 784	5 900	3,95	4,13
France	4 369	5 250	3,04	3,47
Australia	3 950	3 500	1,80	1,72
Global	69 729	68 590	1,95	1,92

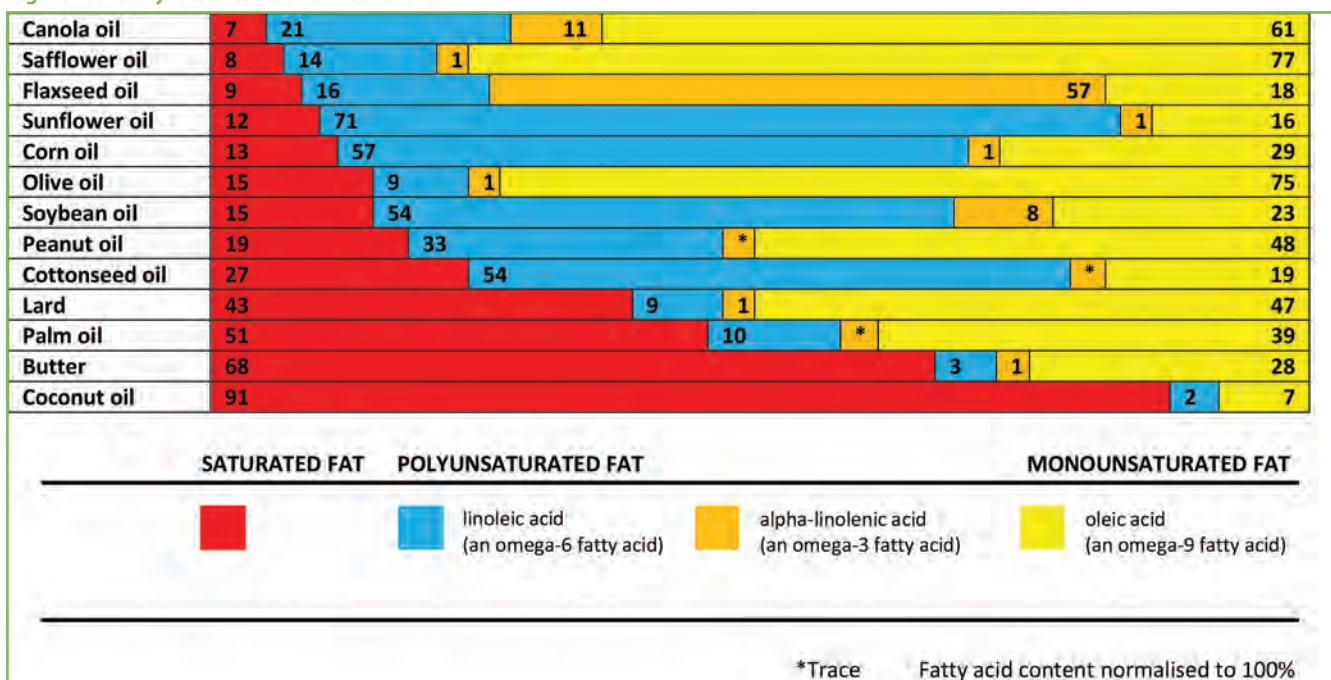
Human nutrition

Canola seed contains approximately 36 to 46% high-quality vegetable oil and 20 to 24% protein. Canola oil is recognised worldwide for its health properties, and is increasingly being used as cooking oil and in margarine production. It contains low levels of saturated fatty acids and relatively

high levels of oleic and linolenic acids.

Of all the vegetable oils that have been used for human consumption, canola oil has the highest percentage of omega-3 fatty acids, which have been scientifically proven to reduce low-density lipoprotein (LDL) cholesterol levels.

Figure 1: Dietary fats in canola vs in other oils.



Animal feed

Both full-fat canola (the unprocessed seed) and canola oilcake (the residue after the oil has been mechanically pressed and/or solvent has been extracted from the seed) are high-quality products that are effectively utilised for farm animals.

The canola oilcake available in South Africa has a protein content of approximately 36%, with an oil content of approximately 9% if mechanically extracted and 2% if solvent extracted. The content of bypass protein in canola oilcake is approximately 28% and is comparable to, or even better than, its value in soya bean oilcake.

The relative monetary value of full-fat canola as animal feed, in contrast to soya bean oilcake that contains 47% protein, varies from 58% for dairy cattle to 94% for poultry and 100% for pigs. In contrast, canola oilcake varies from 53% for poultry to 60% for dairy cattle and 65% for pigs.

Studies undertaken at the Elsenburg Agricultural Training Institute and the University of Pretoria, indicate that the optimum inclusion rate of full-fat canola is approximately 12% in the complete diets of lambs, and 6% in that of dairy cows. Canola oilcake can be used at 15% in the complete diets of sheep and at 12% in that of dairy cattle.

In respect of monogastric animals, the ideal inclusion level of full-fat canola and canola oilcake in the diets of pigs is 12 to 18%. High-level inclusion in finishing pigs should be avoided due to the complication of soft fat in carcasses.

For ostriches it is approximately 10% and for broiler chickens the maximum inclusion levels appear to be between 5 and 10%, with the exception of brown-shelled layers where a maximum of 3% is recommended due to glucosinolate levels.

With the inclusion of full-fat canola in the diets of chickens, pigs and dairy cows, a healthier fat and milk-

fat profile is obtained as it contains a higher concentration of unsaturated than saturated fats.

For the best utilisation of full-fat canola, the seeds should either be mixed with the grain in the milling process or used whole in the feed-pelleting process.

Biofuel

Due to the rising prices of mineral oils and concern about environmental pollution, there is increasing interest in the use of canola oil as a source of biodiesel. According to European research, approximately 1 050kg of canola oil is required to produce 1 000kg biodiesel and 100kg glycerine. Although canola oil is used in the manufacture of biodiesel on a commercial scale in a number of European countries, the profitability thereof in South Africa is still being investigated.

Canola as rotation crop

The inclusion of canola in a crop-rotation system presents several advantages.

Improved grain yields: The inclusion of canola in a crop-rotation system usually leads to an increase in the yield of the subsequent cereal crops. In comparison to a wheat monoculture system, the wheat yields over a five-year period on the Langgewens Experimental Farm in the Western Cape have indicated an increase of 20% in the first wheat year after implementing canola. The wheat yield in the second and third years after canola was used, showed an increase of 11% and 8% respectively. In a system where canola is grown only one year out of every four, the wheat yield in the remaining three years is therefore increased with an average of 13%.

Reduction in diseases: By including a non-cereal crop such as canola, which does not host disease pathogens of cereal crops, the

disease chain is broken and diseases are reduced. Various studies have shown that canola also has a bio-fumigation effect that suppresses certain diseases.

More effective weed control: The inclusion of canola in a rotation with cereal crops increases the variety of herbicides that can be used, as canola is a broadleaf crop (in contrast to wheat and barley as cereal crops) and both triazine-tolerant (TT type) and imazamox-tolerant (clearfield type) cultivars are available in South Africa. By alternating the use of the greater variety of available herbicides, the development of herbicide-resistant weeds such as ryegrass (*Lolium rigidum*) can be controlled.

Improved root system: The canola plant develops a tap-root system that can penetrate the soil to a depth of 1,0m. When these roots die and decay, channels are formed in the soil. Particularly in the case of reduced-tillage systems, this biological ploughing action of canola can give rise to an improved root system in the subsequent cereal crops.

Planters and harvesters are used more effectively: Because canola is planted and harvested earlier than wheat, and the same planters and harvesters can be used, this equipment is utilised much more effectively.

Better distribution of financial risk: Economic evaluations of long-term crop rotation trials have indicated that the inclusion of canola in crop rotation systems increases returns on the capital investment, when compared with monoculture systems using wheat only.

For more information, contact Prof André Agenbag at email gaa@sun.ac.za. References are available from the author. 📧

Using appropriate rhizobium strains for

OILSEED LEGUMES

With about 2 000 species, legumes represent the most utilised plant family and are the most significant crop worldwide. Besides being an important dietary source constituting 33% of the dietary protein nitrogen (N) needs for humans and animals, they are also a source of income and livestock feed. Among the grain legumes, soya bean (*glycine max L.*) and peanut (*arachis hypogaeae L.*) are the major sources of vegetable oil, producing more than 35% of the world's processed vegetable oil.

In order to meet their nitrogen requirements, fertiliser nitrogen has long been used as one of the major agricultural inputs. However, several reports of depressive effects of N-fertiliser that suppress nodulation and yield have been documented in many cases, including soya beans in the past. A combination of factors, including soil nitrogen (N-fertiliser), extremely low or high soil pH and moisture stress, affect grain yield negatively.

Biological nitrogen fixation (BNF) is an alternative process to the use of N-fertiliser where a group of bacteria called rhizobia, form a symbiotic association with the roots of legumes, form root nodules and fix atmospheric nitrogen (N₂). The fixed nitrogen will then be available to plants in the form of ammonia and nitrate. Thus symbiotically fixed nitrogen either by indigenous or introduced strains of effective rhizobia is the most efficient source of nitrogen for legume grain production.

Like many other legumes, both soya beans and peanuts establish a symbiotic relationship with

rhizobia. The major soya bean nodulating rhizobia that have so far been identified are *bradyrhizobium japonicum*, *bradyrhizobium elkani* and *sinorhizobium/Ensifer fredii*. The other significant oilseed peanut differs from soya bean as it is a highly promiscuous legume being nodulated by rhizobia that nodulate a diverse group of legumes.

Benefits of inoculation

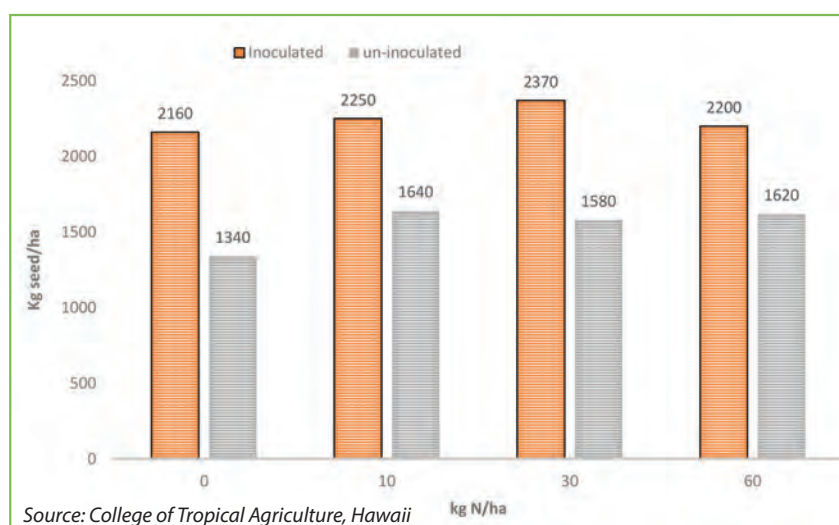
Ever since 1988, when Hellreigel and Wilfrath showed that root nodule bacteria were providing fixed nitrogen to the plants using N₂ as a sole nitrogen source, much work has been done to improve methods of inoculation and inoculant strains. The major aim of inoculation is to provide a sufficient number of viable effective rhizobia and to induce rapid colonisation of the root. In doing so, it is possible to initiate nodulation soon after the completion of germination and to produce optimum yield.

Compared to nitrogen fertilisers,

inoculation with rhizobium represents an economically sustainable, environmentally friendly resource that guarantees the nitrogen requirement of an ecosystem. As legumes are rich in protein with high nitrogen content, they have higher nitrogen requirements than cereal crops. Thus to meet all the nitrogen needs of the legume crops and to achieve high yield, farmers would have to apply more nitrogen fertiliser than the legume crop actually requires.

For instance, to obtain a soya bean yield of 2 000kg/ha farmers need to apply approximately 621 to 429kg nitrogen. The same yield could be obtained with inoculation (BNF) and no nitrogen fertiliser. Benefits of inoculation are not restricted to yield, but can also increase the protein content of seed, even if there is no yield increase. In addition, if crop residues are returned to the soil during harvest, more nitrogen will be available to the next crop, as legumes can obtain more nitrogen as a result of BNF.

Figure 1: Comparison of the effect of added fertiliser nitrogen on inoculated and non-inoculated soya beans. Inoculation with rhizobium results in increased yield. Added fertiliser nitrogen at high concentration affects nodulation and yield in inoculated rather than un-inoculated soya bean.



Why, when and what to inoculate

Questions worth asking when it comes to inoculating legumes are why, when and what to inoculate? Many soils used for legume cultivation do not contain an adequate number of effective rhizobia. A typical example is the case of South African soils that lack the specific rhizobia that nodulate and fix nitrogen in soya bean. In such cases it is vital to inoculate the plants with highly effective rhizobial inoculants.

In general, inoculation is useful and necessary when there are no indigenous strains of the required rhizobia or when they are present at a very low concentration. However, inoculation may not be necessary and does not provide any benefit if there are already much rhizobia in the soil that can stimulate effective BNF.

not mean that the product can be automatically registered. This is because the survival and effectiveness of the inoculant strain may be affected due to low quality or sub-standard inoculant carriers such as peat, perlite or liquid formulations.

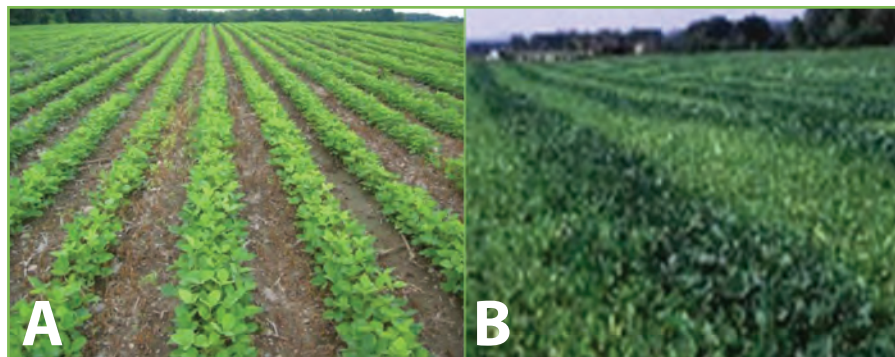
For instance, the survival of the rhizobia and its numbers decrease in the carrier as the age of a low standard inoculant product increases. The efficacy of the rhizobium in the product can also be minimised or lost if the pH of the inoculant is not optimum or if it contains contaminants at a level $\geq 100\,000$ cells/mL. Due to this, the quality of any inoculant product that contains effective rhizobium strains should be regularly controlled for at least six months.

- It should have good shelf life – rhizobia should be viable at acceptable number for at least six months.
- It must contain the desired strain – can be verified microscopically, serologically or molecular fingerprinting.

Conclusion

With special preference to the production of soya bean as the major oilseed legume in South Africa, an effective inoculant strain, *bradyrhizobium* strain WB1, was introduced in the 1970s to promote nodulation and yield. Then, another strain, *B. japonicum* WB74, a synonym of the Australian strain, *B. japonicum* CB1809, was selected and replaced the WB1 strain in the 1990s, following an extensive field trial and screening of different soya bean genotypes.

Figure 2: Soya bean field not inoculated with rhizobia before showing symptoms of nitrogen fixation deficiency (A) and part of a soya bean plot inoculated with rhizobium shown as dark green strips (nodulation effective) and the un-inoculated plots shown as yellowish strips (B).



Source: Pioneer Hi-bred available at <https://www.pioneer/home>

When performing inoculation with rhizobium, it is vital to ensure that the formulated inoculant product is registered for marketing. This will only be achieved if the efficacy of the inoculant strain has been confirmed both under glasshouse and field conditions, in which a trial is conducted for at least two seasons and two geographically different soils.

Registration

However, the fact that the selected inoculant strains pass the field nodulation screening trial, does

The internationally accepted standard quality control protocol in South Africa suggests that:

- The number of rhizobia in powdered carrier products must be at least 5×10^8 cfu g⁻¹ for peat carriers and at least $6,5 \times 10^8$ cfu g⁻¹ for perlite and 2×10^9 cfu mL⁻¹ for liquid formulations.
- The pH of the carrier must be between 6 and 7,5.
- The moisture content should be 35 to 45%.
- Contaminants should not exceed 100 000 cfu g⁻¹, preferably much less than this.

Benefits of inoculation are not restricted to yield.

With over 35 soya bean genotypes in the country, relying only on one strain of *bradyrhizobium* may not render the desired result, nor does the introduction of various new inoculant products from abroad, without proper screening on South African soils, guarantee effective nodulation, nitrogen fixation or yield increase.

It is therefore recommended that emphasis is placed on future research projects to screen and select the most appropriate inoculant products and rhizobia strains across a wide range of soya bean cultivars. This does not only provide better results by improving nodulation and yield increase, but also maintains the ecological welfare and microbial diversity of South African soils.

For more information and references, contact Dr Ahmed Idris Hassen on HassenA@arc.agric.za.



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Peanut production

By Tjaart Myburgh

Only 20% of agricultural land in South Africa allows for crop production, which makes the crop selection competition tough. The only way that peanuts can be used as a competitive crop, lies in its production potential and price. At GWK everybody strives for excellence and therefore puts the farmer first by implementing a rebate policy for all shareholders.

Peanut production can be used in a rotational system, which allows the farmer to save on nitrogen in the upcoming season. The better the soil condition, the higher and more sustainable the peanut production will be. Soil with a clay component lower than 15% is considered to be the ideal. GWK also regularly looks into new cultivars,

and is very excited about a new upcoming cultivar.

The underlying causes of the present low turnover, inefficiency and vulnerability of many other crops, is primarily the reason why peanut production in South Africa was predicted as high as 90 000 tons for 2015. These high predictions had a negative reaction on the price, but with the drought experienced in the dry land regions the price is starting to show a slight increase.

Excellent team

GWK has a well-trained team, consisting of good agriculturists and buyers, to ensure the best possible service and price for the farmer. GWK offers a drying facility for bulk supply. The practice of forcing heated air through a deep bed of

peanuts to remove moisture, makes it possible to take in large quantities of peanuts in a short period of time. Their factory guarantees a high-quality, hand-picked product.

GWK believes in the system of giving back to the farmer. Peanut cultivars can affect the sustainability of production and therefore they believe in new development. With soil disturbance, the soil-water capacity can change and may also have an influence on production potential. They have conducted trials to investigate production if soil is loosened up at a depth of 400mm. Production and water-use efficiency decrease when soil conditions decline.

Nematodes

Nematodes are common amongst peanut varieties and are prioritised at GWK. Seeds are tested for nematodes, and are well selected. Only the highest quality seeds are offered to farmers. While it is often regarded as less important, planting depth is also a priority. GWK has come to the conclusion that temperature and moisture are more constant at a depth of 6cm. Trials indicate that more positive results are obtained at a deeper planting depth.

GWK offers good quality, better prices and a higher production potential. They believe in tomorrow, and therefore they believe in the farmer!

For more information, phone Tjaart Myburgh on 082 801 7414 or visit www.gwk.co.za.



Photographs by Tania Fourie.

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PRF SOYA



Oil & Protein Seeds Development Trust

Symposium

Theme:

Weed control

Programme:

Opening by master of ceremonies	Mr Gerhard Scholtemeijer – Chairman PRF	09:00 – 09:20
Keynote speakers	Prof Stevan Knezevic University of Nebraska, USA <i>The effect of weed competition on soya bean yield</i>	09:20 – 10:20
	Prof Charlie Reinhardt Dean: Villa Academy at the University of Pretoria <i>Soya bean herbicides, their mode of action and the control of resistance plants</i>	10:20 – 11:10
	Break	11:10 – 11:40
	Dr Brian de Villiers Villa Crop Protection <i>Water quality, additives and general practices for better weed control</i>	11:40 – 12:20
	Mr Cobus van Coller Farmer from Viljoenskroon Practical aspects of weed control in soya beans	12:20 – 13:00
	Panel discussion and closing	13:00 – 14:00
	Lunch	14:00 – 15:00

Prof Stevan Z Knezevic – University of Nebraska

Prof Knezevic is a global expert on weed control. At the symposium he will especially focus on the yield-reducing influence that weeds have on soya bean production. In his extensive research he has studied the yield that is forfeited as weed control is delayed. Similar quantitative work has not yet been undertaken on soya bean production in South Africa.

Although US research results may differ from what is applicable to South Africa due to a difference in weed composition, the principles of weed control will remain relevant. There are thus many lessons to be learnt from the American experience.

Soya bean producers and advisors will gain decidedly new perspectives on the influence of weed control and the timing of weed control in soya bean production.

Dr Charlie Reinhardt, honorary professor in weed control and dean of Villa Academy, University of Pretoria

Professor Reinhardt is a well-known expert in the field of weed science in South Africa. His wide knowledge of the field puts him into regular contact with the private sector and farmers. In addition to his academic research, he regularly consults role-players in the field.

At the symposium he will discuss the spectrum of herbicides that is available for soya beans, as well as resistance that may develop in weeds and how it can be dealt with. He will share with the audience some insights gained from his extensive knowledge of harmful weed excretions (allelopathy).

After this lecture, symposium attendees will have a better picture of what is available in terms of weed control and how obstacles can be avoided.

21 July 2015 –
Ermelo High School, Ermelo

23 July 2015 –
Nampo Park, Bothaville

Dr Brian de Villiers – Villa Crop Protection

Over many years Dr De Villiers has conducted ground-breaking research on water quality and its influence on the efficiency of herbicides. He has also become a specialist on the efficiency of additives.

From a producer and adviser's viewpoint, it is necessary that everything possible is done to make weed control more effective, not only to reduce costs but also to protect the environment.

The basic aspects of effective weed control, such as nozzles, spray speed and the role of wind, will be discussed. Water volume also plays a large role in the effective application of herbicides. This aspect will be discussed in more detail.

Symposium attendees will have a clear picture of why the choice of a herbicide represents only part of the solution for effective weed control.

Kobus van Coller – farmer from Viljoenskroon

Weed control affects all soya bean producers. It is thus necessary to gain perspective on how a producer can handle weed control in practice. What are the challenges to effectively apply weed control in real farming conditions?

Mr Van Coller has had to overcome many challenges in effective weed control, with soya bean being a relatively new crop on the sandy soils of the Viljoenskroon district.

More information

Yvette Papadimitropoulos
011 803 2579 or email admin@proteinresearch.net

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Agricol is synonymous with sunflowers. Over the years, the AGSUN range of sunflower hybrids has become a well-known mainstay for South African sunflower farmers.

New programmes

Agricol, nowadays a part of the Zeder portfolio, has announced that the company aims to invest approximately R40 million in sunflower breeding and research over a period of four years. This programme entails investment in various infrastructure projects, expansion of the research team and obtaining of the latest technology in the sunflower world.

Dr David Mogford, an experienced sunflower breeder, was appointed as head of the Agricol's sunflower breeding programme. He currently lives in Wales, from where the group's international breeding programme is managed. Breeding and testing not only takes place in South Africa, but also in the Northern Hemisphere.

Dr Mogford explains that the programme is operated in both hemispheres, which leads to a significant improvement in the rate of product development. It speeds up the process of developing superior quality cultivars that are resistant to a wide range of diseases. A large effort is being made in expanding the sunflower treatment package with resistance to powdery mildew, *Sclerotinia* and *Orobanche*.

BASF product range

According to Mogford, BASF's **Clearfield®** and **Clearfield® Plus** trademark are currently the best technology available for weed control in sunflowers. Agricol's close cooperation with BASF has resulted in these technologies being used in 85% of Agricol's new product development. It is important to note that **Clearfield®** sunflowers are not genetically modified organisms (GMO), but includes a natural trait that have been isolated from specific sunflowers.

According to BASF's **Clearfield®** production system, this technology presents the farmer with various production options. Dr Mogford further confirms that the **Clearfield® Plus** trait does not exhibit the much debated 'yield drag' effect in sunflower hybrids. This technology therefore improves the chances of higher yields.

South African product for a global market

Kobus Scholtz, the breeder responsible for the South African programme, says that he is very enthusiastic about the new technology in the breeding programme. "Our programme has greatly expanded and I can already see the potential in the new genetics."

Antonie Jacobs, managing director of Agricol, has confirmed that the company is currently expanding its



Kobus Scholtz of Agricol (left) with Barry Germishuys, key account manager: Seed Enhancements & Clearfield Strategy of BASF, in front of a variety of sunflower hybrids in Agricol's internal trials.

sunflower sales to various countries in Africa, Asia and Europe. "Our genetics are extremely competitive in these markets and we believe that the new improved cultivars and upcoming **Clearfield®** technology will enhance our global presence."

Erus Hefer, manager of Agricol's northern region in South Africa, says that he is very enthusiastic about the new cultivars. "I am especially excited about the current market leader, AGSUN 8251, which will shortly be available in a **Clearfield® Plus** version. It will give the farmer the opportunity to use outstanding genetics together with this new technology."

*** Clearfield® and Clearfield® Plus are registered trademarks of BASF.**

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Improving on soya bean production record



Kip Cullers holds the world record for soya production yield.



the seedlings emerge at the same time.

Optimise plant population with advice from seed companies about different cultivars.

A weed control programme has to be closely followed in collaboration with an agronomist.

- Promote good microbiology in the soil and health of the root zone by submitting soils for laboratory testing.
- Fertilisation should provide sufficient phosphate and potassium. Fertilise correctly to avoid harming harvest yields and that of subsequent crop.
- Leaf treatment and micro-element applications – under supervision of an agronomist – feed, stimulate and protect the plant against various foliar diseases.
- Additional nitrogen application is critical for the growth cycle of soya beans.
- Management of the pH is the most crucial management factor. A pH (KCL) level of 5,5 to 6 should be maintained.
- Agronomist can give valuable advice in the control of eelworm (nematodes).

Soya bean with its many uses is a significant crop in global agriculture. It is cultivated in various successive and mixed cultivation methods.

However, numerous biotic and abiotic stress factors limit yields. Various explanations are offered to account for poor performance at times.

Significant global research has been done on soya beans with regards to breeding, crop production and protection. Increased yields are needed to meet local demand, as well as to create a sustainable soya bean and maize crop rotation system. With Kip Cullers' visit to South Africa in 2014, producers' interest in soya increased. His world record yield of 10,8t/ha is seen as something that will inspire future producers.

Management practices

The management principles of soya bean production in South Africa did not always keep up with the genetic improvement brought about by breeding programmes. The main priority of DuPont Pioneer's involvement is to increase yields. Understanding the interactions between the main yield factors, will certainly help to implement better management practices that will increase production per hectare. Producers need to evaluate their basic production system. The willingness to test new practices is vitally important.

Understanding the crop's needs and the environment that it prefers, will help with the implementation of best agronomic practices. Therefore, it is important to understand how soya beans grow and develop. Since

growth stretches across a few weeks, environmental conditions influence the yield. Weather patterns have the largest impact on crop production. An excess or lack of moisture can hamper performance. The growth period that is the most sensitive to drought stress is when the plants begin to bloom. Irrigation scheduling is vital during these early stages.

Production requires a systematic approach. Take responsibility for the total production system, from seed choice to seedbed preparation, planting, pest and weed control and harvest.

Key factors

All factors have to be optimised to increase yield:

- Determine the greatest threat to your harvest. All limiting factors should be taken into account.
- Remove as many as possible variables, e.g. seed quality, water shortages, plough layer, frequency of irrigation.
- Seedbeds have to be moist, firm and even.
- Correct irrigation frequency is of cardinal importance for optimal yields and should be planned with your agronomist. Flowering, pod formation and pod setting are the most critical stages.
- Administer inoculation correctly and increase inoculation if pH is low.
- Plant with seed from a registered company that endorses the quality.
- Plant early to optimise radiation energy. The ideal soil temperature is 15 to 18°C. A moist seedbed is vital.
- Optimise germination so that all

World record

Increasing soya bean production per hectare is greatly influenced by the fundamental aspects. If these basic principles are carefully followed, the producer will certainly increase his yield over time. It is this attention to fine detail that has earned Kip Cullers his world record. Kip plants soya beans supplied by DuPont Pioneer. Pioneer currently offers quality seed of three soya bean varieties in South Africa, namely Phb 94Y80R, Phb 95Y20R and Phb 96T06R.

For more information phone Emile van den Berg on cell 082 806 7452.

Establishment and functioning of the

SASDE

In view of the importance of a viable food system, food security, volatile grain and oilseed prices and insufficient information about future stock levels, the South African Grain and Oilseeds Supply and Demand Estimates Committee (SASDE) was established in 2012.



The committee has already published 21 official SASDE reports that seem to have been well accepted and recognised by the industry. The industry has also indicated that the reliance and integrity of the report is of outmost importance.

In 2011 Grain SA applied for a statutory measure for compulsory reports by grain traders on the completion of export and import contracts. Similar practices are used in the United States of America (USA). The application was originally opposed by Sacota, but with further collaboration an S&DEC was established. The committee has sought to tread a path without statutory interference.

As part of the proposals, Dr John Purchase from Agbiz was appointed chairman of this committee and the National Agricultural Marketing Council (NAMC) as the secretariat.

Primary aim

The first official SASDE report was published at the end of June 2013. The NAMC is responsible for the organising and functioning of the committee. The committee consists of the chairman of Sagis, the secretariat of the Crop

Estimates Committee (CEC), three independent members appointed by industry and officials of the NAMC.

The primary aim of the S&DEC is to publish official grain and oilseeds supply and demand figures on a monthly basis.

This would occur through:

- Collection of information regarding import and export figures, production and consumption figures, by the NAMC. The information is processed and reported in an aggregated manner during the S&DEC meetings.
- Extrapolation of historical data obtained from the South African Grain Information Service (Sagis) where necessary.
- Processing of CEC information regarding the crop estimate in terms of supply.
- Determination of an official estimate of grain and oilseed stocks levels at a specific month for the rest of the marketing year, based on the above sources.

Who uses the SASDE report?

The report is widely used by global and national role-players such as:

- Academics
- Financial and investment institutions
- Grain millers
- Government
- Grain and oilseed traders
- Grain and oilseed importers and exporters
- Grain and oilseeds producers
- Grain and oilseed storage facilitators
- Input suppliers towards the grain & oilseeds market
- Monitoring institutions
- Oilseed processors
- Producer organisations
- Research institutions
- Transport organisations of road, rail and sea freight organisations.

Purpose of the SASDE report

The report provides an analysis of the fundamental conditions of the major grain and oilseeds in South Africa. It is widely considered to be the benchmark to which private and public agricultural forecasts are compared.

It is normally released between four and five working days after the national crop estimates figures are released. The reports are released into the public domain in accordance with approval of the South African Competition Authorities.

Accuracy and relevance

It is important to note that the purpose of monthly meetings of the S&DEC is to capture new information available in the market, at a specific time. It is also important to note that the S&DEC does not perform any crop estimates and rely 100% on the official figures supplied by the South African CEC which forms part of the S&DEC. The S&DEC also does not deviate from figures published by Sagis on a historical basis.

Integrity and confidentiality

Confidentiality clauses that S&DEC members are committed to adhere to on the day of the meeting, are:

- No member is allowed to discuss information with anyone other than a member of the committee before the embargo ends.
- Only the NAMC may release the information to the media.
- Members must regard the detail of any information that was collected and/or discussed during the meeting as confidential.
- No member is allowed to be affiliated to a stakeholder trading in grains.
- No member is allowed to do any trading in grains or oilseeds.

The content and description of each item of supply and demand is illustrated in *Table 1*.

Funding of the S&DEC

The initiative is funded via the Maize Trust, the Oil & Protein Development Trust, Sorghum Trust, Winter Cereal Trust and the NAMC.

Supply and demand items for sunflower seed and soya bean seed.

S&D item sunflower	Description of item	S&D item soya beans
CEC	This item represents the total estimated production of a particular grain by the CEC.	CEC
NA	This item represents the item of oilseed produced by commercial farmers but not delivered to the commercial market.	CEC (retention)
Supply	This section represents the total commercial supply of a particular grain produced in South Africa.	Supply
Opening stock (1 March)	The opening stock represents stocks at the beginning of the marketing year.	Opening stock (1 May)
Producers deliveries	This item represents the total item of grain available for the marketing year to be delivered to the commercial market.	Producers deliveries
Imports	This represents the item of oilseeds imported in the specific marketing year.	Imports
Surplus adjustment	This item is necessary to balance stock levels.	Surplus adjustment
Total supply	Represents the total commercial supply of oilseeds in the country	Total supply
Demand	This section represents the commercial demand for grain	Demand
Processed	Processed consists of processed for human, animal, gristing and bio-fuel purposes.	Processed
Human	Oilseeds destined for human use only.	Human
Animal	Processed for animal consumption.	Animal feed (full fat soya)
Crush (oil and cake)	Oilseeds destined for processing.	Crush (oil/oilcake)
Withdrawn by producers	Oilseeds used for bio-fuel purposes.	Withdrawn by producers
Released to end-consumers	This item represents grain delivered to a registered silo and withdrawn by an unknown buyer.	Released to end-consumers
Seed for planting purposes	This item represents seed necessary for planting.	Seed for planting purposes
Net receipts(-)/disp(+)	This item is necessary to balance the supply and demand.	Net receipts(-)/disp(+)
Deficit adjustment	This item is necessary to balance stock levels.	Deficit
Exports	This represents the item of oilseeds exported in the specific marketing year.	Exports
Total demand	This item represents total local demand and total exports.	Total demand
Ending stock (30 Apr)	Ending stock represents oilseeds available for the commercial market, plus supply minus total demand.	Ending stock (30 Apr)
Processed p/month	Total processed/12 months.	Processed p/month
Months' stock	Stock available for a certain number of months.	Months' stock
Days' stock	Stock available for a certain number of days.	Days' stock

Conclusion

The S&DEC filled a long overdue gap in the industry. The S&DEC consists of experts in the industry and provides vital information to South African and global role-players. It is believed that the work can be improved and more participation is essential.

The NAMC is in the process of filling the capacity gaps by employing a grain specialist to focus on optimisation and greater participation. Reports and publication dates are available on the NAMC website at the following link: <http://www.namc.co.za/pages/research--publications/publications/supply--demand-estimates>.

Any enquiries can be forwarded to Christo Joubert at email christo@namc.co.za or cell 076 999 7766.

Disclaimer: Information contained in this document results from research funded wholly or in part by the NAMC acting in good faith. Opinions, attitudes and points of view expressed herein do not necessarily reflect the official position or policies of the NAMC.



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By Dr Dirk Strydom,
University of the Free State

Global oilseed markets:

AVAILABILITY OF STOCKS

Global oilseed production is projected at a record level of 532 million tons, according to the United States Department of Agriculture (USDA) *World Supply and Demand Estimates Report*. The global soya bean production is projected at a record level of 315 million tons. This secured an ending stock increase of 26% from the 2013/14 to 2014/15 season.

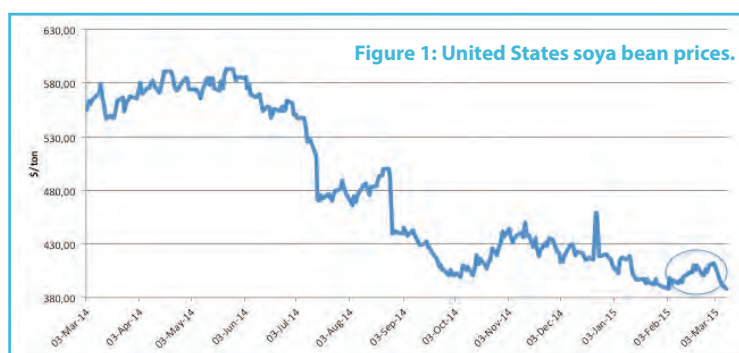
Due to the low maize prices, various fields in the United States were converted to soya beans and it resulted in an increase of 18%. These record levels, together with a large increase in Brazil, lead to the record crop produced for 2014/15.

However, the high-ending stock is not reaching the market, mainly due to logistical issues, especially with regards to labour. Truck drivers in Brazil are unhappy, striking and blocking roads to ports. In ports such as Paranaguá and Santos the daily arrivals decreased to levels as low as 5 – 10% of the normal intake.

These constraints have led to an increase in the United States soya bean price, due to shifts in the

market from Brazil to the United States.

The week of 2 to 6 March 2015 showed some signs of temporary relief, in terms of the strike that had a bearish effect on prices. The vulnerable situation, however, has the ability to create significant volatility in the international market.



Source: CME

Table 1: World supply and demand of soya beans.

		Beginning stock	Production	Imports	Domestic crush	Domestic total	Exports	Ending stock
Million tons								
World	2013/14	57,29	283,74	110,85	240,8	272,9	112,72	66,25
	2014/15	66,32	315,06	114,08	254,19	288,5	117,42	89,53
United States	2013/14	3,83	91,39	1,95	47,19	49,85	44,82	2,5
	2014/15	2,5	108,01	0,68	48,85	52	48,72	10,48
Total foreign	2013/14	53,46	192,35	108,9	193,61	223,06	67,91	63,75
	2014/15	63,82	207,04	113,4	205,33	236,5	68,7	79,05
Major exporters	2013/14	37,21	152,4	0,63	76,1	82,05	62,41	45,78
	2014/15	45,63	162,4	0,31	80,58	86,95	61,98	59,41
Argentina	2013/14	21,81	54	0	36,17	38,97	7,84	29
	2014/15	29	56	0	39,18	42,28	8	34,72
Brazil	2013/14	15,33	86,7	0,61	36,28	39,28	46,83	16,53
	2014/15	16,53	94,5	0,3	37,6	40,75	46	24,58
Paraguay	2013/14	0,04	8,2	0,03	3,5	3,64	4,4	0,23
	2014/15	0,08	8,5	0,01	3,6	3,7	4,8	0,09
Major importers	2013/14	13,23	14,78	95,97	91,34	108,37	0,29	15,31
	2014/15	15,33	15,44	100,3	97,71	115,25	0,35	15,47

Source: USDA

Local supply and demand

South Africa has experienced severe droughts, specifically in the Free State and North West provinces. According to the latest Crop Estimates Committee (CEC) report of 26 February 2015, the production of soya beans will be 938 350 tons on 687 300ha. This represents a yield decrease from 1,88 to 1,36 ton/ha year on year. However, it is difficult to do an accurate estimate since it is still early in the season.

According to the National Agricultural Marketing Council's (NAMC's) supply and demand estimate reports for soya beans, South Africa will have an ending stock of 94 986 tons for the 2015/16 marketing year – 950 tons more than the previous marketing season.

INTERNATIONAL OILSEED PRICES HAVE DECREASED SUBSTANTIALLY.

In terms of sunflower seed, the production projection for 2015/16 is much lower than the previous season (315 tons), and this will result in more imports from countries such as Romania and lower local processing.

Table 3: Main oilseed products
(US \$/ton and R/ton).

Product	March 2015	February 2014	% change
Soya beans (US CIF Rotterdam)	405	591	-31
Soya beans (Brazil)	413	560	-26
Sunflower seed (EU)	435	492	-12
Ground nuts (USA 40/50)	1 300	1 320	-2
Palm oil (Malaysia)	650	846	-23
Soya bean oil (US)	762	920	-17
Sunflower oil (Argentina)	820	896	-8
Soya meal (Argentina)	412	594	-31
Fishmeal (Peru)	2 350	1 530	54
Rand/\$	11,81	10,82	9
Sunflower seed	5 000	5 140	-3
Derived sunflower	5 365	5 714	-6
Soya beans	5 095	6 568	-22
Derived soya beans	5 812	7 007	-17
Soil canola	4 300	4 600	-7

Table 2: Soya beans and sunflower supply and demand figure – South Africa.

	Soya beans	Soya beans	Sunflower seed	Sunflower seed
Marketing season	Projection for 2014/15	Projection for 2015/16	Projection for 2014/15	Projection for 2015/16
	Tons		Tons	
CEC (Crop estimate)	948 000	938 350	832 000	574 300
Retention	30 000	30 000		
SUPPLY				w
Opening stock (1 March)	61 806	94 036	47 116	85 266
Prod deliveries	918 000	908 350	832 000	574 300
Imports	110 000	150 000	63 000	90 000
Surplus	0	2 500	6 000	5 000
Total supply	1 089 806	1 154 886	948 116	754 566
DEMAND				
Processed	977 000	1 046 000	853 500	684 000
Withdrawn by producers	2 300	3 000	1 500	2 200
Released to end-consumers	3 100	3 000	3 000	3 000
Seed for planting purposes	5 120	5 400	3 800	3 000
Net receipts (-) / disp (+)	2 500	2 000	1 000	1 000
Deficit	5 200	0	0	0
Exports	550	500	50	40
Total demand	995 770	1 059 900	862 850	693 240
Closing stock (28 Feb)	94 036	94 986	85 266	61 326
Processed per month	81 417	87 167	71 125	57 000
Months stock	1,2	1,1	1,2	1,1
Days stock	35	33	36	33

Local prices

One of the factors that will play a fundamental role in the local oilseed price is the exchange rate. Over the last year the South African rand has weakened substantially due to factors such as a current account deficit, political issues and the strong US dollar. International oilseed prices have decreased substantially since November 2014, while the weaker exchange rate have supported the local prices to some extent.

As indicated in Table 3, the international soya bean prices decreased by 31% and 26% respectively, while the South African price decreased by 22%. In terms of sunflowers, the decrease in international prices was 12%, while South African prices only decreased by 3%. In combination with the exchange rate, the current drought has also influenced the prices.

Source: South African Reserve Bank and Oil World

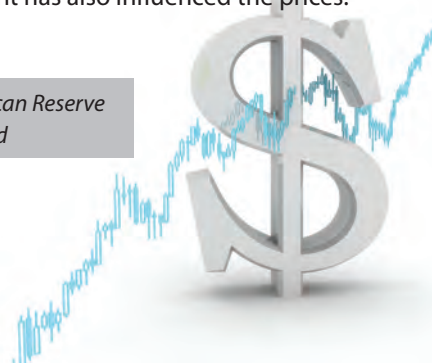
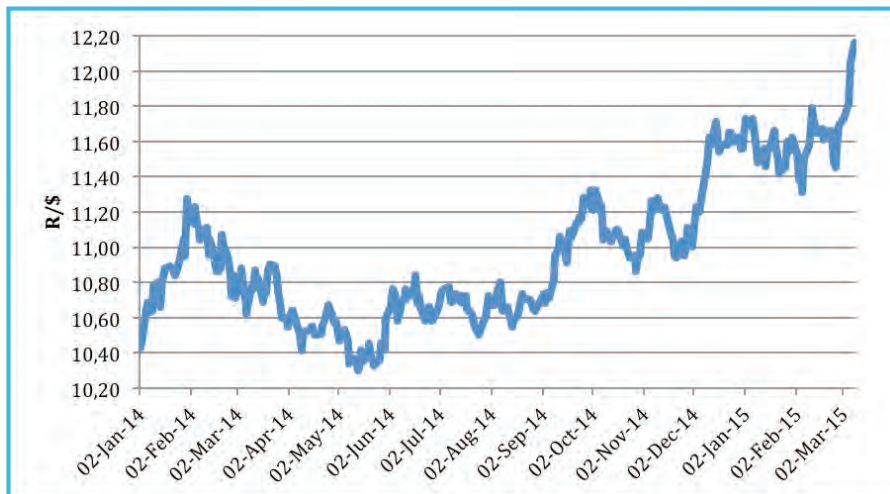


Figure 2: The rand/dollar exchange rate.



Source: South African Reserve Bank

Traditionally, the price of oilseeds is low in March, due to the harvesting period and the high availability of stock. In the second quarter of the year there may be some space for price increases relative to international prices. This is, however, highly dependent on the exchange

rate and producer delivery. A key factor is that the international market is dependent on the availability of stock, and thus prices have a bearish current outlook due to the high stock supply of 2014/15. Points to monitor for the next few months will be:

THE PRICE OF OILSEEDS IS LOW IN MARCH, DUE TO THE HARVESTING PERIOD.

- The interest rate fluctuations, which are linked to the exchange rate.
- The South African producer delivery figures.
- Exports of Brazilian soya beans and the local producer delivery figures.
- Planting of soya beans in the United States at the beginning of April.

Dr Dirk Strydom is a lecturer of agricultural economics at the Faculty of Natural and Agricultural Sciences at the University of the Free State. For more information, contact him on 051 401 7036 or email dstrydom@ufs.ac.za.



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SOYA BEAN STORAGE

and optimum moisture levels

Quality is an important parameter for the commercialisation and processing of grain, and affects the value of the product and its derivatives.

During post-harvest stages soya beans are subjected to qualitative and quantitative losses due to external factors. These factors may be physical such as temperature and humidity, chemical such as oxygen supply and biological such as bacteria, fungi, insects and rodents.

Physical, chemical and biological alterations may occur in soya beans depending on conditions and storage time. The three major factors affecting the storability of soya beans are moisture content, temperature and storage time.

The objective of storage is to preserve the characteristics of the grains after harvest. It is vital that the quality is preserved.

Soya bean quality during storage

The main characteristics that determine soya bean quality are low and uniform moisture content, low percentage of foreign material, discolouration, susceptibility to breakage, damage by heat (internal cracks), insect and fungal damage, elevated values of density, oil and protein concentration, and seed viability.

Some factors that can affect these characteristics are environmental conditions during the grain formation of plants, season, harvesting system, storage techniques and transport.

The grain mass is an ecological system in which deterioration is the result of interaction between physical, chemical and biological

variables. The rate of deterioration during storage depends on the rate of change of these variables, which are directly affected by temperature and water content, and also their inter-relationship with the grain and storage structure. Insects, rodents and fungi are the main biological factors responsible for qualitative and quantitative losses in stored grains.

Foreign material

Foreign material also affects the ability to store soya beans. Fine foreign materials tend to segregate during loading and occupy void spaces in the central region of the grain mass. The larger and lighter materials will accumulate close to the walls of the silo. Consequently pockets in the grain mass are potential sites for hot spots, creating an ideal environment for insects to grow and multiply. Cleaning soya beans prior to storage will reduce the risk of spoilage and economic loss.

Table 1: Recommended safe storage periods for soya beans with different moisture (ACA-SIO, 1997).

Moisture content percentage	Safe storage period
10 – 11	4 years
10 – 12,5	1 to 3 years
12,5 – 14	6 to 9 months
14 – 15	6 months

Pre-harvest losses will be minimised if the crop is harvested before the bean seed moisture reaches 10%.

Temperature

Temperature affects the development of fungi and can create chemical changes, such as hydrolytic and oxidative rancidity. Temperature also affects the development of insects and pests, which multiply at an optimum temperature of between 27 and 35°C. A combination of high moisture and high temperature promotes the development of fungi. Most common fungi have faster growth rates in conditions above 16°C.

Fungi can be expected to start growing after a few weeks at a moisture of above 14% and a temperature of above 30°C, as compared to a few years if kept at 5°C. The combination of moisture and temperature must be considered when deciding on the moisture at which the soya beans will be stored.

Temperature also causes moisture migration. The driving force in moisture migration in grain mass is temperature gradient. This condition causes very small air movements and water vapour translocation in the grain mass. Grains stored at moisture levels considered safe, may spoil because of moisture migration associated with inter-seed currents.

Moisture

To reduce the chances of shattering losses, harvest should begin at seed moisture levels of between 12 and 14%. Harvest at moisture levels of below 10% result in brittle beans that are more likely to split during storage and handling. For maximum weight and minimum field losses, the optimum harvest moisture advocated is between 13 and 15%. If storage bins have the capacity for drying with air blowers, harvesting at 16% is possible. Producers waiting for the ideal moisture of 12% often experience difficulty harvesting an entire crop without losses in yield and quality, either from shattering, lodging or disease. Pre-harvest losses will be minimised if the crop is harvested before the bean seed moisture reaches 10%.

If soya beans are harvested at high moisture levels, they must be dried to 13% as quickly as possible. Advantages of a high-moisture harvest are earlier

harvest, less shatter loss and more available harvest time. Disadvantages are more threshing loss, more damaged seed and the expense of drying to an acceptable moisture level. A moisture level of 11% is desirable if beans are kept for longer than six months.

Deterioration indicators

Heat is the most common indicator of a problem in stored grain and oilseeds. High grain temperatures normally indicate either microbial or insect activity, and if left unchecked they may lead to heat-damaged or charred grains. As soya beans exceed 50°C, the oxidation of oil therein becomes a self-sustaining process. A temperature-monitoring system in soya bean storage silos is essential.

Colour of grains

The appearance of grains is considered a critical and decisive factor in the commercialisation process. Discolouration is indicative of physical or chemical alterations, presence of metabolites and other unfavourable characteristics. The darkening of soya beans during storage is an important qualitative indicator of deterioration. Darkening is significantly increased over time if the grain is stored at a high temperature and humidity.

Oil quality

Soya beans that have been damaged in storage can affect free fatty acid content, which in turn can affect taste and odour, including an increase in refining losses of up to 4%. Free fatty acid content increases significantly in soya beans stored between 13 and 20% moisture, and this increase is exacerbated by high temperatures.

Drying

Soya beans can be rapidly dried after harvest to reach an acceptable moisture level. There are several types of high or low temperature dryers. The purpose of drying is to lower moisture to guarantee favourable conditions for storage and further processing or handling of the product. Drying of beans can be done by circulating air at varying degrees of heat through a

mass of beans. The flowing air imparts heat while absorbing the humidity of the outer layers. Reduction in moisture content unfortunately does not take place uniformly.

Avoid dryers that re-circulate or stir grain constantly. Dryers should minimise drop heights. Beans that have been cleaned will dry more readily and be of better quality. Cooling is one of the greatest benefits gained from moving and turning soya beans in an elevator. Relative humidity of the drying air determines the moisture to which the grain will dry.

Natural drying by exposing beans to the sun is recommended, where atmospheric conditions favour the reduction in moisture over a reasonably short time span.

Conclusion

There is no fixed recommendation for moisture levels at which soya beans can be stored, but only guidelines that vary depending on conditions. The lower the foreign material, the lower the temperature and the higher the moisture level will be at which soya beans can be stored. Storage time and the type of silo used will also make a difference to the moisture content at which to store soya beans.

If storage periods are likely to be long and take place partially in South African summer months, the current maximum 12% moisture is a very logical and sensible parameter. Storing at higher levels of moisture will pose a significant risk. If there is certainty that soya beans will be stored for a very short period of time, not exposed to high temperatures and used rapidly, the possibility of increasing to 13% moisture is strong. The risk of soya bean spoilage will increase when storing at higher moisture levels.

Drying of soya beans is an option where the facilities are available, but the damage during the drying process should be controlled. The cost of drying also needs to be considered.

Extracts used from literature. References available from the author at email erhardb@netactive.co.za

HIGH-OLEIC SUNFLOWER OIL

– a healthy alternative

Every diet should contain some form and a certain amount of fat. All fats and oils are not the same. Some are considered healthier than others.

*By Dr Rouxlene van der Merwe,
University of the Free State*



High-oleic sunflower oil is regarded as a healthy alternative to traditional sunflower oil.

Research has shown that a diet high in oleic acid, such as the famous olive oil-rich Mediterranean diet, is considered healthier than others. Traditionally the boundaries of edible oils were set as the more expensive olive oil on the one side and the cheaper palm oil on the other. South African sunflower oil lies somewhere in-between.

Traditional vs high-oleic sunflower oil

Sunflower cultivars with high-oleic acid content were introduced in the 1980s. High-oleic oil differs from traditional sunflower oil with a significantly higher oleic acid content of more than 80% (compared to 20-30% for traditional sunflower oil), a low concentration of linoleic acid of 2-9% (compared to 60-70% for traditional sunflower oil) and generally less than 10% saturated fatty acids (SFAs).

Because of the high oleic acid content, the oil is referred to as monounsaturated, while the traditional oil with its high linoleic acid content is referred to as polyunsaturated.

Traditional sunflower oil with its high polyunsaturated fatty acid (PUFA) content and relatively low total SFA content, has excellent nutritional properties. It is primarily used for cooking, frying, preparing salad dressing and margarine production.

However, traditional sunflower oil is not optimally suited to some potential applications that require a high oxidative stability, for example for the manufacturing of shelf-stable fried foods. In addition, the oil is often judged as unsuitable for continuous deep-frying because of its high unsaturation level and susceptibility to oxidation.

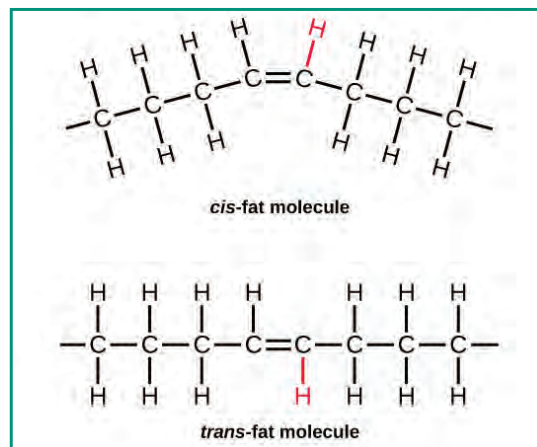
Lipid oxidation

Lipid oxidation is a significant reaction that can cause deterioration in the quality of edible oil. The consequences of lipid oxidation are the formation of off-flavours and odours associated with rancidity, as well as a loss in functional and nutritional value.

The hydrogenation process

Traditionally some oils need to be hydrogenated to enhance their oxidative stability. Hydrogenation involves the chemical addition of hydrogen to unsaturated fatty acids, by mixing heated oil and hydrogen gas in the presence of a catalyst. During this chemical process, not only are unsaturated fatty acids converted to saturated ones, but many positional and trans-isomers (Figure 1), not normally found in nature, are also produced.

Figure 1: Fatty acid chain containing a double bond in the "cis" and "trans" configuration.



The intake of these artificial or trans-fatty acids raises health concerns, as the evidence suggests. Consequently, there is an increasing interest within the food industry to produce oil crops containing higher amounts of saturated and monounsaturated fatty acids (MUFAs) in their oils.

Fortunately, plant breeders have been successful in overcoming the limitations of traditional oil by developing novel and healthier oil types. Research has led to the development of high-oleic acid sunflower varieties, with oil that approaches or exceeds an 89% oleic acid content.

They were developed through conventional breeding methods, and are speciality oils particularly useful for food products

such as spray oils (snacks and crackers), frying oils and other products that require an oil with high oxidative stability. Due to their natural stability, these oils do not need to be hydrogenated in order to be used for the applications

mentioned. Additionally, high-oleic sunflower oil is considered healthier, because it contains no trans-fatty acids.

More stable to lipid oxidation

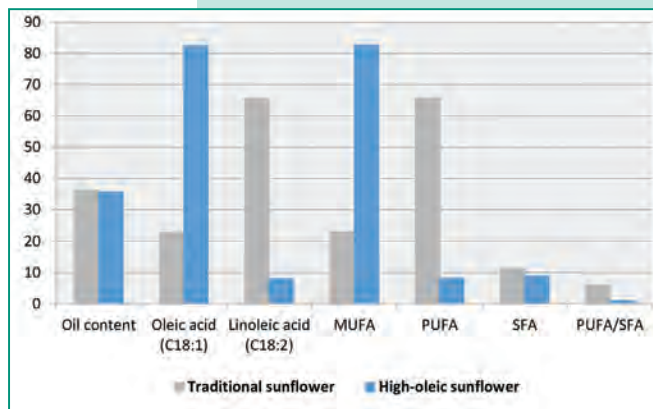
Oil oxidative stability depends on various factors, including oil composition, minor antioxidant or pro-oxidant compound content and degree of processing. The degree of unsaturation of fatty acids is one of the most important parameters that influence oil oxidative stability.

Oxidative degradation is directly related to the PUFA content of the oil, and oxidation essentially takes place at the double-bond (unsaturation) sites in triglyceride molecules (Figure 1). Consequently, the higher the number of double bonds in the triglyceride structure (the unsaturation level of fatty acids), the

more susceptible the oil is to oxidative degradation and the higher the rate of oxidation. As a result, traditional sunflower oil, which is highly polyunsaturated, should be more susceptible to oxidation than high-oleic sunflower oil, which is highly monounsaturated.

This conjecture was verified in a study conducted to evaluate and compare the oxidative quality and stability of traditional and high-oleic sunflower oil. The PUFA-SFA ratio is a measure of the extent of polyunsaturation and is therefore taken as a measure of an oil's tendency to experience autoxidation (Figure 2).

Figure 2: Comparison of traditional and high-oleic sunflower oil with regard to oil quality and level of unsaturation.



Oils with the highest ratio are the most likely to experience autoxidation. The different refractive index and iodine values of the traditional and high-oleic sunflower oil can be attributed to differences in their unsaturation levels (Table 1).

Refractive index and iodine values increase with the number of double bonds present in the fatty acid, and thus with the unsaturation level. As a result, the traditional oil with the higher unsaturation level indicated higher refractive index and iodine values than the high-oleic sunflower oil.

Table 1: Comparing mean values of certain physico-chemical parameters in traditional and high-oleic sunflower oil.

Oil type	Refractive index (ND 40°C)	Iodine value	Peroxide value (meq/1 000g)	p-Anisidine value	OSI at 110°C (hours)
Traditional	1,467142	105,64	10,33	4,55	2,70
High-oleic	1,462098	83,86	3,17	0,44	10,38

The initial oxidative status of the two oil types was evaluated by measuring peroxide and p-anisidine values. This is an indication of the oxidative quality of the crude oil. The peroxide test measures the hydro-peroxide content of an oil sample and is a useful index for the early stage of oxidation. The p-anisidine test assesses secondary oxidation by estimating the amount of unsaturated aldehydes generated during the decomposition of hydro-peroxides, and is a reliable indicator of oxidative rancidity in oils. The lower peroxide and p-anisidine values observed for the high-oleic oil, confirm that this oil type is of better quality and should be more stable to oxidation than traditional sunflower oil.

The oxidative stability of the two oil types was assessed under accelerated oxidation conditions, using the Rancimat or Oil Stability Index (OSI) test. Since OSI measures the resistance of lipids to oxidation, OSI duration is positively associated with oil stability. The high-oleic oil proved to be the most stable with the highest mean OSI value.

Since oxidative stability is related to the unsaturation level of oil, the high oleic oil, with considerably reduced linoleic acid content, indicated the highest resistance to oxidation. Oil shelf life is estimated by using the OSI values, and the high-oleic oil exhibited a predicted shelf life of almost three times that of the traditional oil.

In conclusion, although traditional sunflower oil is popular for its nutritional value, oil of the high-oleic sunflower hybrids has proved to be of superior quality and oxidative stability. Due to its natural stability and zero trans-fatty acids, high-oleic sunflower oil is regarded as a healthy alternative to traditional sunflower oil.

For more information, contact Dr Rouxlene van der Merwe of the Faculty of Natural and Agricultural Sciences at the University of the Free State at vandermerwer@ufs.ac.za.

The value of **RELIABLE** **ANALYTICAL RESULTS** to support the oilseeds industry

By Wiana Louw, Southern
African Grain Laboratory NPC

Crop quality monitoring over different seasons and production regions with the purpose of measuring the desired characteristics of soya beans and sunflower seeds produced in South Africa, needs to be based on reliable analytical services and should be internationally accepted.

To ensure international acceptance of analytical results, testing laboratories should comply with ISO/IEC 17025, an international standard covering the general requirements for the competence of testing and calibration laboratories. The International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC) formed a specialised system for worldwide standardisation.

The South African National Accreditation System (SANAS) is a public entity responsible for carrying out accreditations in respect of conformity assessment, which includes accreditation of laboratories, certification and inspection bodies. The Southern African Grain Laboratory NPC (SAGL) has been operating under this accreditation system since 1999, covering a scope of analytical services aligned with the needs of the grain and oilseed related food and feed industries.

Technical competence

Under an international standard such as ISO 17025, participation in

international proficiency schemes as an ongoing proof of technical competence and international comparability, is a requirement and at the same time gives end-users the assurance that they can use the analytical results generated under ISO 17025 accreditation for decision-making processes.

The reliability of any analytical method depends on its accuracy and precision, and is established for every method applied in the laboratory. In laboratory testing accuracy means closeness to the true value, while precision refers to the reproducibility to ensure the same result every time.

These are equally important since getting the same result every time does not necessarily mean the correct result every time, hence the difference between accuracy and precision. To ensure both, SAGL annually participates in one national and twelve international proficiency testing schemes.

Since the 2011/2012 production season, SAGL has embarked on a process of accumulating data to determine the quality of the commercial soya bean crop on a



The 2012/2013 quality reports on soya beans and sunflower seeds.

national level with the financial assistance of the Oil & Protein Seed Development Trust. A similar annual survey was initiated since the 2012/2013 production season of sunflower seeds.

Representative sample

To ensure a representative sample of each season's production, a sampling plan for the collection of the samples was designed by the industry in collaboration with the SAGL. The members of Agbiz Grain representing the grain silo industry, provide the samples to the laboratory at no cost to make these surveys possible.

Each delivery at the silo is sampled by the participating companies as per the grading regulations for grading purposes. After grading, these samples are then placed in containers according to class and grade. When about 80% of the expected harvest has been received, the content of each

container is divided using a multi-slot divider to obtain a homogenous 3kg sample which is labelled with information relating to the depot, storage structure, the class and grade. The individual samples are then submitted to the laboratory for testing.

Reliable measurements

The sampling plan ensures representative samples from the different production regions which ensure a good reflection of each seasons' production. The final sample selection at the laboratory is based on the production figures released by the National Crop Estimates Committee (CEC). As per agreement with the members of Agbiz Grain, the results are then reported on a regional basis.

The specific analyses included in the first soya bean survey were grading, nutritional analyses to determine the protein, fat and ash content of the samples, screening of a selection of the samples for the presence of genetic modification (CP4 EPSPS – Roundup Ready), screening for the presence of residues of a range of mycotoxins using LC-MS/MS analyses, as well as a randomly selected set of samples which were analysed for their protein bound amino acid profile.

The sunflower seed samples in the sunflower quality survey were graded before it was milled and chemically analysed for moisture, crude protein, crude fat, ash and crude fibre content.



The benefit of generating results using accredited primary wet chemistry methods, is that these results can also be used to develop robust calibrations to ensure rapid and reliable near-infrared measurements which are widely used in the animal feed and human food industries.

The analysis results are updated weekly on the SAGL website as the samples are received and analysed in the laboratory. Annually, once all the samples for a particular season have been analysed, a report is compiled and hard copies are distributed to interested parties. The reports can be downloaded from the SAGL website where reports of previous seasons are also available for download.

Popular articles containing summaries of each season's results are also published in industry publications after the reports have been released. Feedback from the industry to better align the tests performed as part of crop quality surveys with the needs of the end users in mind, is important to improve and expand the survey reports.

A database containing reliable analytical data generated over several seasons and regions, can then be statistically evaluated to identify possible trends. Oilseeds and their derivatives, vegetable oil and meal, are in demand globally and there is a need to quantify the value for different stakeholders to develop and support actions that will ensure a viable future of oilseed crops.

Quality assurance

In addition to the crop quality surveys performed on soya beans and sunflower seeds, support for the oilseed industry also involves the offering of ring tests as a useful tool for equipment verification, method optimisation, training, confirmation of accuracy and benchmarking against other laboratories. Quality assurance to provide reliable measurements is essential, since these measurements form the basis of the different phases within the oilseed value chain.

Oilseeds are traded and processed based on grades and specific quality attributes evaluated according to a set of agreed standards. Nutritional data on raw materials as well as final food and feed products is needed for compliance with regulations such as labelling legislation.

Quality control procedures in the product development departments of food and feed companies, where compliance with standards such as ISO 17025 is not compulsory, require a tool to ensure accurate measurement. Participation in ring tests serves as such a tool. When properly applied, this can play a vital role in the global management of sustainable food and feed production to address the growing demand.

For more information visit the Southern African Grain Laboratory NPC website at www.sagl.co.za.



Principles of controlling SLUGS AND SNAILS in no-till



Losses of canola seedlings due to the black-keeled slug, '*Milax gagates*', in the Swartland near Moorreesburg.

Exotic slugs are becoming pests in the soya growing areas of KwaZulu-Natal. Their appearance is linked to the adoption of similar no-till practices in canola in the Western Cape. Entire fields of canola seedlings would disappear overnight without trace, sometimes necessitating replanting twice.

Once pathogens had been eliminated as the cause of such losses, attention was focused on the presence of various organisms active in the fields. These included crickets, dusty maize beetles (*goniocephalum simplex*), millipedes, slugs, isopods, cutworms and earwigs, amongst others. Initial attempts by farmers to prevent such losses, such as the burning of stubble and the use of various insecticide treatments and slug pellets, resulted in variable results.

The key to identifying the culprits was the devising of a suitable standard trap that could accommodate all these organisms, and then linking the pest organisms with the losses of seedlings. The traps were made out of 30 x 30cm melthoid squares that were placed on top of flattened soil and which were held down with two large nails.

Treatments tested

Various treatments were then applied to plots 50 x 6,6m in extent. Immediately after planting, each plot had four areas of 1 x 0,5m demarcated with string, and the number of surviving seedlings were counted and related to the numbers of the various organisms under five melthoid traps in each plot at weekly intervals.

Initial field trials in which nine treatments were tested, showed that the control plots were stripped bare, that planting double the numbers of seeds/ha or disturbing the soil by "ploughing" twice, had little beneficial effect and that seed treated with Cruiser did not significantly protect the seedlings.

Slug pellets deposited in the soil at planting had some positive effect, but the two equally effective treatments were the depositing of slug pellets in the soil plus the



A melthoid trap under which slugs hide during the day within a lupin field, where major losses of seedlings were found, in the Caledon district.

broadcasting of slug pellets on the surface, and the broadcasting of slug pellets on the surface at planting. The latter treatment is obviously the most effective.

The culprits were identified as exotic isopods or pill bugs (*Armadillidium vulgare*) and slug species from the Mediterranean Basin (*milax gagates*, *deroceras*



The trial consisted of six treatments and six replicates (36 plots) which were randomly but equally divided between the two sites, so that each site contained three replicates of the six treatments.

panormitanum and *deroceras reticulatum*). The isopods were shown to cause about 80% of the losses of seedlings and slug pellets, containing 30% metaldehyde, and 20% carbaryl were effective in controlling both slugs and isopods.

There was no significant advantage in a second application of slug pellets six days after the first.

A further field trial determined that the slug pellets should be applied on the surface at planting and that 8kg/ha was the most cost-efficient rate of application.

There was no significant advantage in a second application of slug pellets six days after the first. In the winter rainfall region the slugs over-summer in the humus layer of the soil (up to about 20cm deep), where they congregate to conserve water, using the tunnels of earthworms initially to penetrate the soil.

Soaking rains bring them to the surface in the winter, where they feed on the seedlings along one row initially and then widen their range into adjacent rows to eventually form a bare oval patch. Several of these patches may then coalesce if the slug population is substantial.

Their primary mortality rate is caused largely by adverse weather conditions, which results in widely fluctuating numbers of slugs at the beginning of each season. It is not possible to eradicate these organisms and it is essential that the seedlings are protected for the four weeks from planting by the judicious use of slug pellets.

Earthworms, crickets and various predatory beetles are not killed by slug pellets, but millipedes are.

Changeover to no-till

Was the changeover to no-till responsible for the appearance of these organisms as pests? Possibly not entirely because it was shown that in the Western Cape the growth of the relatively new canola crop formed a favourable micro-climate for the slugs in which they laid eggs over an extended period until harvesting.

The slugs had already entered the soil to over summer in surrounding crops such as medics about 30 days prior to harvesting of the canola. In effect, the planting of canola resulted in a massive surge in the number of slugs, especially by the end of the season. Their potential threat to crops of the next season was determined by adverse or favourable weather conditions during their inactive summer months, mainly the alleviating effect of summer rainfall. 🌧️

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Strongarm has proven to save costs as farmers generally cut down on their follow-up glyphosate applications and under favourable conditions it is not needed at all. Farmers were very pleased with the effective weed control of Strongarm and were surprised at how well difficult weeds such as wandering Jew, wild stockrose and even yellow nutsedge were suppressed.

Ottosdal

George Steyn of Humanskraal near Ottosdal is a large-scale farmer. His father, Boet Steyn, has been a pioneer and has been actively involved in mulch cultivation since 1977. George still makes use of the tine and stubble cultivation only.

"Weed control with Strongarm is excellent. I sprayed only once and the fields are weed-free. Our greatest enemy is wandering Jew. Other herbicides control the softer weeds, but not wandering Jew. Under these conditions the weed flourishes as it only needs to compete with the crop, and not with other weeds as well."

Bothaville

Equally impressed is Japie Grobler of Karookom, Bothaville, and former president of AgriSA. "Our large block of peanuts is completely free of weeds. Strongarm definitely works," he says. His son, Philip, says: "We sprayed everything with Strongarm. It works like a charm. Where we did not spray and had to weed mechanically, the crop is not as promising."

"Strongarm is a winner," says Zakkie Steyn of Bothaville. He owns a peanut processing plant operating under the Peanut Bear logo and exports to America. "Someone mentioned he wouldn't mind an available roundup-ready peanut. But we now have Strongarm. What makes it remarkable, is that it worked so well after we had excessive rain. On one farm the sprayer's tank ran dry and it simply passed through the land. There I could see how well it works on wild lucerne. Even wandering Jew was still effectively controlled after December's impressive rain. Where we failed to spray, the peanut plants were

swamped by weeds. We also had good control of yellow nutsedge."

Wim Nel of Palmietfontein, Bothaville, is equally satisfied with Strongarm. He says his peanut fields have never been as free of wild lucerne.

Middelburg

"With Strongarm the farmer walks away as the winner," says Theuns van der Westhuizen of Groenkraalfontein, Middelburg in Mpumalanga. He is a client of Louis Botha, a representative of Nulandis in the Middelburg district. "One of my major problems is wild stockrose (*Hibiscus cannabinus*) and there are no other herbicides that control it well enough in soya fields. I used to experience many problems with flat tyres on implements. When a combine runs over the stockrose and breaks its stem, a short, sharp piece of the stem remains anchored in the soil. It is strong and sharp enough to easily penetrate implement tyres, causing major delays. Consequently, control of stockrose is a bonus as it is not indicated on the product label. There are other hardy weeds such as wandering Jew and cocklebur on my fields, but they are effectively controlled by Strongarm."

Danie van Wyk of Wonderfontein, Middelburg, planted 100ha with soya bean and obtained excellent weed-control results when the product was combined with one glyphosate application. "It was a difficult year, but Strongarm performed outstandingly. It also saves on the cost of additional glyphosate sprays," he says.

Farmers can contact Johan Bothma on 082 321 6551 or email Bothma@dow.com, or their nearest Dow AgroSciences agent.



Bellis[®]

The AgCelence[®] solution for sunflowers, gives you benefits above and beyond normal crop protection.

Get the best return on investment:

- Higher yields
- Excellent disease control
- Increased production
- Increased stress tolerance

Ensures peace of mind with excellent disease control

- **Reliable and effective performance**
 - Provides extensive protection through its translocation action
 - Rapid uptake and fast distribution into the leaves
- **Resistance management**
 - Distinct dual mode of action with the combination of **Boscalid** and **F500[®]**

Targeted fungal diseases will be effectively controlled by Bellis[®], giving you higher quality crops and an improved return on investment.

Recommendations:

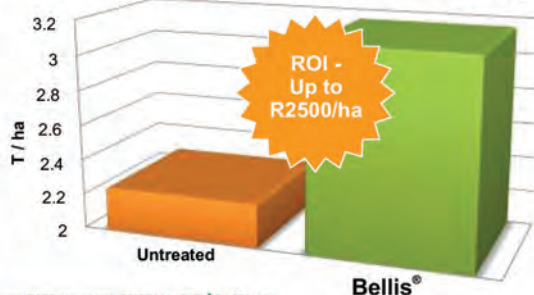
Dose rate per ha: Bellis[®] 600 to 800 g

Applications and timing: A maximum of two applications per season. The first to be applied at BBCH 16 - 18 (6 to 8 leaves unfolded) the second at BBCH 61 (beginning of flowering).



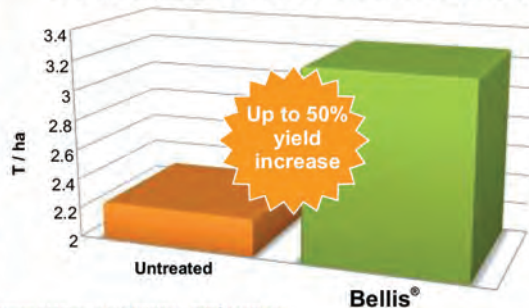
Sunflower field: Treated with Bellis[®] (top right), in comparison to the untreated, exhibiting high disease infection (bottom left).

Sunflower yield results - Clearfield[®] seed variety



Source: BASF internal trials 2013/2014 - Bellis[®] 2 x 600 g/ha

Sunflower yield results - Conventional seed variety



Source: BASF internal trials 2013/2014 - Bellis[®] 2 x 600 g/ha

For more information please visit the BASF Crop Protection website – www.agro.basf.co.za

BASF
The Chemical Company

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BASF
We create chemistry

- innovative farm management solutions for soya beans



BASF has developed efficient management solutions for South African farmers to increase return on investment for soya bean crops.

BASF offers industry-leading, innovative crop-protection solutions for sustainable farm management. Their scientists are continuously developing new technologies that further enhance effectiveness. They see farmers as their partners, providing them with reliable and sustainable solutions to meet their expectations and needs.

High-quality performance inoculants

BASF offers efficient, innovative and sustainable solutions for soya bean crops. Their vast range of biological products provides the highest quality soya bean inoculants with Rhizoflo® and HiStick®. The unique packaging and formulation of the products deliver high rhizobium cell numbers to every seed, resulting in yield increases improving on that of conventional products. Further benefits include improved nitrogen soil status, long product shelf life, consistent performance and improved crop uniformity.

In addition to inoculants, they offer the bio-fungicide Trichoplus®. Trichoplus® is differentiated in the market by the unique species, *Trichoderma fertile*, which delivers superior performance in disease

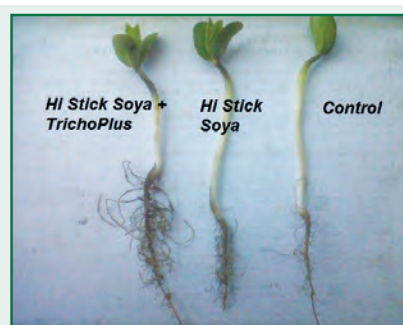
prevention, is aggressive in rhizosphere colonisation and provides plant-growth promotion effects. Therefore, by using biological products such as Rhizoflo®, HiStick® and Trichoplus®, farmers can optimise their operations and achieve the best return on investment. This profound effect on soya bean growth

is displayed in the photos above and below, taken from commercial trials.

Efficient and convenient farm management operations

Frontier® Optima is a well-known pre-emergent herbicide for superior efficacy on soya bean. Frontier® Optima requires less rainfall for activation than other herbicides in its class, and has a more consistent performance in drier soils. It provides superior pre-emergent control of annual grasses, broadleaf weeds and yellow nutsedge.

In addition to this, Frontier® Optima exhibits fast action and has excellent water solubility. Hammer® is a quick and effective herbicide for excellent early control of broadleaf weeds and some perennial grasses in soya bean fields. These herbicides are designed to optimise farm management operations, resulting in peace of mind due to quick and efficient weed control.



Soya bean roots at Crissiesmeer after eight days of planting.

Highest return on investment

In order to complete and enhance your crop-protection programme of soya beans, BASF brings you Abacus®. Abacus is their AgCelence® solution that provides increased plant growth efficiency, excellent disease control and increased stress tolerance, resulting in maximum crop yields and the best return on your investment. Abacus® is the proven industry leading combination of F500, providing the AgCelence® effect and epoxiconazole, the most efficient triazole.

Furthermore, Abacus® is formulated with the highest quality and its formulation technology enhances the active ingredient's solubility in water. This feature enables the product to be distributed evenly, improves rain fastness on plant surfaces and facilitates quick adsorption by the plant. Therefore this superior formulation ensures that the active ingredients result in the highest performance.

Together with these high-performance farm management solutions, BASF offers on-farm support with the expertise of their regional sales managers. This is a key component of their service to farmers. Their team is readily available to support farmers in every region with advice and the right recommendation, based on their needs and expectations. Their team is highly professional and experienced in crop protection solutions and farm management. Delay no further and contact a sales manager in your area to receive the full benefit of crop protection solutions for your soya bean crop.

Visit www.agro.basf.co.za for more information.

The use of SOYA BEAN MEAL

in the South African poultry industry

Formulation and quality considerations

Soya bean meal is the main source of dietary protein for poultry in South Africa and many parts of the world. The increased use of vegetable protein meals in animal feed has been brought about through consumer pressure for more sustainable and welfare-oriented animal protein production. The increased use of vegetable protein sources has highlighted the importance of protein quality, and the methods used to control quality have increased proportionately.

This is particularly evident in the case of chicks, where protein quality is a major factor in early growth and performance, but is equally important in the feeding of older birds, where feed cost and conversion are the determining economic parameters. Feed manufacturers use the quality criteria and its consistency as the

primary reason for selected soya bean meal from a specific supplier.

Heat treatment

Soya bean is an excellent source of protein as alluded to above. However, its potential can only be achieved after heat treatment. Heat labile anti-nutritional factors present in soya beans, including protease inhibitors, lectins, goitrogens and anti-vitamins, can cause growth inhibition, decreased feed efficiency, goitrogenic responses, pancreatic hypertrophy, hypoglycaemia and liver damage in poultry, depending on age, sex, health status and plane of nutrition.

Raw soya beans are known to contain two separate protease inhibitors:

- Proteins with a molecular weight of about 20 000Da and a specificity directed primarily against trypsin, known as the

Kunitz trypsin inhibitor.

- Those that have a molecular weight of between 6 000 to 12 000Da and are capable of inhibiting chymotrypsin as well as trypsin at independent sites, referred to as the Bowman-Birk trypsin inhibitor.

The second of the major anti-nutritional factors are lectins. Lectins are glycoproteins with the ability to bind carbohydrate-containing molecules on the epithelial cells of the intestinal mucosa, with toxicity determined by the extent of binding.

Differentiation

Different sources of soya bean meal products are marketed to and used in the animal feed industry. The chemical composition of soya bean meals of different origins are given in Table 1 (Mateos *et al.*, 2011, 2012).

Table 1: Chemical composition of soya bean meal from different origins.

	n	DM	CP	CF	NDF	EE	SUC	STA	RAF
Argentina	136	88,5	45,4 ^c	4,8 ^b	9,2 ^b	1,7 ^{ab}	6,7 ^b	4,9 ^b	1,1 ^b
Brazil	131	88,6	46,6 ^b	5,5 ^a	10,6 ^a	1,8 ^a	5,7 ^c	4,6 ^c	1,4 ^a
USA	164	88,6	47,3 ^a	3,8 ^c	7,8 ^c	1,6 ^b	7,2 ^a	5,7 ^a	1,0 ^c
SEM		0,08	0,12	0,08	0,13	0,04	0,08	0,04	0,03
P		NS	***	***	***	**	***	***	***

n – no. of samples; DM – dry matter; CP – crude protein; CF – crude fibre; NDF – neutral detergent fibre; EE – ether extract; SUC – sucrose; STA – stachyose; RAF – raffinose.

Specifications such as these may vary among organisations and regions, and although they provide a solid basis for commercial transactions they are inadequate and of limited value when formulating diets.

Nutritional aspects

Soya bean meal inclusion in poultry diets is determined largely by the nutrient specification of the diet to be formulated, as well as the price. Other considerations that impact the inclusion of soya bean meal are the use of alternative proteinaceous ingredients, sought animal performance levels and level of technological treatment (processing).

Soya bean meal is used as a protein source, and therefore the most important criteria for its use is the level of digestible amino acids. *Table 3* gives an indication of nutritional composition of soya bean meals for poultry (Mateos *et al*, 2011). They are often completed with additional quality recommendations as indicated in *Table 2*.

Table 2: Recommended quality measurements for soya bean meal.

Ash	Less than 7,5%
Acid insoluble ash (silica)	Less than 1%
Protein solubility index (0,2% KOH)	75 – 85%
Protein dispersibility index	15 – 40%
Urease activity	0,00 – 0,05 pH unit rise
Trypsin inhibitor activity of meal.	Less than 3mg/g
Bulk density	57 – 64 g/100ml
Screen analysis	95% through a #10 mesh 40 – 50% through a #20 mesh 6% maximum through a #80 mesh
Colour	Uniform particle colours of light tan to light brown
Taste	Bland
Contaminants	Free from urea Free from melamine Free of ammonia Free from heavy metals Free from Salmonella Free from mycotoxins and mould

Table 3: Amino acid composition (% of protein) of soya bean meals per origin.

	ARG	BRA	USA	SEM	P
n	112	119	161		
Lysine	6,09 ^b	6,06 ^c	6,16 ^a	0,005	***
Methionine	1,36 ^a	1,33 ^b	1,36 ^a	0,002	***
Cysteine	1,51 ^a	1,48 ^b	1,50 ^a	0,004	***
Threonine	3,93 ^a	3,88 ^b	3,91 ^a	0,003	***
Tryptophan	1,37 ^a	1,34 ^c	1,36 ^b	0,001	***

The variation in amino acids, as shown in *Table 3*, is closely related to fibre levels and to a number of anti-nutritional components. While fibre may account for the dilution effect between the two meals, differences in heat treatment still present one of the major sources of variation within types of soya bean meals.

Quality variation and control methods

Variation in protein quality among samples of soya bean meal can occur due to either insufficient heating (under-processing) or excessive heating (over-processing). The following test methodologies are used to assess the quality of soya bean meal:

Urease: The presence of active trypsin can be indirectly determined by measuring the activity of urease enzyme present in soya. Both trypsin inhibitor and urease proteins are denatured and deactivated during heating. Urease, unlike trypsin inhibitors, is easy to measure, and because of it, it is used as a marker of trypsin inhibitor activity. Although the urease test is routinely done and often used in contract specifications, the results do not correlate well with animal performance.

KOH protein solubility: Protein solubility in a 0,2% KOH has been shown to be a good indicator of in vivo protein quality for over-processed soya bean meal (Araba

and Dale, 1990a; Parsons *et al*, 1991). The KOH solubility assay was also reported to be useful for detecting under-processing of soya bean meal (Araba and Dale, 1990b). However, Anderson-Hafermann *et al* (1992) later concluded that this assay was not very accurate for assessing under-processing of soya bean meal. KOH results indicate that samples with high values are most digestible as long as urease activity is below the upper recommended limit.

Protein dispersibility index: The PDI assay has been used for at least 25 years in the food industry. Recent investigators have examined the value of the PDI to predict growth of chicks fed various samples of soya bean meal. Results suggest that the PDI is useful to further distinguish the quality of soya bean meal that is otherwise considered to be of good quality based on the urease and KOH measurements. Soya bean meal with a PDI between 45 and 50% and urease of 0,3 pH unit change or below indicate extremely high quality, adequately heat processed but not over-toasted meal (Batal *et al*, 2000).

CANOLA AS A ROTATIONAL CROP

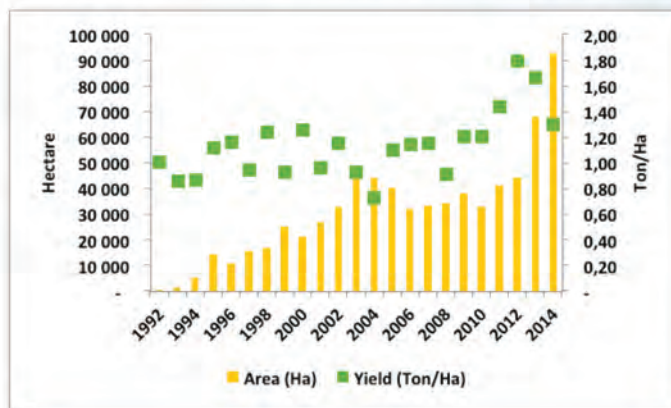


Canola was first introduced in South Africa in 1992 as a rotational crop for the wheat producing areas in the Western Cape, at that time it had a slow start with a ceiling of almost 40 000 Ha being reached until the late 2000's. Since then however the crop came into its own right as a cash crop and have the area under canola reached a record 92 000 ha in 2014.

Theoretically canola will give a yield of between 60 to 70% of your wheat yield, but this will differ from year to year and conditions. Canola requires a mild wet winter that is typical of the Western Cape, cool periods during flowering which occur from July to September will drastically increase yield potential. The crop is drought resistant and will recover from an initial drought without yield loss. In the Western Cape canola is planted between April and Middle May and harvest will commence during October to November. Canola under irrigation was not tested thoroughly in South-Africa yet, but a few farmers in different areas (Bergville, Koedoeskop, Groblersdal, Queenstown and Douglas) have tried it with relative success in the early days of producing the crop under irrigation in the predominant summer rainfall areas.

The implements used to harvest canola is the same used as for your wheat and other small grains, therefore it fits perfectly into a rotation without additional infrastructure and implement requirements. Canola is no longer the stepchild of the rotational cash crops but has over the last couple of years shown that is a profitable crop with many advantages in the rotation with especially wheat.

In 1993 Southern Oil (Pty) Ltd. revolutionized agriculture in the Western Cape with the introduction of Canola as a crop in South Africa. The objective was to process locally grown canola seeds and stimulate the growth of a new product industry in the SA market place. What began as an ambitious enterprise development project, with the aim of creating jobs has grown from strength to strength and today SOILL is the leader in the ever growing Canola Oil market. Ever since opening its doors in 1996 SOILL's goal was to provide farmers with an alternate income stream and still today we procure 100% of the South African canola crop and utilize only locally grown canola seed in the production of Canola oil products.



For more information contact Franco le Roux at 028 514 3441 or email franco@soill.co.za

WWW.SOILL.CO.ZA



The measurement of the trypsin inhibitor activity (TIA) appears not be that common. However, data from the literature indicates that activity levels of between 30 and 40mg/g of soya bean meal indicates raw meal and levels lower than 5mg/g as being acceptable for young animals (Clarke and Wiseman, 2001). The use of this quality control method for soya bean meal routinely is probably related to the complexity of the analysis as well as the time required.

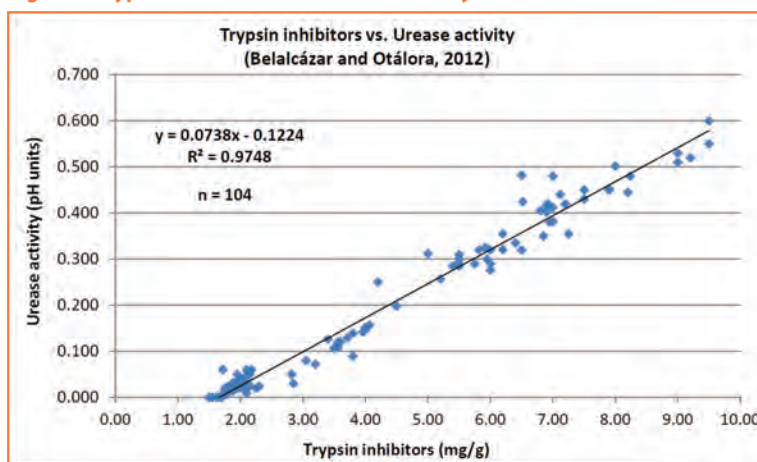
More recent data from 2005 (Ruiz and Belalcázar, 2005; Ruiz et al, 2008; Ruiz, 2012) indicated that excess intake of trypsin inhibitors in feed fed to broilers led to rapid feed passage. The authors further developed a regression equation, which can assist with interpretation and is indicated in *Figure 1*.

Table 4: Protein quality of soya bean meals according to origin.

	n	Urease	TIA	KOH	PDI
ARG	118	0,02 ^b	2,5 ^b	82,2 ^c	16,7 ^b
BRA	125	0,03 ^a	2,6 ^b	82,9 ^b	15,4 ^a
USA	164	0,02 ^{ab}	3,1 ^a	86,8 ^a	19,7 ^a
P		**	***	***	***

Urease activity is very low for all samples, independent of country of origin. Using the most recent data available and extrapolating the results from these trials, it appears appropriate to re-access the ranges for the quality criteria. A summary of quality control tests with limits is provided in *Table 5*.

Figure 1: Trypsin inhibitors versus urease activity.



Serrano et al (2012) and Serrano *et al* (2013) found no differences in broiler growth performance on four different soya bean meals tested. However, the TIA levels were below 2,7mg/g. Mateos et al (2013) and Frikha *et al* (2012) compared soya bean meals from three different origins (see *Table 4*).

Conclusion

Commercial specifications of soya bean products provide limited information on soya bean meal for diet formulation, detailed nutritional specifications are required. Table values are inadequate since bioavailability will vary with origin, variety and production conditions. Within a specific soya bean meal product, major variation in digestibility can and will occur with degree and quality of processing.

Current methods used by the industry to evaluate soya bean quality are not capable of detecting differences between sources. Using a combination of quality criteria and not a single parameter appears the most appropriate when interpreting data.

For more information, contact Brett Roosendaal at
Brett.Roosendaal@rcf.co.za. 🌱

Table 5: Summary of quality control tests for heat-treated soya bean meal.

Test	Principal	Duration	Skill level	Accuracy	Measurement	Recommended values
Urease Index	Heat denatures urease and thus anti-nutritional components, mainly an indicator of under-heating.	20 min	Low	Average	pH increase due to ammonia release	0,00 – 0,05
0,2% KOH solubility	Over-heating reduces N solubility in 0,2% KOH quantification of over-heating.	20 min	Low/Ave	Average	Protein solubilised	75 – 85%
PDI	Heating reduces N solubilisation in water, quantification of under-heating.	10 min	Low/Ave	Good	Protein solubilised	15 – 45%
TIA (Trypsin Inhibitor Activity)	Direct measurement of trypsin inhibitor, also indicator of all anti-nutritional components.	>24 hours	High	Good	Presence of trypsin inhibitors	< 3mg/g
Dye-binding (cresol red – soy-check)	Measures lysine (free epsilon amino group), reduced by overheating.	<10 min	Low	Low	Dye binding related to protein solubility	5 – 6,5mg/g

How do we ensure food security responsibly?

Senter360
spil van sukses

According to the World Bank, sustainable environment and natural resources management is at the heart of their efforts to end poverty and boost shared prosperity.

Biodiversity and natural resources constitute the social safety net of the poor, representing a food bank and often their only source of livelihood. For example, wild-capture fisheries constitute 40% of total animal protein intake for countries in West Africa and sustain more than three million people. The World Bank has committed \$33 billion in funding for the environment and natural resource management over the past decade, with IDA contributing \$7,7 billion for environmental sustainability in the poorest countries.

Urgent priorities

Addressing climate change is an urgent priority for the World Bank Group. Without bold action now, the warming planet threatens to put prosperity out of reach of millions and

roll back decades of development. For that reason, climate risk is now considered in all country assistance and partnership strategies for the poorest countries.

About 85% also consider disaster risk. All country strategies increasingly incorporate climate- and disaster-resilient planning and interventions such as "climate smart" agriculture and measures to boost food security and water efficiency.

It is in the light of this that companies such as Senter 360 have taken up the responsibility to develop products in line with this vision. Senter 360 is a South African-based international company that operates mainly throughout Africa.

Although it is an irrigation equipment manufacturing and supply company, Senter 360's research and development funding is channelled into developments such as the use of solar power to drive irrigation and pumping equipment, and the use of modern technology to optimise water usage.

As water is a precious commodity and getting it to the roots of the crop as effectively as possible and with minimal wastage, is of the utmost importance. There is sprinkler

technology available that can control the droplet size, optimising it for the least evaporation while simultaneously keeping it small enough not to compact the soil and causing run-off and water loss.

Multi-level soil moisture measuring probes empower users to optimise water application by measuring soil moisture at successive depths of 100mm. Water application can therefore be perfectly managed by not over-irrigating and wasting water and washing out fertilisers, or under-irrigating and causing loss of yield.

Smaller scale farming

Although this is high-technology equipment, it is affordable and can be effectively used in smaller scale farming operations. All the equipment can be controlled by the user's smartphone - an instrument becoming common sight in Africa, thus alleviating the use of expensive purpose-made and difficult-to-service equipment.

The purpose is to support the bigger vision by bringing efficient means of crop production to a market that has previously never had the knowhow or funding to step up to first-world standards of crop production and has the least impact on the environment while producing the maximum yield. Double cropping becomes viable with low risk, and less land and resources needed to produce more.

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