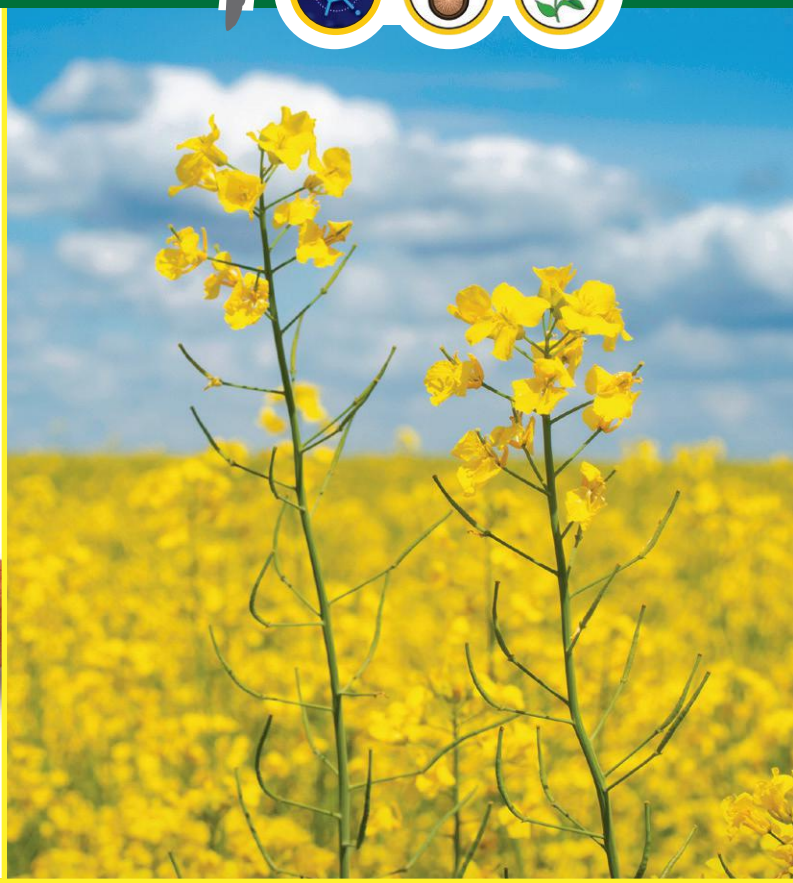
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OILSEEDS focus

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









Sunflower cultivars and maximum yield

Nematode control in soya bean

Unlocking sunflower production potential

Dangers of retained canola seed

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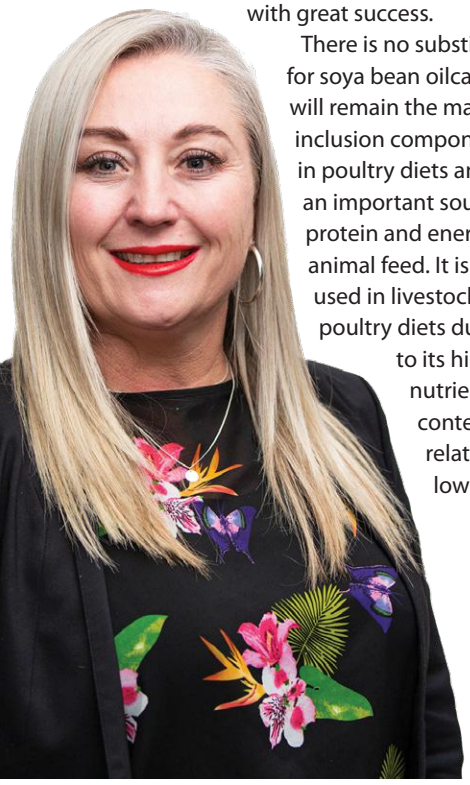
The importance of soya bean oilcake in animal feed

By Anina Hunter, chairperson, AFMA

South Africans live in a volatile, uncertain, complex and ambiguous (VUCA) world with ever increasing challenges and opportunities. Given the multitude of challenges we've had to face the past few years, the importance of self-sufficiency and less dependence on imports have been some of the major drivers in assuring that South African production of soya beans meet local demand. Soya bean oilcake dominates the protein contribution to animal feed.

Positive growth

Government, industry and producers have over the past few years developed this sector with great success. South Africa is reaching a point where we will be able to export soya beans and meet local demand. Soya bean crushers have invested in crushing capacity to ensure the growing crop can be processed with great success.



Anina Hunter.

There is no substitute for soya bean oilcake – it will remain the major inclusion component in poultry diets and is an important source of protein and energy in animal feed. It is widely used in livestock and poultry diets due to its high nutrient content and relatively low cost compared to other sources of protein, available at the required volumes and at constant supply year round. Local soya bean and soya bean oilcake prices have increased significantly over the past few years; the driver of late is not world stocks, but rather international events and prices.

A source of nutrients

Soya beans contain more than 40% protein, making it one of the richest sources of protein available for animal feed. It also provides essential amino acids, such as lysine, methionine and tryptophan, which are crucial for animal growth and maintenance.

Soya bean oilcake is also a good source of protein and energy. Lower protein diets are becoming mainstream and essential synthetic amino acids such as arginine and isoleucine are used strategically to further lower the cost of diets while leading to reduced levels of oilcake in broiler diets. The balance lies in weighing up the lowest cost diet per ton in line with the cost-efficient option, to deliver the highest profitability in a production unit.

In addition to its protein content, soya bean oilcake is also rich in unsaturated fatty acids, including linoleic and linolenic acids, which are important for the health and wellbeing of animals. Another benefit is the variety of minerals, including iron, calcium and phosphorus, it contains. These are essential for the development and maintenance of strong bones and tissues in animals.

Feed conversion

The use of soya bean oilcake in animal feed has been shown to improve feed conversion efficiency. It also helps reduce the cost of animal feed, and is relatively cheap compared to other sources of protein such as meat and dairy products. These products are not readily available at required volumes to fundamentally change the inclusion rate of soya bean oilcake in South African poultry feed diets.

The fibre component of oilcake has also proven important for gut health and improving feed conversion efficiency. The fibre content of sunflower oilcake is advantageous for gut health and pellet quality.

The quality of soya bean oilcake is extremely important as an over- and under-processed product will not deliver the nutritional advantages mentioned and will negatively impact livestock performance. Crushers are constantly improving their processes to ensure that the value of soya bean oilcake can be extracted down the value chain. Local crushers are therefore measured against agreed quality criteria as this is paramount to ensuring animal performance and health. This market sector can only succeed if local crushing plants can be run sustainably with the support of industry. Unfortunately, these crushers also face challenges relating to local electricity and water supply.

Successful production

Investment in cultivar development for the local climate has contributed to the successful growth of local soya bean production. Every year more hectares of soya beans are planted and improved yields to drive crop profitability is a constant focus. International benchmarking against the rest of the world's products remains important to ensure our competitiveness. This is also true when analysing local soya bean oilcake quality – we have determined that our local products have a higher sugar content relative to the rest of the world.

Overall, soya bean oilcake plays a crucial role in the animal feed industry, providing essential nutrients for the growth and maintenance of livestock and poultry.

For more information, contact the author at email Anina.Hunter@rclfoods.com.

Load shedding likely to remain a challenge in 2023

The impact of load shedding has serious implications for the agricultural sector as well as the wider economy of South Africa. Not only are consumers facing higher food prices, but numerous other economic pressures, such as the concerning trend of rising crime rates, remain a challenge, which means the risk of instability in the country is a real threat.

Electricity is an essential factor in the oilseeds supply chain – from irrigation systems and crushing facilities, to grain storage facilities, feed mills, poultry production and slaughter facilities, among others. The industry is indeed resilient and will make plans wherever possible. However, this comes at significant cost which will have to be recovered from the consumer who is already buckling under the pressure of high prices.

The privatisation of energy generation to add to the current Eskom production is a step in the right direction. This has, however, been left far too late and positive effects will be limited in the short term. Moreover, the necessary policy structures for recovery are long overdue.

International markets

Transnet is a critical component in the export of agricultural products. An efficient grain export programme requires a percentage of transport on rail. Record maize and soya bean crops are creating a surplus that needs to be exported, and this exportable surplus of over four million tons of maize and soya beans require efficient transport to the ports.

Numerous commodity sectors have underperformed in terms of exports due to the poor performance of rail to our ports, despite high international commodity prices. On the positive side, soya bean exports have progressed well despite the port constraints (more demand than supply of export infrastructure). The ports of Maputo and East London also had to be utilised in 2022 for the export of grains, despite being much less cost-effective than Durban.

Trading companies have excelled in creating export markets for soya beans considering South Africa has become a new (small) global player in consistent soya bean exports. Southeast Asia is also proving to be the most accessible market.

Despite the numerous challenges we face in 2023 there are many positives we can draw from. These include excellent crop expectations due to, once again, favourable weather conditions and favourable prices for producers, as well as decreasing fertiliser prices.

We are also privileged to bring you another excellent issue of *Oilseeds Focus*. Enjoy this edition and feel free to send feedback.

Dr Erhard Briedenhann

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

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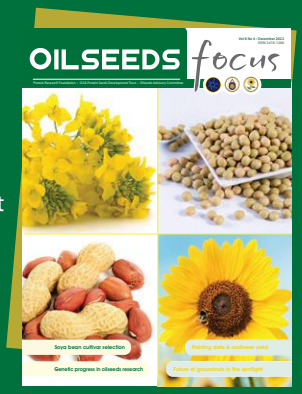
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NEWS

Rain in Brazil puts pressure on soya bean prices

The soya bean harvest has started in Brazil, but it has been delayed due to rainfall. This is supporting the soya bean price as Brazil is the largest producer and exporter of soya beans in the world. Analysts from the Brazilian market agency, AgRural, estimated that at the beginning of February, 9% of the area had been harvested, compared to an average of 16% in the same period last year.

The price index of the International Grains Council, a measure of the price of soya beans in the world, fell slightly to 303 points at the beginning of February.

The soya bean price is also supported by the drought in Argentina. The country has experienced very dry conditions for some time, with weather forecasts for the coming period indicating mainly drought in most Argentine regions. The export of soya beans from Argentina is somewhat sluggish due to the tight supply, and less soya is shipped as a result.

In the short term, the soya bean price is not as volatile. Price pressure is expected for the longer term, especially when the Brazilian record harvest comes on the market. Nevertheless, there are concerns regarding the harvest in the southern provinces of Brazil as it is very dry, and the harvest will therefore be lower than in previous years. – *All About Feed*

Availability of canola seed affects industry

During the annual general meeting for Region 26 (Swartland) at Overberg Agri in Moorreesburg, Koos Blanckenberg from Grain SA's Canola Specialist Committee gave an overview of the 2022 canola production year, stating that producers in the Southern and Western Cape achieved a record canola planting and harvest for 2022.

Last year, a total of 127 000ha was planted to canola, and around 208 000 tons were harvested. "The canola industry is growing but is unfortunately being held back at the moment by a lack of available canola seed. We need some 330 tons of seed to cover the same area as last year. Until now, however, the three companies importing canola seed into South Africa have confirmed that only 175 tons are on their way to South Africa. This is not nearly enough."

He said that another 100 tons could possibly be added. "This amounts to 275 tons, which is closer to the total needed. We also know that sone seed was retained last year."

The Canola Specialist Committee remains in contact with the seed companies and will do its best to have enough seed available in South Africa. Unfortunately, not all the cultivars we've bargained on will be included, said Blanckenberg. – *Hugo Lochner, Plaas Media*

China to import less soya

China will import less and less soya in the coming years. This is according to a Rabobank research report. China is by far the largest importer of soya in the world and is the final destination of more than 60% of the world's soya trade – the product is mainly used in animal feed.

Although the demand for animal feed will continue to grow in the coming years, this will not be the case for the intake of soya. Rabobank believes that animal feed production in China will grow slightly every year as a result of growth in Chinese livestock farming. However, imports of soya will decrease due to increasing local production of animal feed raw materials and the use of less soya bean meal in animal feed, explains grain and oilseeds analyst Lief Chiang of Rabobank.

China wants to become less dependent on imports of animal feed raw materials. This applies in particular to imports of soya beans. With less supply of soya, the country sees opportunities to lower the cost price of food.
– *All About Feed*

WUSA puts application efficiency first

WinField United in the United States (US) has invested millions of dollars in developing world-class application innovation technology to test the efficacy of adjuvants when being added to pesticides to enhance their performance. WinField United South Africa (WUSA) is drawing on the expertise of its parent company in the US.

The WinField United group's US Innovation Centre tests different formulations under various conditions to determine the best products and how they can be optimally applied in practice while reducing drift to non-target areas. In terms of deposition effectiveness, WUSA introduced the DropSight application technology in 2022 to better understand application efficacy.

Portfolio lead for adjuvants at WUSA, Pierre Strydom, says: "This technology will help local farmers to adhere to the stricter regulations on crop protection that are coming out of the European Green Deal, which aims to reduce and minimise the impact of contamination of pesticides on our natural resources. – *Press release, WinField United South Africa*



Claims of seed oil health risks debunked

While the Internet may be full of posts stating that seed oils such as canola and soya are 'toxic', scientific evidence does not support these claims, according to experts. Guy Crosby, adjunct associate of nutrition at Harvard TH Chan School of Public Health, was among those quoted in a 2022 *Consumer Reports* article who pushed back on the idea that these oils cause health ills, ranging from headaches to heart disease.

While it's true that many foods that use seed oils – such as packaged snacks and French fries – are unhealthy, they also tend to be high in refined carbohydrates, sodium and sugar. "If you cut back on these foods, chances are you're going to feel better," Crosby said. "But these other components, not the seed oils themselves, are the culprit behind weight gain and other negative health outcomes."

Repeatedly heating unsaturated fats to high temperatures, such as in restaurant deep-fryers where oil is infrequently changed, is a health concern, Crosby said. However, he added that "cooking with seed oils at home isn't an issue". In addition, experts said that there is no reason to cut back on whole foods that contain omega-6 – the type of polyunsaturated fat dominant in seed oils – such as nuts and seeds. Evidence suggests that a diet high in these foods can help lower cholesterol and blood sugar, and reduce heart disease risk. – *Harvard School of Public Health*

SAVE THE DATE

Be sure to diarise **25 April 2023**
for the proposed **Sunflower Symposium**
presented by the Oil and Protein Seeds Development Trust
and Oilseeds Advisory Committee.

Venue: **CSIR Convention Centre, Pretoria.**
Theme: **Quality aspects of sunflower and improvement of yields.**

Presentations / topics will include the following:
Planting dates
Potential of high-oil sunflower cultivars
Chemicals to be used and optimal or correct spraying times
Yield improvements and quality
Sunflower breeding
Comparison between local and global sunflower perspective
New technology

The programme and speakers will be finalised soon.
Registration will open by the end of March 2023
and only 130 places will be available.
Watch the press for details!

Oil price index drives lower food prices

The FAO Food Price Index averaged 131,2 points in January this year, down 1,1 points (0,8%) from December, marking the tenth consecutive monthly decline. With this latest decline, the index has fallen 28,6 points (17,9%) from the peak it reached in March 2022. The drop in the index in January was driven by declines in the price indices of vegetable oils, dairy and sugar, while those of cereals and meat remained largely stable.

The FAO Vegetable Oil Price Index averaged 140,4 points in January, down 4,2 points (2,9%) month-on-month and standing nearly 25% below its level a year ago. The decrease reflected lower world prices of palm, soya, sunflower seed and rapeseed oils. In January, international palm oil prices dropped for the second consecutive month, largely weighed by subdued global import demand, as major importers replenished their stocks during the past few months.

World soya oil quotations also fell moderately, linked to sluggish import demand due to uncompetitive prices compared with those of other vegetable oils, as well as improved weather conditions in Argentina, raising production prospects. In the case of sunflower and rapeseed oils, international prices fell on ample global export supplies. – *www.fao.org*

Biggest area ever planted to soya beans

According to the latest area estimate by South Africa's National Crop Estimates Committee, the estimated area planted to soya beans is 1,1 million hectares – and 18,83% increase or 174 200ha compared to the 925 300ha planted the previous season. This is the biggest area planted to soya beans in South Africa's history.

In terms of groundnuts, the estimated area is 31 200ha, which is 28,11% or 12 200ha fewer than the 43 400ha planted the previous season.

The preliminary estimated area for sunflower is 568 550ha, which is 15,23% or 102 150ha fewer than the 670 700ha planted the previous season. – *Press release*

Correct cultivar choice: A core factor in maximising sunflower yield potential

By Safiah Maali, ARC-Grain Crops, Potchefstroom, and Nicolene Cochrane, ARC-Biometry, Pretoria

Optimisation of crop production requires, among several inputs, the selection of a suitable, well performing cultivar. The ten-year world average sunflower yield recorded from 2011 to 2021 equals 1,75 t/ha and is 35% higher than that of the average sunflower yield of 1,30 t/ha in South Africa obtained during the same period.

The objective of the national sunflower cultivar trials conducted by the Agricultural Research Council-Grain Crops (ARC-GC) and partially funded by the Oil and Protein Seeds Development Trust (OPSDT) since the 1970s, is to enable producers to optimise their sunflower production through sound cultivar selection.

Table 1: Days to flowering and seed yield of cultivars evaluated in 2020/21 and 2021/22.

Cultivar	Days to 50% flowering	Seed yield (t/ha)		
	Mean	2020/2021	2021/22	Mean
AGSUN 5101 CLP	70	2,33	2,03	2,18
AGSUN 5103 CLP	70	2,51	2,24	2,37
AGSUN 5106 CLP	70	2,44	2,32	2,38
AGSUN 5108 CLP	69	2,32	2,27	2,29
AGSUN 5270	68	2,50	2,32	2,41
AGSUN 8251	69	2,49	2,21	2,35
Aguara 6	69	2,33	2,11	2,22
LG 5678 CLP	69	2,14	1,99	2,07
LG 5710	69	2,33	2,08	2,20
P 65 LL02	69	2,37	2,27	2,32
P 65 LL14	69	2,30	2,19	2,24
P 65 LP 54	69	2,43	2,20	2,32
P 65 LP65	70	2,37	2,31	2,34
PAN 7080	70	2,43	2,31	2,37
PAN 7100	69	2,44	2,27	2,36
PAN 7102 CLP	69	2,40	2,27	2,34
PAN 7160 CLP	70	2,48	2,37	2,42
PAN 7170	69	2,40	2,17	2,28
PAN 7180 CLP	70	2,49	2,24	2,36
SY 3970 CL	71	2,10	1,86	1,98
Mean	**69**	**2,38**	**2,20**	**2,29**

The importance of the trials was highlighted when these trials were conducted in that same period of time but achieved an average yield of 2,24 t/ha, which is 28% higher than that of the world sunflower yield average, and 72% higher than that of the national sunflower yield average. During the evaluations, commercially available cultivars are evaluated in order to predict their future yield performances and assess their seed composition.

The uniqueness of the national sunflower cultivar trials conducted by the ARC-GC lies therein that it is the only unbiased effort in South Africa striving to evaluate high-potential cultivars in the main sunflower production areas. Data generated in these field trials in terms of grain yield and seed quality is available not only to producers, but also to any other interested parties.

Processing of data

During the 2021/22 growing season, a number of seed companies entered 20 sunflower cultivars for evaluation by the ARC-GC. Each field trial consisted of randomised complete-block design layouts with three replicates.

Data collected from 17 field trials after harvesting was sent back to ARC-GC and subjected to statistical and quality analysis. Yield data was subjected to analyses of variance and the regression line technique as described by Loubser and Grimbeek (1984) was used to calculate yield probabilities for cultivars at different yield

potentials. Yield probabilities were also calculated for 20 cultivars evaluated in 36 trials during 2020/21 and 2021/22, and 16 cultivars evaluated in 54 trials during the 2019/20 to 2021/22 growing season.

Trial results: Seed yield (t/ha)

Seed yield is a complex trait, which is influenced by cultivar, environmental factors, management practices and their interactions. A total of 20 sunflower cultivars, of which four were new introductions, were evaluated in 17 field trials during 2021/22.

Table 1 indicates the growing season lengths of these cultivars as well as their mean seed yields for the previous two seasons (2020/21 and 2021/22). It is recommended the yield results be used along with the yield probability and stability values (*Tables 2, 3* and *4*) for a more accurate cultivar choice.

Trial results: Yield probability

A cultivar's yield probability represents the ability to realise an above average yield at a particular yield potential. For instance, if the yield probability of a cultivar at a particular yield potential is equal to 60%, the chances of realising a yield above the mean of all cultivars is 60% with a 40% chance of obtaining a yield below the mean.

Table 2 shows yield probability values for the cultivars tested in 2021/22. Since new cultivars are introduced and some removed annually, a multi-season reliability analysis is only possible for a limited number of cultivars. *Table 3* shows yield probability values for 20 cultivars evaluated in 36 trials during the last two seasons (2020/21 and 2021/22). *Table 4* shows yield probability values for 16 cultivars evaluated in 54 trials during the last three seasons (2019/20, 2020/21 and 2021/22).

Tables 3 and *4* can be used to select a core of cultivars. This selection can be expanded with cultivars selected from *Tables 1* and *2*. It is advisable to grow more than one cultivar and to include new cultivars on a limited scale only.

Cultivar selection from yield probability table

Determine the yield potential for a particular field and set a yield target. The long-term mean yield of a particular field

Table 2: Yield probability (%) of cultivars evaluated in 2021/22 at different yield potentials.

Cultivar	Yield potential (t /ha)						Regression line	
	1	1,5	2	2,5	3	3,5	F prob	R^2
AGSUN 5101 CLP	52	39	25	16	9	6	<0,001	0,88
AGSUN 5103 CLP	66	64	60	57	52	49	<0,001	0,87
AGSUN 5106 CLP	56	62	66	71	74	76	<0,001	0,85
AGSUN 5108 CLP	45	52	57	64	68	73	<0,001	0,90
AGSUN 5270	56	61	65	69	72	73	<0,001	0,85
AGSUN 8251	47	50	54	57	61	63	<0,001	0,97
AGUARA 6	48	43	35	30	25	22	<0,001	0,90
LG 5678 CLP	42	34	26	20	16	14	<0,001	0,78
LG 5710	45	41	36	33	29	28	<0,001	0,79
P 65 LL 02	44	52	58	66	71	76	<0,001	0,89
P 65 LL 14	75	66	53	40	28	20	<0,001	0,74
P 65 LP 54	74	66	56	44	34	27	<0,001	0,88
P 65 LP 65	33	53	75	89	96	98	<0,001	0,97
PAN 7080	44	52	60	68	74	78	<0,001	0,84
PAN 7100	59	63	66	70	72	74	<0,001	0,94
PAN 7102 CLP	32	45	58	72	81	87	<0,001	0,93
PAN 7160 CLP	52	67	78	88	93	95	<0,001	0,95
PAN 7170	37	41	44	48	52	56	<0,001	0,88
PAN 7180 CLP	66	63	59	54	50	46	<0,001	0,92
SY 3970 CL	32	27	21	18	15	14	<0,001	0,69

**R^2 is a statistic that explains the variation around the mean of the appropriate model. An $R^2$of >0,5 is recommended. The closer the R^2 value is to 1, the better the regression fit is. The better the cultivar meets the requirements and stays above the regression line, the more stable the cultivar is.*

F prob = F probability (the probability that the slope and section on the y-axis contribute significantly to the model). An F prob value of <0,1 is recommended.

Yellow blocks: Cultivars performed the best under high yield potential.

Blue blocks: Cultivars performed the best under low yield potential.



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is usually a good indicator of the yield potential and can therefore serve as yield target. Cultivars with the highest yield probability values, in the column below a particular yield potential, are those with the best chance of performing well under the conditions.

One year's results showed that AGSUN 5106 CLP, AGSUN 5108 CLP, AGSUN 5270, AGSUN 8251, P 65 LL 02, P 65 LP 65, PAN 7080, PAN 7100, PAN 7102 CLP and PAN 7160 CLP performed the best under yield potential >2 to 2,5t/ha, while AGSUN 5103, P 65 LL 14, P 65 LP 54 and PAN 7180 CLP performed better under yield potential <2t/ha (*Table 2*).

Two years' yield probability results showed that AGSUN 5103 CLP, AGSUN 5106 CLP, AGSUN 5270, P 65 LP 65, PAN 7080, PAN 7102 CLP, PAN 7160 CL and PAN 7180 CLP performed well under high yield potential environments. P 65 LL 14 and P 65 LP 54 performed better under low yield potential, while AGSUN 8551 and PAN 7100 performed well under all yield potentials (*Table 3*).

Three years' yield probability results showed that AGSUN 5103 CLP, AGSUN 5106, AGSUN 8251, PAN 7080, and PAN 7160 performed better under high yield potential. P 65 LP 54 and PAN 7102 CLP performed better under low yield potential, while AGSUN 5270 and PAN 7100 performed well under all yield potentials (*Table 4*).

Trial results: Cultivar stability

Stability of cultivar performance for a high grain yield across varied environments and broad adaptation are the goals of most sunflower breeding and testing programmes. Interactions between cultivar and environment often confound the genetic differences that affect yield among sunflower cultivars. The usual solution to this problem is to evaluate cultivars across many environments/sites and years to estimate yield potential across randomly occurring cycles of normal and extreme conditions.

The stability of a cultivar is determined by the coefficient of determination value (R2)*. The closer the R^2 is to 1 and the lower the F prob value (preferably <0,1), the more stable the cultivar will be. AGSUN 8251 and P 65 LP 65 were considered the most stable cultivars during the 2021/22 season followed by PAN 7160 CLP and PAN 7100. However, over two growing seasons PAN 7100 and PAN 7160 CLP were the most

Table 3: Yield probability (%) of cultivars evaluated in 2020/21 and 2021/22 at different yield potentials.

Cultivar	Yield potential (t /ha)						Regression line	
	1	1,5	2	2,5	3	3,5	F prob	R^2
AGSUN 5101 CLP	33	33	31	31	30	30	<0,001	0,88
AGSUN 5103 CLP	46	51	57	62	67	72	<0,001	0,85
AGSUN 5106 CLP	47	55	61	69	74	79	<0,001	0,88
AGSUN 5108 CLP	46	48	50	52	54	56	<0,001	0,91
AGSUN 5270	55	60	65	69	73	76	<0,001	0,88
AGSUN 8251	63	63	64	64	63	63	<0,001	0,90
AGUARA 6	50	47	42	38	34	31	<0,001	0,86
LG 5678 CLP	40	30	20	14	8	6	<0,001	0,86
LG 5710	40	39	39	39	39	39	<0,001	0,83
P 65 LL 02	46	49	51	54	57	59	<0,001	0,83
P 65 LL 14	69	59	48	37	27	20	<0,001	0,82
P 65 LP 54	68	64	58	53	47	42	<0,001	0,84
P 65 LP 65	46	52	56	61	65	69	<0,001	0,91
PAN 7080	37	47	56	66	74	81	<0,001	0,88
PAN 7100	69	69	69	69	69	69	<0,001	0,92
PAN 7102 CLP	55	57	59	60	62	63	<0,001	0,88
PAN 7160 CLP	57	63	69	74	78	82	<0,001	0,92
PAN 7170	53	52	50	48	47	45	<0,001	0,86
PAN 7180 CLP	59	61	63	65	66	67	<0,001	0,88
SY 3970 CL	40	33	26	21	16	13	<0,001	0,62

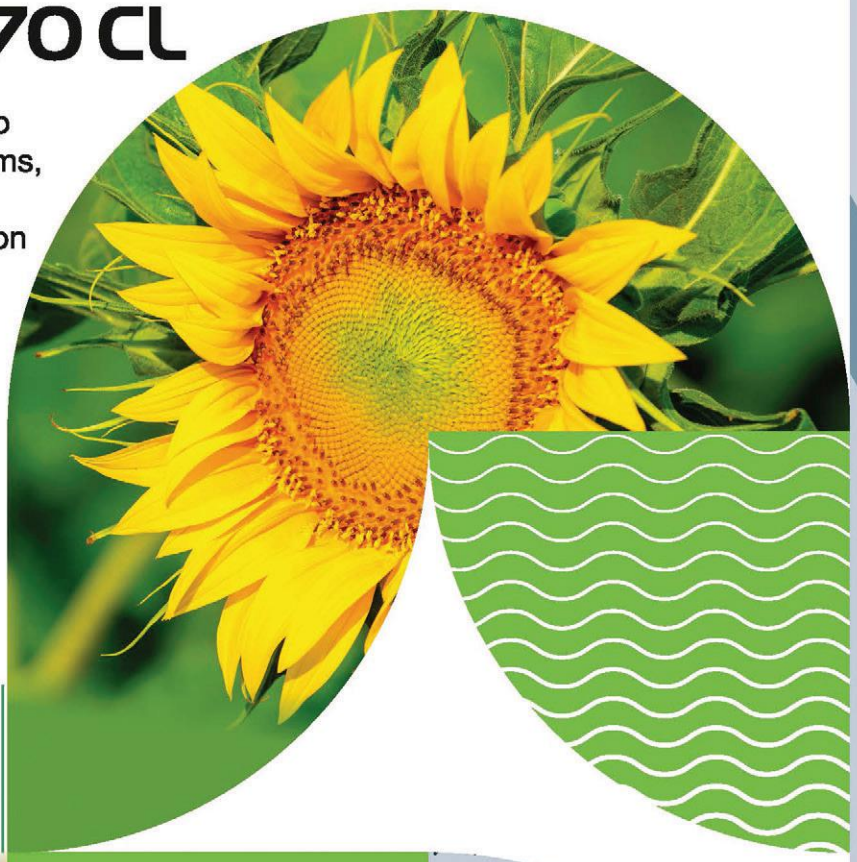
Yellow blocks: Cultivars performed the best under high yield potential.
Blue blocks: Cultivars performed the best under low yield potential.
Red blocks: Cultivars performed the best under all yield potential.

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Table 4: Yield probability (%) of cultivars evaluated in 2019/20 to 2021/22 at different yield potentials.

Cultivar	Yield potential (t/ha)						Regression line	
	1	1,5	2	2,5	3	3,5	F prob	R^2
AGSUN 5101 CLP	35	35	34	34	35	35	<0,001	0,90
AGSUN 5103 CLP	44	50	56	61	67	71	<0,001	0,87
AGSUN 5106CLP	43	50	58	65	72	78	<0,001	0,89
AGSUN 5270	72	70	68	66	63	60	<0,001	0,82
AGSUN 8251	50	54	58	62	65	69	<0,001	0,92
LG 5678 CLP	35	26	18	13	8	5	<0,001	0,85
LG 5710	46	42	38	35	31	28	<0,001	0,81
P 65 LL 02	44	48	50	54	56	59	<0,001	0,82
P 65 LL 14	58	55	50	47	42	39	<0,001	0,87
P 65 LP 54	69	64	58	52	45	39	<0,001	0,85
PAN 7080	34	45	57	68	78	86	<0,001	0,92
PAN 7100	68	68	68	68	68	68	<0,001	0,93
PAN 7102 CLP	66	63	59	55	50	47	<0,001	0,89
PAN 7160 CLP	52	61	69	76	82	87	<0,001	0,94
PAN 7170	53	55	55	57	57	58	<0,001	0,89
SY 3970 CL	38	33	27	23	18	16	<0,001	0,71

Yellow blocks: Cultivars performed the best under high yield potential.
Blue blocks: Cultivars performed the best under low yield potential.
Red blocks: Cultivars performed the best under all yield potential.

Acknowledgements

Execution of these trials were made possible through the financial support of the Agricultural Research Council, the Oil and Protein Seeds Development Trust, seed companies, and numerous collaborators who conducted trials. We would like to acknowledge William Makgoga and Jan Erasmus of the ARC-Grain Crops for conducting the trials and technical support.

stable cultivars followed by AGSUN 5108 CLP and P 65 LP 65. Three growing seasons' data indicated that PAN 7160 CLP was the most stable hybrid followed by PAN 7100.

Conclusions

Choosing the correct hybrid is one of the key decisions every grower must take before the start of a season. Growers should consider not just yield, but also yield stability, yield potential and yield probability according to a realistic yield potential for each field. The sunflower national cultivar trial data is of great value for the long-term competitiveness of the industry.

For more information, email Safiah Maali at maalis@arc.agric.za or Nicolene Cochrane at cochranen@arc.agric.za.



Water usage in soya bean production

By Philip Fourie, Pioneer agronomist

The total amount of moisture used by a soya bean crop during a given season can vary from anything between 500 to 650mm, with more than 60% (575mm) of the overall requirement which exists during growth stages R1 to R6. Most of the groundwater withdrawn by a soya bean planting occurs in the top 90cm of the soil profile.

The most critical time for moisture during a soya bean plant's growth is during R3 to R6, which represents pod-fill:

- R1 = starts to flower.
- R3 = pod-fill commences.
- R6 = full-seed stage (pods are green, seeds are green and fully developed in the pod).

Evapotranspiration

Early in the season, while soya beans are developing, a significant amount of soil surface is still visible and the greatest loss of moisture is ascribed to evaporation from the soil surface. The soil surface will become more shaded as the plants grow bigger, at which point evaporation from the soil surface will start decreasing while transpiration from the leaf surface will increase.

Transpiration

The transpiration process entails the manner in which water is absorbed from the soil by the roots and transported to the leaves. Small openings on the leaf surface (stomata) allow water (steam) to move through the leaf and into the atmosphere, cooling down the plant in the process.

The rate of transpiration is determined by air temperature, solar radiation and wind.

Water usage in the growth season

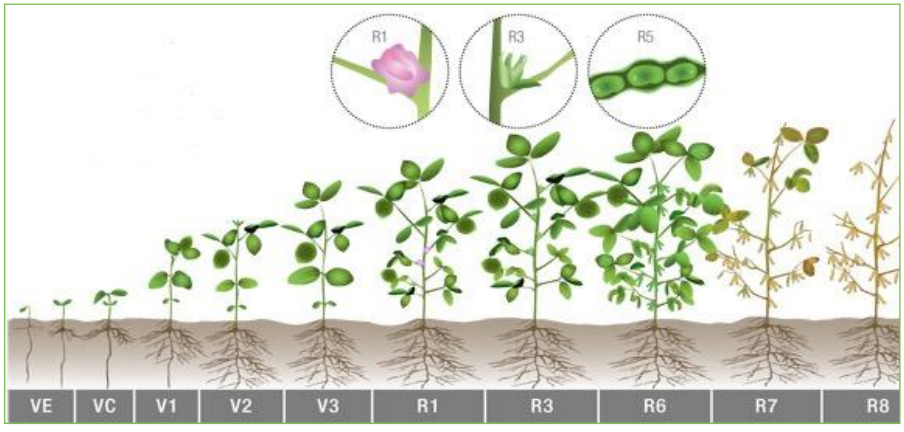
Daily evapotranspiration (ET) varies enormously across the growing season. This is due to day-to-day environmental variables such as the weather. As with most crops, soya beans also follow a normal water usage trend – ET increases throughout the vegetative stages, exhibits peak usage during pod-fill, and then decreases as the crop reaches maturity.

More than 60% of the total water utilisation by soya beans takes place during phases R1 to R6 of the reproductive growth stages. Seasonal water usage of soya beans is between 508 and 660mm (Kranz and Specht, 2012) whereas in the case of maize, this figure could be anything between 530 and 711mm.

Root depth and water absorption

Soya beans possess a strong, well-developed root system that is very important for water uptake and growth. Soya bean roots can easily reach depths of between 150 and 200cm, without any soil limitations (Ordóñez *et al.*, 2018).

Figure 1: Growth stages of soya beans. (Source: University of Illinois, US)



Indeterminate growers will still develop vegetatively after R1 (flowering stage).

Table 1: Average daily water usage, water usage per growth stage, and cumulative water usage across the growth cycle. (Source: Pioneer Seeds US)

Growth stage	Daily water usage	Water usage per growth stage	Cumulative water usage
	Millimetres		
2nd tryfoliate (V2)	2	14,2	25,4
4th tryfoliate (V4)	2,3	16	55,6
6th tryfoliate (V6)	3,6	24,9	80,5
Start of flowering (R1)	5,1	50,8	131,3
Full flower (R2)	6,4	44,5	175,8
Early pod development (R3)	7,1	49,8	225,6
Pod extension (R4)	8,1	81,3	306,8
Early pod-fill (R5)	8,4	83,8	390,7
Mid pod-fill	8,1	81,3	471,9
Full pod (R6)	6,4	44,5	516,4
Bottom leaves start yellowing (R7)	3,8	38,1	554,5
Maturity (R8)	2,5	25,4	579,9

In the case of the high-potential and water-table soils in the western area of the country, a depth of 200cm is used as the deepest value towards which roots can develop and potential maps can be determined. According to Kranz and Specht (2012), moisture is mostly withdrawn from the top 60 to 90cm.

Impact of water availability

Soya beans can comfortably resist drought during the vegetative stage, with little effect on yields. Excessive moisture during the vegetative stages can lead to excessive vegetative growth which will not necessarily lead to greater yields.

The result of excessive vegetative growth is usually agronomic problems such as plants falling over and plant diseases. Sufficient water during the flowering stage, followed by a drought cycle, will lead to smaller seeds.

Irrigation

The safest and best way to irrigate soya beans is to have irrigation cycles coincide with the stages most sensitive to moisture stress during the soya bean growth cycle. Soya beans react very quickly to water applied during the later stages of the growth cycle. However, holding back water until around stage R3 can be problematic. In most cases, the system will not be able to meet the plants' requirements.

For more information and reference, contact Pioneer Agronomy Services at info.rsa@pioneer.com



The dangers of retained seed

By Piet Lombard, Lisa Smorenburg and Dr Johann Strauss, Directorate: Plant Sciences, Western Cape Department of Agriculture

The danger associated with retained seed is not a new topic, but one that has been discussed at length over the past two seasons.

In the Western Cape, producers are currently faced with some important choices: Do we halt our crop rotation system? Do we plant any cultivars that are available? Do we plant retained seed?

This article summarises data collected in Australia, but also local data collected on the Langgewens Research Farm during 2022.

Figure 1: Retained seed versus company seed (F1) during the rosette stage (left) and the late flowering stage (right) at the Langgewens trial.



Summary of local data on the use of retained seed

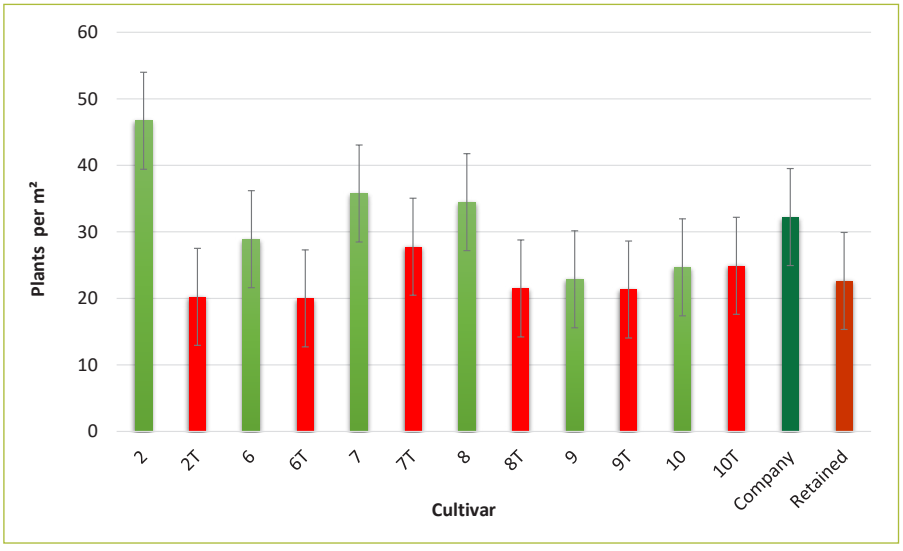
- Seed yield decreased by 5,5 to 24,1% (7 to 17% in Australia).
- The yield of some cultivars declined less than that of others, but this trial's average decline was 13,9%.
- Oil content decreased by 0,8%.
- Seedlings died off (lower survival rate).
- Blackleg infections increased (11 to 20,2%).

A question that is often posed by industry role-players is whether canola seed can be retained and replanted. It is important to understand how canola is cultivated and what dangers such a practice could pose.

A hybrid cultivar is bred from two lines, namely a paternal and a maternal line. Each of the lines is pure and therefore the progeny will always possess the same traits.

Retained (or F2) seed subsequently no longer possesses precisely the same combination of genes. This article focusses mainly on the local study. However, Potter *et al*. (2014) also conducted an in-depth study in Australia and the results are very similar to what was discovered locally.

Figure 2: Number of plants per square metre during the harvest of the company seed versus retained seed.



Materials, methods and discussion

A trial consisting of six different cultivars (all F1) and one single cultivar (F2) from retained seed from the 2021 season was planted on Langgewens in the Swartland. There were three replications and standard agronomic practices applied.

The retained seed did not receive a fungicide treatment, but the entire population was sprayed for blackleg during the four- to five-leaf stage. Plant counts were performed after germination and immediately after harvest. Flowering dates, seed yield and seed oil content were determined.

Vigour and seedling survival

The growth vigour of the plants from the retained seed in all the cultivars planted in the Langgewens trial, was weaker than that of the control (*Figure 1*). The number of seeds planted per square metre was the same for retained seed and company seed (F1).

While differences were noted in cultivars, the company seed planting

Figure 3: Retained seed (left) and company seed (F1, right) towards the end of the flowering stage at Langgewens in 2022.



Figure 4: Internal blackleg infection in the different cultivars (company seed indicated in green and retained seed in red).

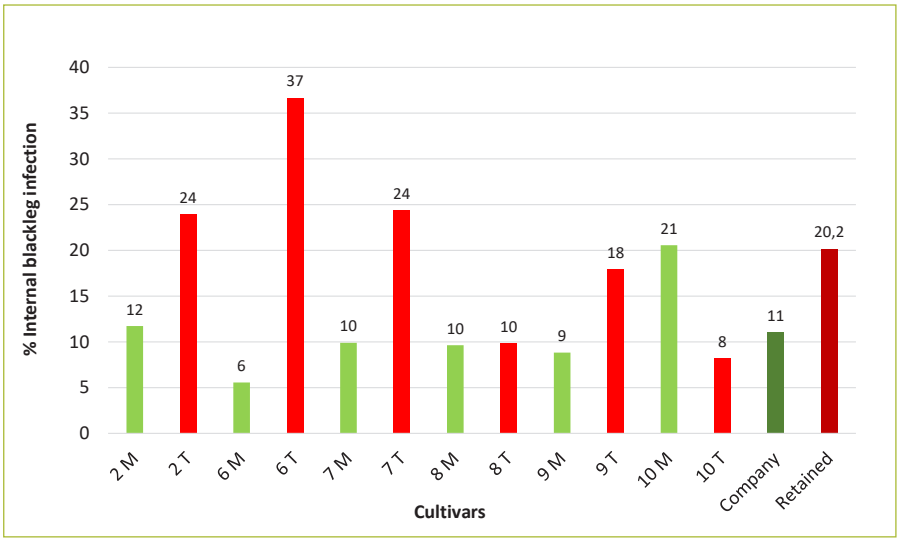
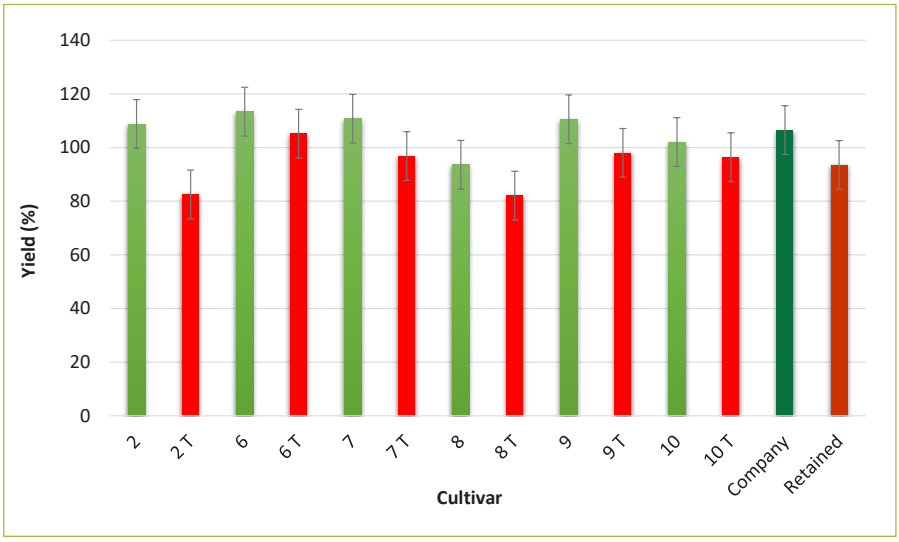


Figure 5: Seed yield of the various company seed entries.





recorded an average of ten more plants per square metre. Four of the cultivars lost significantly more seedlings in the F2 planting (*Figure 2*).

Flowering date

In most cases, the flowering date of the retained seed was one day later than that of the control. It is important to note that the retained seed completed its flowering stage later than the control.

Blackleg

Internal blackleg infection in the retained seed (20,2%) and company seed (11%) differed significantly. There were cultivar differences, with some cultivars showing a bigger difference in internal blackleg infection than others (*Figure 4*).

In Australia, the internal blackleg infection of retained seed, which had been treated with Jockey®, differed significantly from the company seed at only one location, although the retained seed consistently contained more blackleg.



Table 1: Summary of yield reduction and the potential loss of income if the retained seed were to be planted.

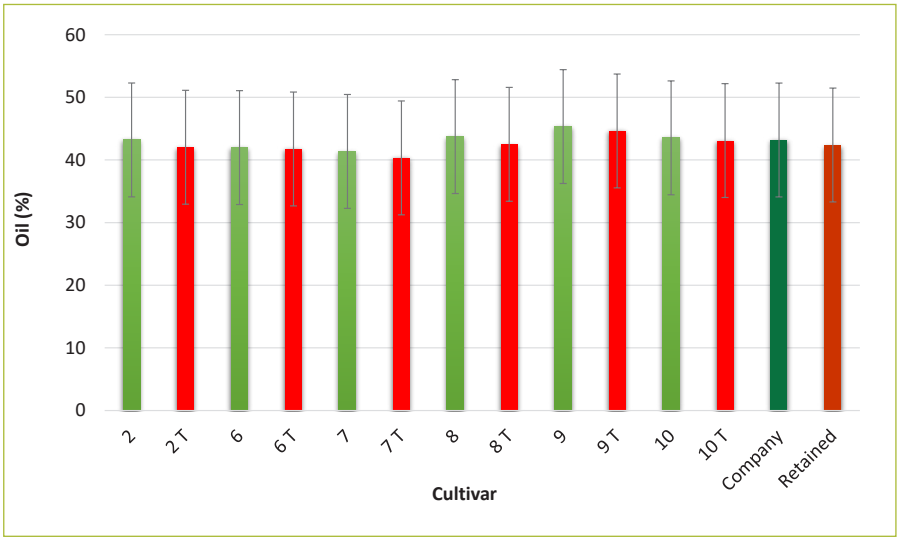
Entries	Yield (%) delivered by control	Loss of income (2 ton/ha^{-1} yield at R10 000/ton^{-1})
2 T	75,9	R4 828
6 T	92,8	R1 440
7 T	87,4	R2 520
8 T	87,7	R2 460
9 T	88,7	R2 260
10 T	94,5	R1 111
Company seed	100	R0
Retained seed	87,8	R2 440

Yield

A comparison of the yield of retained seed with that of the control indicates a decrease in yield of 5,5 to 24,1%. The average decrease in yield was 13,9%. Based on an expected yield of 2 tons/ha^{-1}, the average decrease was 278kg but reached as much as 482kg/ha^{-1} for entry 2.

It is general knowledge that internal blackleg infection reduces yield. This yield reduction must also be measured against loss of income, as summarised in *Table 1*.

Figure 6: Percentage oil content of the various company seed and retained seed entries.



Oil content

In the Australian trial, the oil content percentage of the retained seed was lower than that of the company seed at all three trial sites. At Langgewens, the oil content of the retained seed was on average 0,8% lower (7% moisture) (*Figure 6*).

Conclusion

Where the retained seed (F2) was used, there was a decrease in yield along with increased blackleg pressure. The benefits of using company seed clearly outweigh the cost saving associated with using retained seed.

The higher internal blackleg infection creates the risk of increased disease pressure in future, a scenario which promises harsh consequences for the industry. The benefits associated with retained seed are far outweighed by the disadvantages.

We need to find a solution for the sustainable supply of good and adapted cultivars.

To read more about the study in Australia, visit *www.grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2014/02/testing-retained-sowing-seed-of-hybrid-canola-over-a-range-of-rainfall-zones-adelaide*. For additional enquiries, contact Piet Lombard at 021 808 5321 or piet.lombard@westerncape.co.za.

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As a multi-crop specialist, Pannar offers a broad crop portfolio characterised by good yield potential, adaptability and stability that minimises the risk in crop production. Pannar's formidable sunflower and soya bean packages have been enhanced with several new cultivars.

Sunflower

Pannar's sunflower stable of top performers fare well in the Agricultural Research Council national trials year after year, and harness some of the leading genetics available on the market. The hybrid package is suitable for your preferred production system and comprises conventional hybrids and Pannar sunflower hybrids with the Clearfield® Plus trait. A high oleic hybrid rounds off the comprehensive sunflower package.

Pannar delivers hybrids that are widely adapted, maintain excellent yield potential, and offer exceptional stability under varying conditions. Planting a hybrid package is recommended to strategically manage disease and drought stress. We also bring you options to stagger your flowering season to help you manage the risk of *Sclerotinia* infection.

PAN 7090

This new three-way cross conventional hybrid has consistently delivered top performance in Pannar P3 trails, demonstrating good yield potential, oil content, stability and adaptability. It is recommended as part of the main planting for all sunflower production regions.

Soya beans

The Pannar soya bean cultivar package offers a profitable combination of yield potential and exceptional agronomic characteristics. The versatile Pannar soya bean package has unparalleled stability at different yield potential levels, over different production regions and seasons. It is a proven and safe choice. Pannar also provides a full range of maturity classes covering almost all planting dates and densities.

PAN 1502R

PAN 1502R (maturity group [MG] 5,2) is a consistent performer in a segment of the market that is notorious for unstable performance. It will serve as a great supportive variety to complement the long-standing PAN 1532R (MG 5,3) in this early maturity category. It has an indeterminate growth habit and is an agronomically sound variety.

PAN 1507R

As an agronomically sound variety, PAN 1507 (MG 5,5) is an excellent choice in cooler production regions. PAN 1507 complements PAN 1532R (MG 5,3) in this early maturity class, and PAN 1521 (MG 5,5) and PAN 1555R (MG 5,5) in the medium growth class.

PAN 1586R

PAN 1586R (MG 5,9) is the latest addition to the medium maturity group and an excellent choice for the eastern production area. It is a vigorous variety well suited to temperate production areas, particularly under tough conditions. Together with PAN 1521R (MG 5,7), PAN 1555R (MG 5,7) and PAN 1588R (MG 5,9) it is recommended as part of the main planting in all the temperate dryland production areas, which also includes the western Highveld.

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PAN 7090 strengthens Pannar's formidable conventional sunflower hybrid package.



PAN 1586R is a new versatile medium cultivar (MG 5,9) bolstering Pannar's robust cultivar package.



Unlocking South Africa's true potential in sunflower production

By Prof Ferdi Meyer, managing director at BFAP and extraordinary professor at Stellenbosch University

Sunflower has a broad value chain, making it an important crop in South Africa's agribusiness sector. Sunflower seed is primarily used for the manufacturing of sunflower oil (mainly for human consumption) and oilcake (used in the animal feed sector). Most of the seed produced is marketed locally to oil mills, animal feed manufacturers and for seed.

In production volume, sunflower is the fourth largest grain crop produced in South Africa after maize, wheat and soya beans. For the period between 2012 and 2022, an average of approximately 753 000 tons of sunflower were produced per annum. What is concerning to note, however, is that sunflower production has remained relatively stagnant over the past decade.

National average yields have also remained below 1,5t/ha in most of the production seasons and have not kept up with the constantly increasing global yields. Average global sunflower yields for the past decade amount to 1,8t/ha compared to South Africa's average of 1,3t/ha. Furthermore, globally the area planted for sunflower seed production has increased significantly from just over 22 million hectares in 2000 to around 28 million hectares in the recent production seasons (FAOSAT).

Low oil content persists

A further concerning trend that has emerged over the past four seasons is a decline in sunflower seed oil content, which has had a major adverse impact on the competitiveness of the crushing industry. The oil content of sunflower seed produced in South Africa is significantly lower than that produced in Argentina or the Balkan countries.

Furthermore, cultivar trial data from international seed breeders shows that the same cultivar planted in South Africa yields a lower oil content than if planted under optimal conditions in Argentina. Whereas the industry norm was typically the delivery of sunflower seed with an oil content of 39% and higher, the oil content has dropped significantly, putting crushing margins and the overall competitiveness of the industry under pressure.

A study by the Bureau for Food and Agricultural Policy (BFAP) for the Oilseed Advisory Committee (OAC) in 2020 highlighted several key factors influencing sunflower yields and the quality of seed produced. This research has clearly illustrated that seed yield and oil content are complex, and quantitative traits that are not only controlled by many genes but are also influenced highly by environmental conditions – both additive and non-additive genetic effects – play an important role in the inheritance of seed yield and oil content.

Sound production practices

Ample evidence exists that too early or too late planting dates have a negative effect on both yield and oil content of sunflower seed, and the late plantings common in South Africa, where sunflower is mostly planted after maize and soya

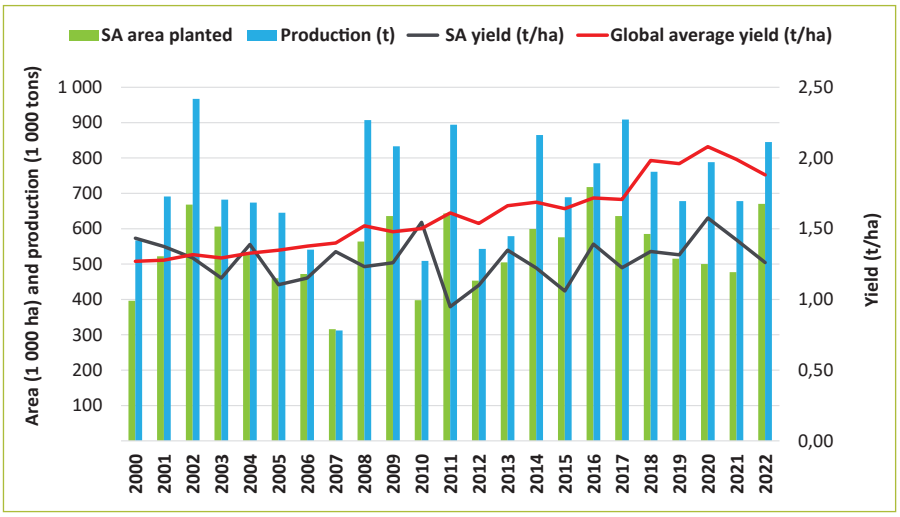


bean crops have been planted, may negatively influence sunflower seeds' oil production potential.

The 2018 sunflower crop seems to be a typical illustration of this phenomenon, where exceptionally late plantings (in some cases as late as the first week in February) coincided with a sharp drop in oil content of the delivered crop. In fact, the past five production seasons (except for 2017) all had a late start, with the majority of plantings only commencing in late December and January in the major sunflower production areas.

Sunflower seed production is the predominant cash crop in Argentina and the Balkan countries, while in South Africa it is maize and more recently soya beans. In South Africa, sunflower is often planted as 'catch crop' and preference is not given to the timing of production (such as optimal planting date), fertiliser applications, soil analysis, or much of the required pest, weed or disease programmes needed for optimal production.

Figure 1: South Africa versus global sunflower trends: sunflower area, production and yields.



Thus, to achieve both high yields and a sufficiently high oil content as inherent to the genetic potential of the sunflower seed, the crop should be planted in areas with suitable climatic conditions (temperature and water stress) and optimal crop management (planting date, planting density, fertilisation) need to be implemented.

The right cultivar for the job

Currently, South African producers have a choice of 199 different sunflower seed varieties, of which 113 are classified as high oil hybrids with the potential of achieving higher than 40% oil content. All 113 cultivars are GMO free, but some have speciality traits such as specific herbicide resistance (e.g. Clearfield or Clearfield Plus) or fatty acid compositions (e.g. high in oleic acid).

From a seed breeding and plant sciences theoretical perspective, there should be a negative correlation between yield potential and oil content. However, based on a range of analyses undertaken on available data (national cultivar trial database), BFAP's study could not find conclusive evidence that a negative correlation exists between yield and oil content. To some extent, these results could have been anticipated given the wide range of external influences such as the planting date and weather that have a significant influence on yield and oil content.

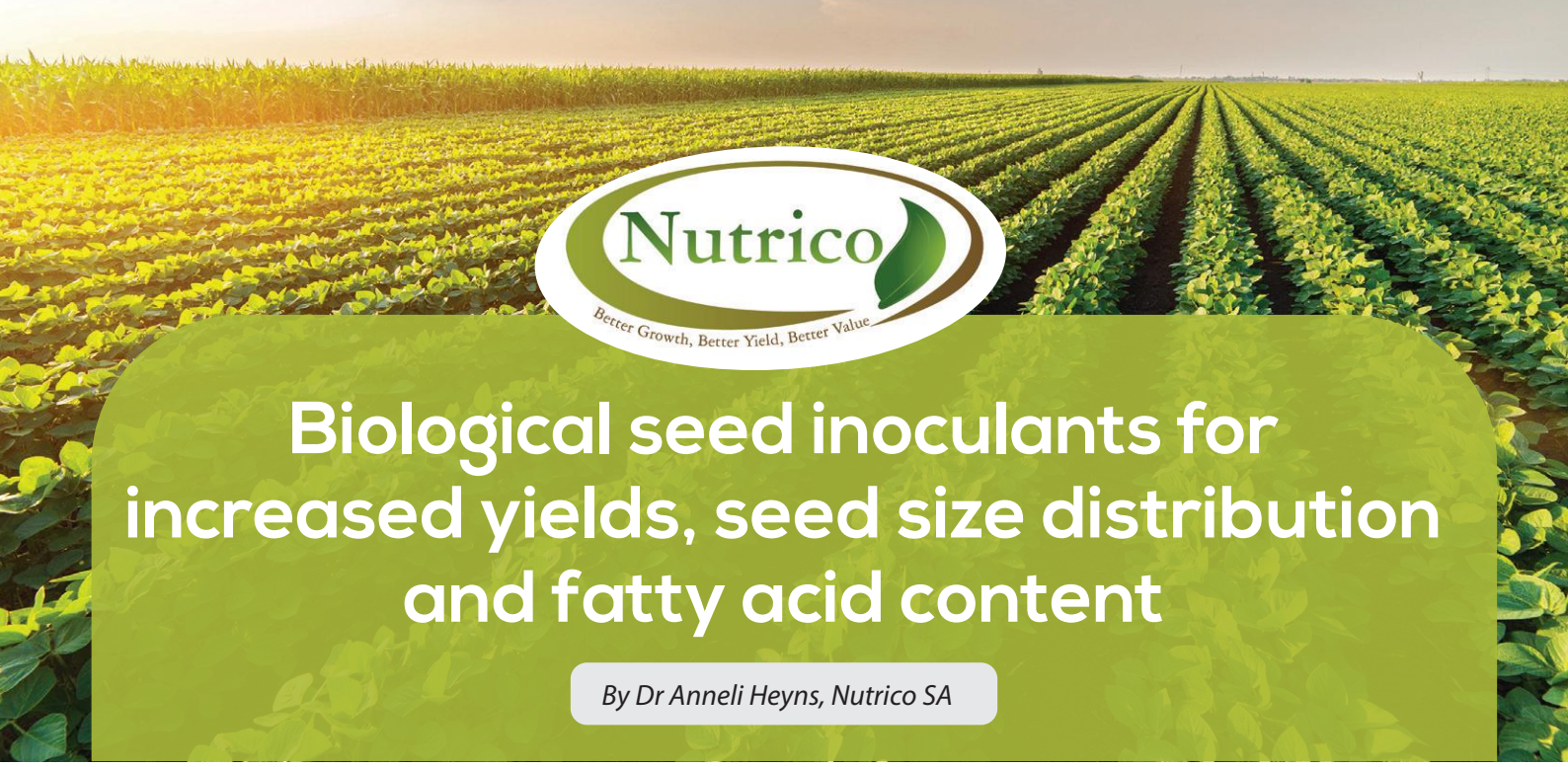
Despite these inconclusive results, the fact remains that higher yields (in the case of producers) and higher oil content (in the case of processors) are critical to boosting the overall competitiveness of the industry. Most seed companies seem to be confident that with the correct cultivar selection, the average oil content of the South African sunflower crop could be significantly improved without compromising on yield in a meaningful way.

A complex situation

Overall, it comes down to the producer's willingness to adopt new high oil content seed and targeted agronomic practices to produce seed that consistently exceeds the threshold 38% (preferably more than 40% oil content), as well as the wherewithal of processors to pay premiums based on oil content, which will sustainably stimulate high levels of high oil yielding seed production, while competing with crude oil imports.

One needs to also be cognisant of the fact that these relationships (pricing structures, profitability, producer decisions) are by no means clearly defined cause-and-effect relationships when it comes to sunflower seed production in South Africa. This is because the causal relationships behind yield and oil content performance are not clear-cut and the positioning of sunflower seed in the typical South African crop mix creates additional complexities.

For more information, email Prof Ferdi Meyer at ferdi@bfap.co.za or visit *www.bfap.co.za.*



Biological seed inoculants for increased yields, seed size distribution and fatty acid content

By Dr Anneli Heyns, Nutrico SA

The importance of *Arbuscular mycorrhizae* (i.e. endo-mycorrhizae) fungal associations in certain oilseeds and their significance in nodulating nitrogen-fixing plants have been well documented. As a result, a mycorrhizae-crop nutritional dependence is created within the rhizosphere that has been shown to produce increased yields, size distribution and fatty acid content of soya bean seeds.

Mycorrhizal dependence refers to the degree to which a host relies on the mycorrhizal condition to grow optimally at a given level of soil fertility. Differences in the relative mycorrhizal dependence between crop species and cultivars are also related to other plant factors, including root structure, plant growth rates and micro-organisms in the rhizosphere, which could affect the demand for phosphorus (P).

Soya beans have a high mycorrhizal dependence because the legume roots are less extensive due to nodule formation. However, certain conventional agricultural practices disrupt the mycorrhizal network, creating a need for supplementing with biological inoculants. Such unfavourable agricultural practises include tillage, crop rotation with non-host plants, excessive use of inorganic P fertiliser and fungicide applications.

Biological inoculants are beneficial micro-organisms applied to either the soil or plant to improve productivity and crop health. They are environmentally friendly products widely used to control pests and improve the quality of the soil and crop. Beneficial micro-organisms include a combination of specific bacteria, select fungi and/or mycorrhizae. Introducing these microbes into the root zone helps create an ideal environment for optimising plant growth.

Symbiotic partners

Fungal inoculation alone can benefit host plants. Mycorrhizal inoculation paired with other amendments such as *Trichoderma* and seaweed-based biostimulants can further improve conditions.

Trichoderma is a genus of soil-dwelling fungi that are highly effective at colonising many kinds of plant roots and inhibiting fungi that cause several types of diseases. Furthermore, it can induce both localised and systemic resistance in a range of plants to a variety of plant pathogens, and have a substantial influence on plant growth and development.

Trichoderma grows on the plant roots and in the rhizosphere, forming a physical barrier to prevent the growth of fungi that would otherwise cause plant disease. *Trichoderma* protects the roots and the mycorrhiza during the first weeks of establishment until the mycorrhiza is sufficiently established to protect the roots, extending beyond the root zone where they mine the soil for additional nutrients and water that would otherwise be inaccessible.

Local trials show that further yield increases are obtainable when biological inoculants are combined with quality seaweed-based biostimulants. Seaweed extracts induce changes in the physiological and biochemical process, leading to improved nutrient uptake and better plant growth. They induce early seed germination, improve root growth, increase leaf chlorophyll, improve crop yield, and enhance resistance to biotic and abiotic stress. In addition, seaweed extracts also improve the physico-chemical and biological properties of soil.

Introducing SeedSecure

Breathe new life into your rhizosphere with SeedSecure, a new range of composite biological products for optimal root growth stimulation, and root health from inoculation to harvest. Nutrico has tailor-made this range to address the nutritional dependencies of mycorrhizae and legumes, ensuring effective root colonisation.

The SeedSecure formulation combines the benefits of several strains of *Trichoderma* and endo-mycorrhizae to

SeedSecure

Trichoderma & Mycorrhiza

SEEDSECURE FIELD PACKS

PACK NUMBER	APPLICATION TYPE	PRODUCT CONTENTS	
1 	Dry Seed	Biological Seed Inoculant *Mycorrhiza en Trichoderma Asperellum*  10 x 50g	STSA Powder Seed Treatment  2 x 1.25kg
2 	Dry Seed Wet Seed In-Furrow	Biological Seed Inoculant *Mycorrhiza en Trichoderma Asperellum*  10 x 50g	Algae Roota Seaweed Biostimulant  1 x 1L
3 	Dry Seed Wet Seed	Rootguard *Trichoderma Harzianum*  5 x 250g	STSA Powder Seed Treatment  2 x 1.25kg
4 	Dry Seed	Biological Seed Inoculant *Mycorrhiza en Trichoderma Asperellum*  10 x 50g	Sidi Man 300 Manganese Powder  1 x 5kg

The SeedSecure range

Pack 1 contains Seed Application (M176, *Act 36 of 1947*) and STSA (B4304, *Act 36 of 1947*) and is therefore best suited for dry seed applications. STSA is a seed treatment made available immediately after application and replaces talc and graphite for planter lubrication. The use of STSA promotes the vigour of germinating seeds and ensures even emergence. STSA contains the necessary nutrients and growth stimulants to support germinating plants in the first few days of growth.

Pack 2 contains the synergistic partnership of Seed Application (M176, *Act 36 of 1947*) and Algae Roota (B5119, *Act 36 of 1947*) and is suited for dry/wet seed applications and for use in-furrow. Algae Roota is a biostimulant consisting of concentrated seaweed extract (*Ascophyllum nodosum*) to promote root growth from an early growth stage.

Pack 3 consists of Root Guard (L10242, *Act 36 of 1947*) and STSA (B4304, *Act 36 of 1947*). Root Guard is a fungal inoculant for the control of root diseases and enhanced plant growth. It contains a unique *Trichoderma* strain, *Trichoderma Hariazanum*, which is well-known for its protection against various diseases.

Pack 4 combines Seed Application (M176, *Act 36 of 1947*) and Sidi MAN 300 (B3826, *Act 36 of 1947*), harnessing the high concentration of manganese to boost nitrogen metabolism, sending seeds off to a good start.

promote the overall health of soil, resulting in abundant root growth and improving plants' performance. SeedSecure is therefore a crucial partner for increased and sustainable local oilseed production.

For user convenience, this range is curated into four turnkey application packs suitable for use as a seed treatment or in-furrow applications. The backbone of the SeedSecure range is the 100% biological Seed Application which holds min 400 spores/g of endo-mycorrhizae and 10^8 CFU/g of *Trichoderma Asperellum*, expertly combined with full-spectrum nutrients suitable for use during the planting stage.

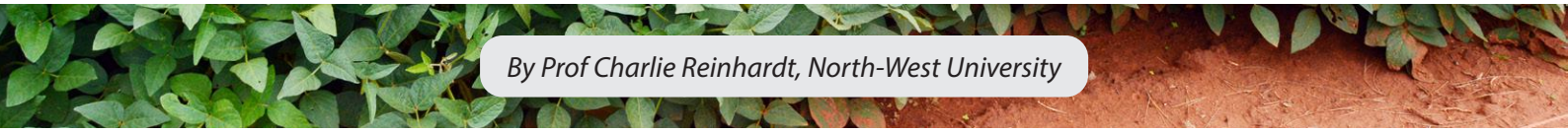
The benefits of SeedSecure

- Contains local fungal strains that are suited for regional conditions.
- Suitable for dry/wet seed application or in-furrow.
- Shelf life of 12 months.
- Registered for use on most oilseeds.
- High active concentration at a low application rate.
- Contains synergistic partnering of mycorrhiza and *Trichoderma*.
- Protects against soilborne diseases.
- Manages the plant tolerance to abiotic stress factors.
- Enhances nitrogen fixation.
- Improves soil structure and health.
- Promotes abundant root development and growth.
- Increases phosphorus and other nutrient uptake, and water availability and uptake.
- Boosts overall plant growth and vigour.
- Significant yield increases.
- No withholding period or residues.
- No crop phytotoxicity.

Nutrico is proudly celebrating 20 years of growing excellence in product development, manufacture, and supply of innovative and sustainable plant nutrition and crop protection products. Our vision is to empower our customers with scientific knowledge and solutions aimed at consistently gaining better crop growth, increased yields and higher value. For more information on our extensive range of biological solutions, visit *www.nutrico.co.za* or phone 011 392 4072 or 021 807 5922.



Nematode control in soya bean: Interactions with certain herbicides



By Prof Charlie Reinhardt, North-West University

Recent long-anticipated expansion of soya bean production in South Africa has exposed this vitally important crop to various pests and diseases, as well as environmental stress factors. According to Engelbrecht *et al.*, 2020, plant-parasitic nematodes (PPN) represent a significant biological threat for soya bean production, especially species of *Meloidogyne* (root-knot nematodes) and *Pratylenchus* (lesion nematodes).

In spite of this risk, Engelbrecht *et al.*, 2020, contends there is a lack of information in South Africa and sub-Saharan Africa regarding crop yield losses suffered due to PPN. The authors cite local research reporting soya bean yield losses ranging from less than 10% to about 40%. They describe the potential impacts of the two dominating nematode groups, *Meloidogyne* and *Pratylenchus*, on soya bean production in South Africa, and discuss the efficacy of various nematode management methods and strategies.

In sub-Saharan Africa the leading soya bean producing countries are South Africa (2018/19: 1,17 million metric tons [Mmt]; 2019/20: 1,45Mmt; 2020/21: 1,9Mmt; 2021/22: 2,2Mmt), Nigeria and Zambia (USDA World Agricultural Production, 2023). In South Africa, several effective chemical (synthetically produced) nematicides are registered for use in crops such as maize, sunflower, groundnuts, cotton and dry beans; however, until recently there was a total lack of nematicides registered for soya beans in this country.

Possible reasons could be the relatively small size of the market, uncertain economic returns on nematicide use, and perhaps even negative crop responses. Fact is that several types of nematicides registered on soya bean elsewhere in the world are currently not registered in South Africa. This could explain the high incidence of unregistered (unlawful!) use of nematicides on soya bean in this country.

Influence of nematodes on crops

Nematodes are non-segmented invertebrate animals, typically 300 to 1 000 microns (1 000 micron = 1mm) in length and 15 to 35 microns wide, although some can be up to 4mm long. Their association with plants dates back 150 million years.

Nematodes trigger direct and indirect damage symptoms on plants. Direct symptoms include a reduction in root mass, abnormal root structure, and enlargement of roots. In the case of enlarged roots, the benefit of high surface area of thin roots is sacrificed. Indirect symptoms include reduced water and nutrient uptake and translocation.

Visible aboveground symptoms include stunting of plants, wilting and yellowing of green plant parts, and in cases of severe infection, even the death of plants. Patterns of damage are typically visible as circles or patches on a crop field. Total uniform infection of a field is unlikely. Belowground effects of root-knot nematodes become visible when galls form on plant roots. These galls are different and easily distinguishable from the nodules resulting from infection by the nitrogen-fixing bacteria *Bradyrhizobium* and *Rhizobium*, with which soya bean seed is commonly inoculated.

Lesion nematodes cause discoloration (grey, brown, black) on the outer surfaces of infected roots, and necrotic (dead) tissues inside the roots. Diagnosis of nematode damage is by no means easy to perform and should best be left to experts because many other biological, chemical and physical stress factors can cause look-alike symptoms on plants.

Reasons why root-knot and lesion nematodes remain highly problematic in soya bean are wide host ranges, including crops grown in rotation; variety of nematode species in a particular crop field; lack of effective nematicides; variable cultivar susceptibility to infection; and seasonal fluctuation in infection levels.

Biological and chemical control options are pursued by the crop protection industry. Integrated pest management (IPM) strategies, which avoid single-method approaches, are being promoted for best results.

Chemical (synthetic) nematicides

Nematicides that are synthetically produced in a factory remain the most

important tool used worldwide for PPN control, although there is a dearth of chemical options in soya bean, in South Africa in particular.

Nematicides can be grouped into 'fumigant' and 'non-fumigant' products. The first highly effective nematicide on a global scale was methyl bromide, a fumigant product that entered the market in the 1940s. Methyl bromide was eliminated from use in developed countries in 2005 based on its acquired-over-time classification as 'Class I ozone-depleting substance'.

Since the 1960s, the non-fumigant organophosphates and carbamates were developed and are still used extensively the world over. Terbufos is a potent organophosphate, and aldicard is a carbamate that gained notoriety and market-elimination because of its extreme toxicity towards animals. Aldicard is classified as insecticide (acaricide) and nematicide, while terbufos is classified as insecticide and nematicide (*The Pesticide Manual*, British Crop Production Council).

According to Engelbrecht *et al.*, 2020, only one nematicide, Avicta® (active ingredient, abamectin), is in the process of being registered by Syngenta in soya bean in South Africa. On page 25 of Syngenta's *Africa and Middle East Product Guide*, at the product Avicta® Complete (active ingredients: abamectin + thiamethoxam), there appears this wording: "Registered countries: South Africa". Avicta® is marketed as a seed-treatment product.

Bayer recently registered the nematicide Velum® 1 GR (active ingredient: fluopyram) in South Africa for use in maize and soya bean. This product is a granular formulation applied in the plant-furrow. Besides being registered for control of *Meloidogyne* and *Pratylenchus* nematodes, Velum® 1 GR also controls spiral nematodes (*Helicotylenchus* species).

A common perceived shortcoming of seed-treatment products, such as Avicta®, is the relatively low amounts of active ingredient that can be conveyed to a crop field in this manner. Although effective crop protection during the critical seedling phase is highly desirable, protection against pests such as nematodes are also important beyond the seedling stage. Granular formulations applied in the plant-furrow offer this benefit.

Nematicide-herbicide interactions

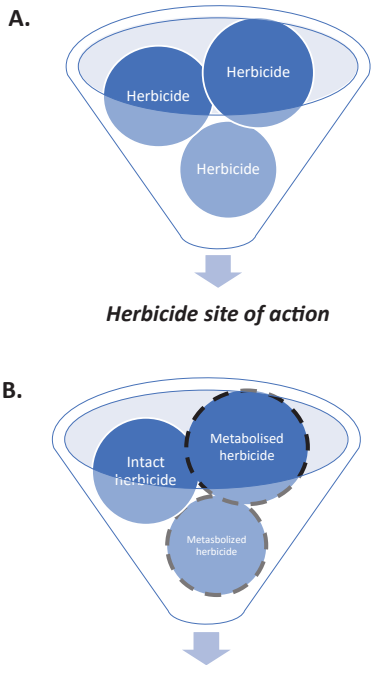
Many types of herbicides can be tolerated by the crops for which they are registered, only because the herbicide is rapidly inactivated or metabolised within the crop plant's system. A 'super family' of oxidative enzymes, cytochrome P450 oxidases, are responsible for attacking and inactivating (i.e. metabolising) many important herbicides within plants. This complex of plant enzymes is also activated by other stressors such as pesticides (xenobiotics), pathogen attack, wounding, light-induced stress, water stress, infection, etc.

In cases where a crop's tolerance to a herbicide is dependent on the speed at which cytochrome P450 enzymes metabolise the herbicide, any factor limiting or reducing P450 activity could result in plants not being able to tolerate the herbicide; hence, crop damage is incurred.

Organophosphate and carbamate insecticides/nematicides reportedly inhibit P450 activity, and such products can sensitise crops to herbicide damage under specific conditions. The latter conditions mainly involve the use of mixtures of certain herbicides and certain organophosphates or carbamates, but also the separate use of such products on the same crop within a certain timeframe. To avoid crop damage problems of this kind, certain herbicide products (e.g. those with mesotrione and chlorimuron-ethyl as active ingredients) carry warning statements on the label.

This is but one reason why unregistered use of nematicides, especially carbamates and organophosphates, for the control of nematodes on soya bean is not only illegal but also can cause yield losses through indirect herbicide damage. Who these days can afford yield loss in the order of 10%, and even 5%? Note that crop damage caused by herbicides is usually invisible to the eye up to a damage level as high as 20%.

Figure 1: Diagrammatic representation of how 'enhanced herbicide metabolism' activated by cytochrome P450 enzymes imparts herbicide tolerance in crop plants.



A. In herbicide-sensitive plants a threshold amount of intact (=active) herbicide molecules reach the site of action and plants die.

B. In herbicide-tolerant plants sufficient herbicide molecules are metabolised (=inactivated) by cytochrome P450 enzymes before they reach the site of action - such plants survive.

Charlie Reinhardt is professor in agronomy at North-West University, and research project lead in the South African Herbicide Resistance Initiative (SAHRI) at the University of Pretoria. He can be contacted at 083 442 3427 or email dr.charlie.reinhardt@gmail.com.

Take a step back with foliar nutrition

By Prins van der Merwe, agronomist, Yara

The use of foliar nutrition dates to 1844 when iron sulphate was first applied to remedy chlorosis, also known as green sickness. Today, 179 years later, foliar nutrition sprays are an integral part of fertilisation and are used more than ever before. Market and data research indicates that this market will reach an estimated US$7,4 billion by 2026.

Except for the growth in the use of foliar sprays, products are also developing from only sulphate and standard water-soluble products to chelated and formulated products. Given these new products, formulations and even unfamiliar nutrients on the market, it is no surprise that distinguishing between fact and fiction may be difficult when it comes to foliar products and their effects.

In this regard, it is best to take a step back and revisit the main principles for foliar feeding sprays. A good starting point is the motivation for using these products:

- Nutrient availability is limited through the roots as a result of soil conditions, which include cold or waterlogged soils, high nutrient loss due to leaching, and root diseases.
- When environmental conditions or nutrient translocation are limited to certain plant parts and growth stages when demand for certain nutrients is pivotal for the season.

Here are some practical considerations in respect of foliar feeding sprays.

Nutrient uptake

In terms of spraying, efficient nutrient uptake by leaves is a function of concentration gradient. Nitrate (K, Ca, Mg) and sulphate (K, Mg, Mn, Zn) products are effective and widely used, but should be sprayed at between 1 to 4% to be effective (especially in citrus). By spraying at these concentrations, leave burn in certain circumstances is possible. Chelates are also popular options, but producers should consider whether the amount of nutrient applied is effective enough for plant response, especially considering the cost per nutrient.

Water rate and droplet size

Water rates differ between crops and can vary from 200ℓ/ha (broadacre crops) to over 3 000ℓ/ha (tree row crops). The water rate for nutrient foliar applications should not exceed the point of run-off. Therefore, droplet size is key, as it determines how much of the spray solution is retained on the leave.

Droplet size is determined by the type of nozzle and pressure. The sufficient size of droplets differs between crops and can vary from 100 microns (pome fruit) to 1 000 microns (citrus). After determining the correct water rate and droplet size, the correct time of application should be considered.

Nutrient uptake

Nutrients can only be absorbed when it is in solution form. This implies that droplet drying must take as long as possible after spraying. Therefore, temperatures should not exceed 27°C (relative humidity of at least 50 to 80% is required).

Foliar sprays should be applied during cooler times of the day (e.g. early morning or late afternoon). When spraying in the afternoon, make sure the fruit and leaves are also cooled down, because the air temperature may have cooled, but the leaves and especially fruit takes longer. Light also improves nutrient uptake and therefore (early) morning applications might be best.

Mixing of products

Tank mixing of products is important. In theory it is advised to only combine three products in a spray tank, but in practice this is not the case. To minimise problems, always follow the prescribed mixing procedure of the different products. For more guidance in this regard, refer to Yara's tank mixing website (*www.tankmix.com*). Also consider the pH effect of the different nutrient products (e.g. mixing YaraVita™ suspension with YaraVita™ phosphorous products may result in precipitation).

Plant status and crop type

The efficacy of a foliar applied solution is influenced by the physiological status of the plant and type of crop. Leaf characteristics such as its shape (onions versus tree crops) and physical attributes (cuticle composition, surface wax architecture, presence of leaf hairs, etc.) differ between crops and should be taken into consideration. Crops should also have enough healthy leaves and not be under any abiotic stress.

YaraVita™ product range

Foliar nutrition is and will remain a key part of crop nutrition, but the rational and practical side of application should always be considered. It should be noted that foliar applications will never replace soil applied nutrients (especially macronutrients) and should be used accordingly, although it can be six to 20 times more effective in certain conditions.

If a foliar application is required, we can comfortably recommend our YaraVita™ product range, as it contains the best raw materials (pharmaceutical grade), can be effectively administered (concentration, dispersing agents, suspension agents) and has a tank mix app (*www.tankmix.com*). Moreover, nutrients can be effectively absorbed (wetting agent stickers, absorbing agent) by the leaves.

For more information, email elna.wessels@yara.com or visit *www.yara.co.za*.



Konsentrasiebestuur is nou nog makliker met Yara plantvoeding

Eenvoudig

Yara-oplossing vir fertigation – YaraRega™ en YaraTera™ CALCINIT™ is volledig wateroplosbaar en werk met enige besproeiingstelsel. Slegs twee produkte vir alle gewasse en alle groeistadiums volgens plantbehoefte.

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Hoogs effektief.

Gebalanseerde plantvoeding is nou nog makliker met YaraVita™ spoorelemente wat aandag aan "detail" gee.

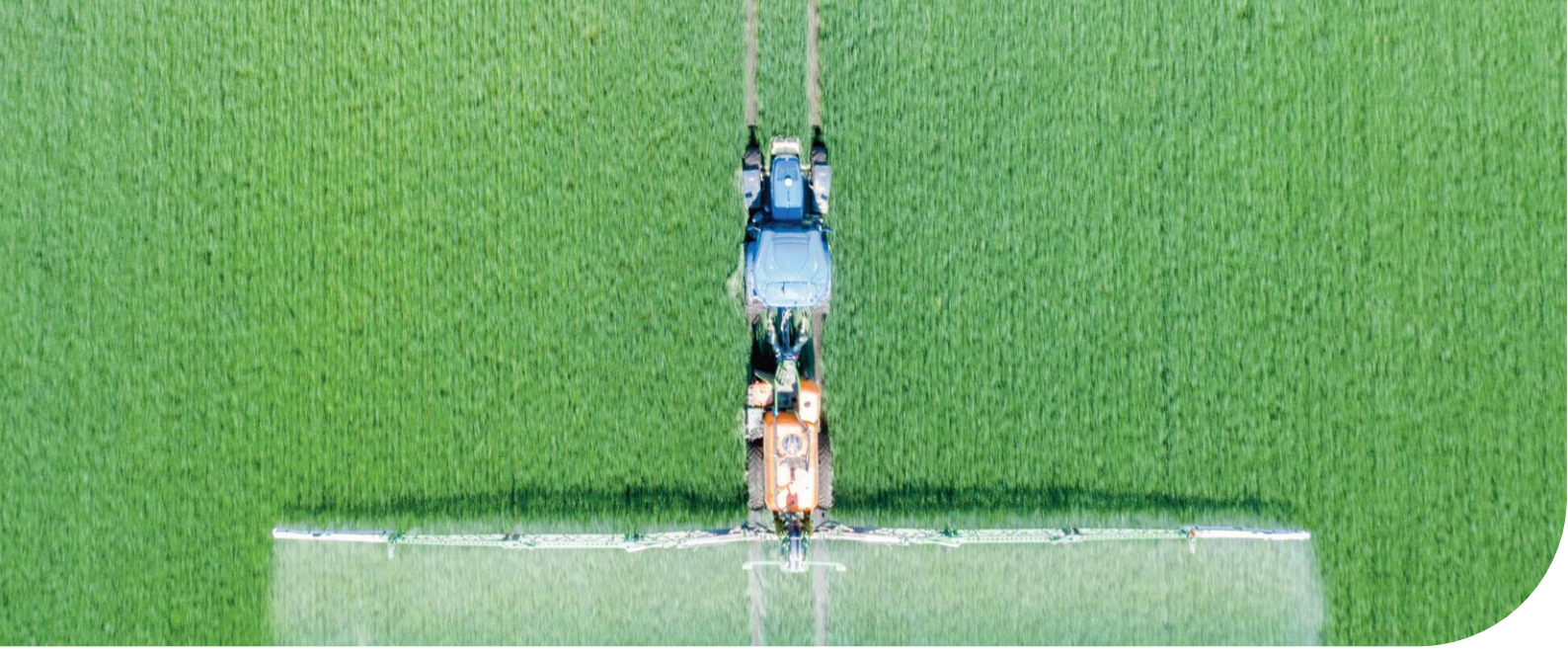




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Product registrations: A chemical catch 22

By Susan Marais

The need to regulate agricultural remedies in South Africa is a given. Regulations should be in place to protect the health of consumers and workers handling plant protection solutions, as well as the environment.

However, in 2020 the European Commission adopted a set of strategies in its European Union (EU) Green Deal that aims to make the EU climate neutral by 2050. While there are several aspects to the Green Deal, the farm-to-fork strategy is of great concern to the South African agricultural industry, according to Rod Bell, CEO of CropLife SA.

"The EU has every right to implement legislation aimed at protecting its citizens and the environment, but it doesn't give them the right to be prescriptive over farmers producing crops under different circumstances in other countries," Bell says. "They need to consider other role-players across the world and what is required for food production."

While CropLife SA does not plan on ever challenging this right of the EU, it maintains that all role-players involved in the production of food (either for local consumption or export) in South Africa need to be aware of the implications the introduction of various parts of the EU Green Deal may have.

Farm to fork: Strategic concerns

Within the next seven years, the farm-to-fork strategy aims to ensure that a quarter of EU produce are farmed organically. Furthermore, the EU wants to half its agricultural pesticide and antimicrobial use, as well as reduce fertiliser use by a fifth (20%).

"EU legislation is sure to follow in support of this aim," says Bell. "Locally we should be concerned, because this strategy will inevitably lead to certain products being removed from the 'plant protection solutions' toolbox that is currently available to South Africa's primary food producers."

Moreover, Bell expects that the import tolerance for certain products will be revoked. This means that food produced with the use of such plant protection solutions in South Africa will no longer be allowed entry into the EU. Certain maximum residue levels will go down to the level of quantification or will be revoked altogether if that product is not registered and used in the EU.

Not all doom and gloom

While the EU's strategies are cause for concern, this is not entirely out of line with CropLife SA's strategies to convince more South African producers to adopt integrated pest management (IPM) strategies. Not only does the adoption of IPM strategies make sense from a primary food producer perspective – it also makes sense for consumers, workers handling plant protection solutions, and the environment.

CropLife SA's IPM principles are aligned with a few of the points included in the EU's farm-to-fork strategy. These include the reduction of pesticide volumes applied to food crops. "Producers should only apply a plant protection solution when absolutely necessary," Bell says.

Furthermore, producers ought to include other plant protection solutions (such as biologicals and pheromones) in plant protection programmes, using as

many tools from their pest control toolbox as possible.

Local regulatory challenges

CropLife SA is, however, concerned that the EU's plans, together with South Africa's regulatory issues, might leave producers' toolboxes rather empty.

The loss of useful plant protection solutions is one risk, but the 'double whammy' is the current delays being experienced by industry in terms of bringing new technologies to the local market for primary producers of agricultural produce to effectively protect their crops from pests. Other countries that compete with South Africa for the EU's agricultural produce import market, can adapt more quickly to the loss of older plant protection solutions via the introduction and adoption of new plant protection solutions due to a faster regulatory process for new technologies in the plant protection arena.

"To bring a new product to market, we need multiple years of field trials to generate data in different climatic regions of the country before an application can be brought to the registrar's office," Bell says. All agricultural chemicals need to be registered by the office of the registrar of the *Fertilizers, Farm Feeds, Seeds, and Remedies Act, 1947 (Act 36 of 1947)* before it can be sold.

It takes at least seven years for a company to conduct their field trials on a single product, compile a registration dossier, submit the dossier to the regulator and finally receive authorisation for the sale and use of the new technology. "This brings us to our double whammy, because this long waiting period for product registrations could deter multinational agrochemical companies from bringing their latest technologies to South Africa."

Expiration of patent registration

Liza Bohlmann, communications business partner at Bayer Crop Science (South and East Africa), says another concerning issue is that any new product's patent registration will expire in a set number of years. Agrochemical and seed companies annually spend billions on research and development.

As a global life sciences company, Bayer's research and development expenses during 2021 amounted to some €5,3 billion (around R101 billion). Every year that the registration period drags on, it shortens the period that innovation companies can have a return on research and product development investments for future projects. In short: Producers face the potential loss of current products on the market, while they might not see the introduction of new tools coming to market due to registration issues.

"When all is said and done, it is important to be fair to South African regulators," Bell says. "They are under a lot of pressure from various entities outside of agriculture. There are many groups that still believe we can feed the world without pesticides. These groups are placing immense pressure on regulators not to register certain new products."

Bell adds that it is crucial that regulators should refrain from listening to misleading hype. All decisions should be based on recognised, peer reviewed data. Careful thought is necessary when deciding what pesticides to withdraw and keep from our producers.

Global regulations' local effect

Local, regional and international regulators need to not only consider the natural impact of chemicals, but also the socio-economic impact of removing too many plant protection solutions from the South Africa producer's toolbox.

"While their intentions might be good, they need to ensure they do not negatively impact producers (large or small scale), local food production (local use or for export) and local food security."

Furthermore, EU policymakers need to be aware that South Africa's local climate conditions and crop-pest combinations are in many instances unique to this country. Therefore, removing plant protection solutions from the market simply because the same crop or crop-pest combination cannot be found in the importing country is unfair.

"For the EU Green deal policymakers and local regulators to only have 'safe products' on the market is certainly very noble, but we also have local conditions that need to be considered, as well as some unique crop-pest combinations that require plant protection solutions that might not be necessary or used in the EU."

While less than 2,5% of Europe's inhabitants are undernourished according to the Food and Agriculture Organization's *2022 State of Food Security and Nutrition in the World*, hunger is a daily reality for almost 10% of South Africans.

"South Africa remains on the borderline with regard to food security, because we are often the victims of the vagaries of our climate," Bell says. "Regulators need to be reminded that we do have unique conditions. We cannot simply bow to international or local pressure to remove certain plant protection solutions from local markets without careful consideration."

Solutions on the horizon

During the second half of 2022 CropLife SA, as part of the Strategic Agricultural Inputs Forum, made significant strides in working together with the Office of the Registrar of *Act 36* and the director general of the Department of Agriculture, Land Reform and Rural Development (DALRRD) to try to understand the root causes behind the bottlenecks being experienced in the local regulatory process for plant protection solutions.

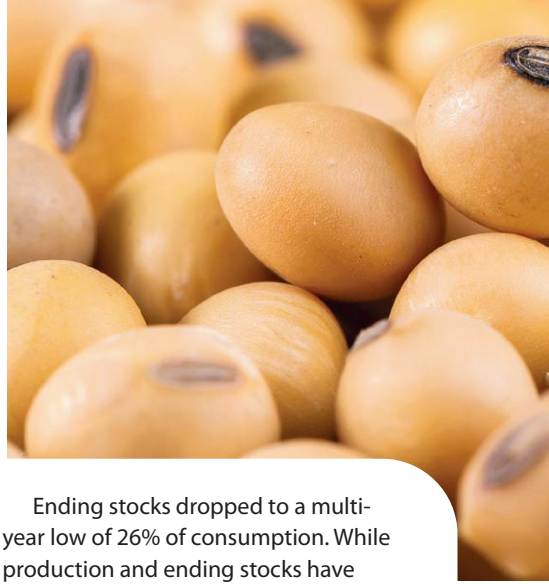
One of the common threats that all of these industries share is that they cannot sell products on the local agricultural market if these products are not registered in terms of the various provisions detailed in *Act 36*. After a great deal of work involving representatives from SAIF and the Office of the Registrar, an exercise to identify the reasons for delays in the regulatory process was completed with the finalisation of a gap analysis document, which was formally adopted as a baseline by the DALRRD and SAIF.

"We are now working together with the Office of the Registrar to understand how we can jointly address the items highlighted in the gap analysis exercise to improve the regulatory process and timeline. The baseline will help us to see how the situation could be improved. While we still have a long way to go, we are thankful for the officials' willingness to work with us," Bell concludes.

It is important to keep in mind that such teamwork will not reap overnight results. Meanwhile, the EU Green Deal and its potential negative impact is looming.

For enquiries, phone 087 940 4168 or visit *www.croplife.co.za*.

A look at the current soya bean situation



By Christiaan Vercueil, junior agricultural economist, Grain SA

Since the 2012/13 production season, soya bean production has been showing an upward trend of an average of 4% per season. This led to increasing ending stocks at the end of each season. During the 2019/20 season, world soya bean production decreased by 6% or 28 million tons of soya beans to 340,37 million tons.

Figure 1: US soya bean area harvested, production, consumption and ending stocks from 2012/13 to 2022/23.

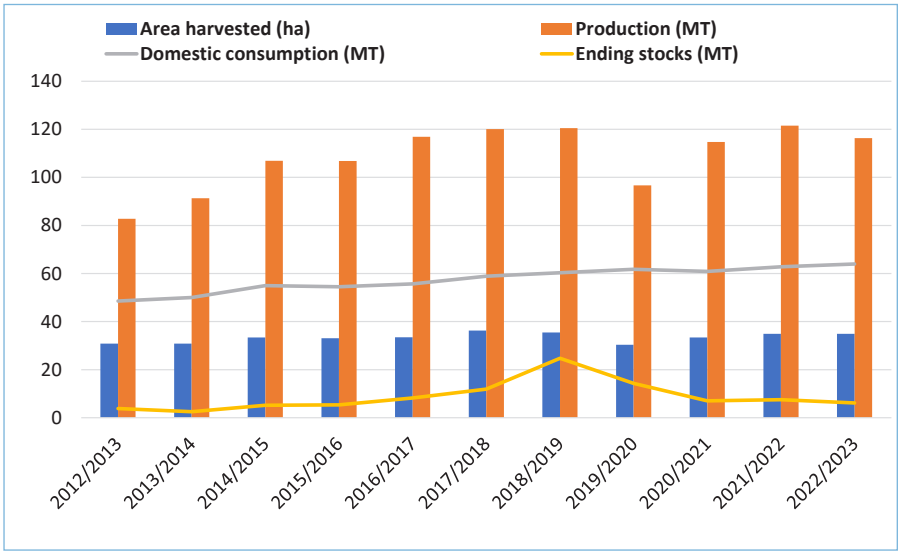
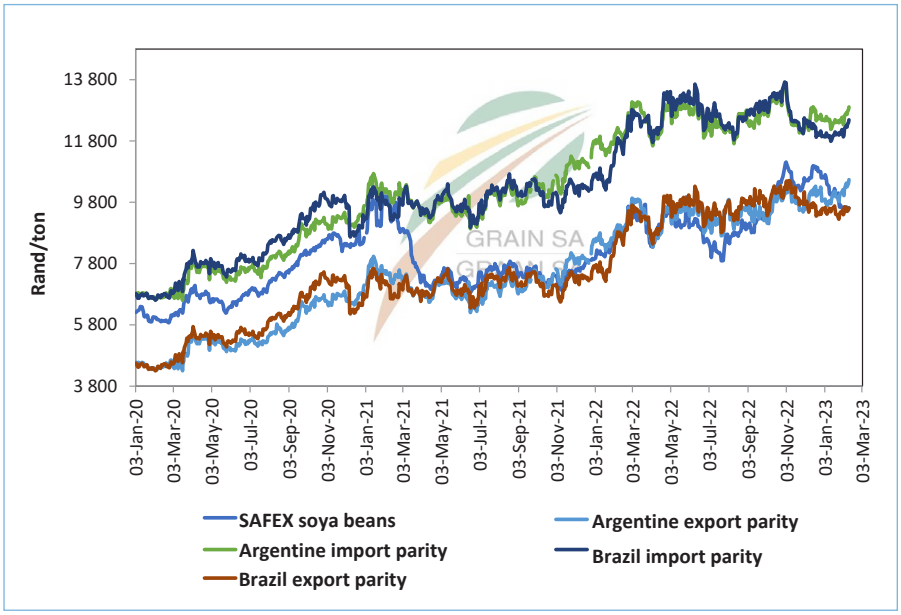


Figure 2: Prices of whole soya beans delivered in Randfontein. (Source: Grain SA)



Ending stocks dropped to a multi-year low of 26% of consumption. While production and ending stocks have recovered since, consumption has also continued to increase year-on-year.

In the 2021/22 season, South American production was low, and the world turned to the United States (US) to increase international ending stocks. However, while the US had planted the biggest soya bean crop in its history (*Figure 1*), drought experienced during the production period led to a below-average crop.

The yield amounted to 3,33t/ha compared to the five-year average of 3,36t/ha and the previous season's record of 3,48t/ha. Thus, ending stocks remained at lower levels. But while the US experienced a marginal season, South America had an even worse season, which led to a heavy reliance on US soya bean exports.

South America

Prices were to remain supported due to these lower-level ending stocks until Argentina and Brazil entered the market. That time has arrived and soya bean harvesting in South America has in the meanwhile commenced.

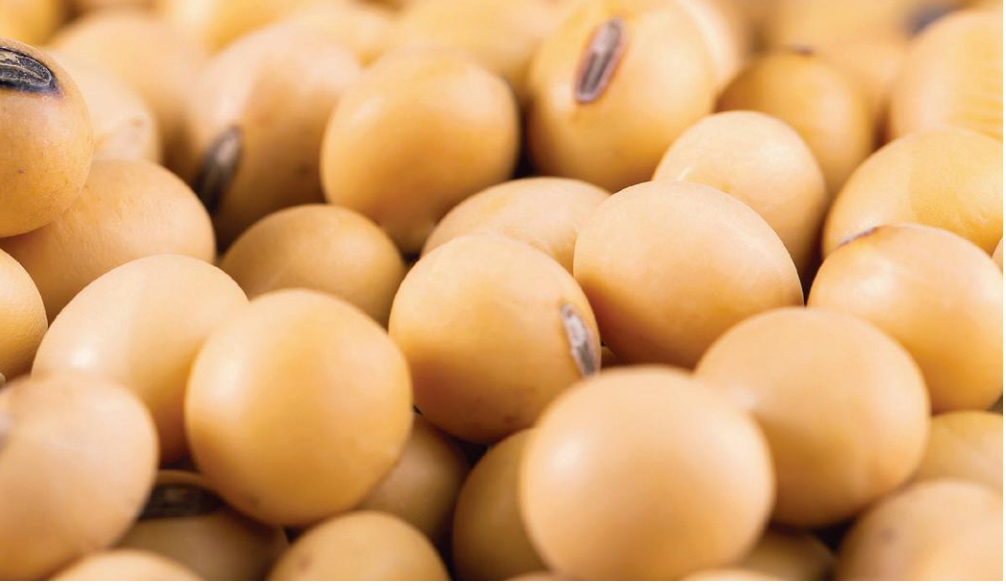
Argentina

Argentina has seen a decline in soya bean production across the current as well as the past three seasons – from 55 million tons in 2018/19 to an estimated 41 million tons in the current season, with other reports and publications pegging the Argentine soya bean crop at 35 million tons.

In addition, the Argentine soya bean crop is not looking well due to widespread drought. Although the country recently received some rain, irreversible damage has already been done to the crop.

Brazil

The situation in Brazil is different. The country produced ten million tons less



(-7%) in 2021/22 than during the previous season, which is another major reason why soya bean stocks were at low levels. In contrast, soya bean production this season is estimated at a record figure of 153 million tons. Once full-scale soya bean harvesting commences, the world will shift from the US to Brazil as the main origin of exports.

Brazil's soya bean exports for January 2023 came in at around 840 000 tons – only about a third of the figure in January 2022 due to lower ending stocks and rain delays during the harvesting process. Soya bean export prospects for Brazil in January 2023 are, however, between eight and nine million tons, indicating the shift of origin to Brazil.

The local market

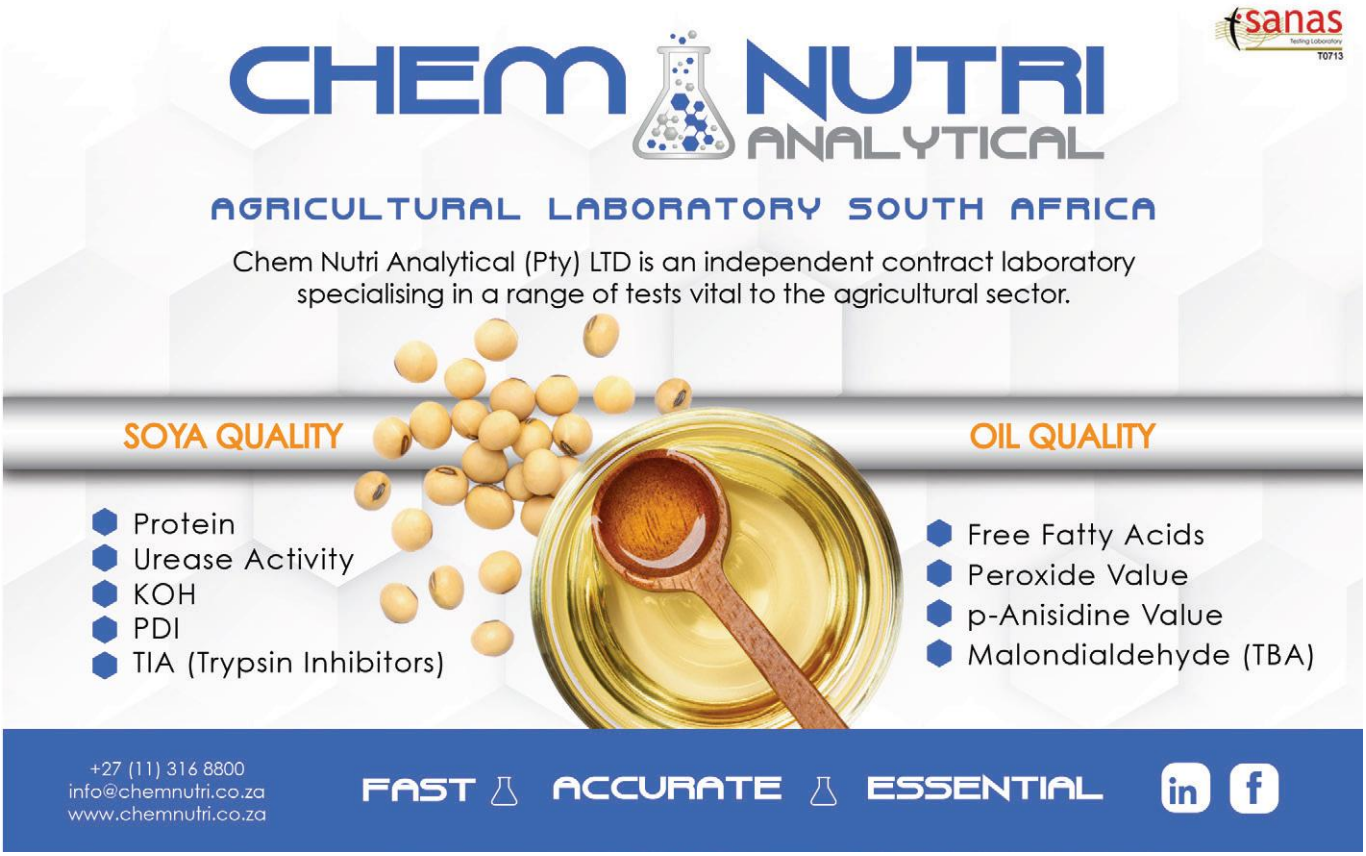
Local market prices (*Figure 2*) have recently been slightly higher than Argentine and Brazilian export parity, partly because of high export demand in South Africa, lower local stocks due to the end of the season approaching, and lower prices in Argentina and Brazil due to a large expected crop in South America and lower exports due to lower stocks.

Producer soya bean sales were also high in Argentina in December due to the preferential soya bean exchange scheme. SAFEX prices have moved closer to export parity with a large crop expected in South Africa as well. Prices have been under pressure since mid-December and moved from R10 996/ton on 15 December 2022, to R9 780/ton on 13 February 2023, which amounts to an 11% loss in fewer than 30 days.

Conclusion

If exports reach 270 000 to 320 000 tons towards the end of the season, supplies might be tight which can support prices for a short period. But expectations for the soya bean market are bearish with South America expected to enter the market in bulk.

For more information, contact Grain SA at 086 004 7246 or visit *www.grainsa.co.za*.



Role of soya bean oilcake and meal in the local poultry feed industry

By Christal-Lize Muller

The value of South Africa's poultry industry, which is the largest agricultural subsector contributing in excess of R50 billion to the gross value of agricultural production in 2021, cannot be overemphasised. It employs more than 50 000 people directly and accounts for approximately 40% of total local animal feed usage. Last year alone it accounted for 66% of total meat consumption in the country.

Although its consumption has grown locally, the industry has faced some major challenges over the past decade. This included the severe drought which caused a substantial spike in feed prices, increased poultry meat dumping which resulted in price pressures, and supply chain challenges due to the Covid-19 pandemic, drought conditions, and Russia's invasion of Ukraine.

Nevertheless, South African producers remain competitive and are producing a kilogram of chicken meat at a lower cost than their European counterparts. Given high global feed prices, South Africa is positioned well with its local soya bean industry continuing to expand.

Rising feed consumption

According to Izaak Breitenbach, general manager of the Broiler Organisation at the South African Poultry Association (SAPA), the local poultry industry plays a major role in the country's feed industry, simply because of the volume of feed utilised by the industry.

Despite various challenges there is no shortage of feed at this stage. Poultry feed consumption has risen, as producers are struggling to slaughter locally during load shedding. Chickens are therefore kept on farms for longer.

In December 2022, the Bureau for Food and Agricultural Policy (BFAP) published a study regarding the competitiveness of the South African broiler industry.

The first benchmark analysis of this study was conducted in 2015 in collaboration with Dr Peter van Horne of Wageningen University and Research to evaluate the technical and economic efficiency (including feed and raw material costs) of South African production relative to global leaders.

The assessment was repeated in 2017 and the report details an update of the same study, based on 2021 data, highlighting how this position has evolved over time. The countries used in the study included South Africa, the Netherlands , Germany, Poland, the United States (US), and Brazil.

Technical efficiency

The BFAP study indicates that South Africa showed the lowest feed conversion ratio (FCR) of all countries sampled. FCR serves as an indicator for technical efficiency, but must be interpreted in combination with slaughter weight, as feed conversion declines as birds get older. Therefore, a longer growing period would be accompanied by a higher FCR.

The report stated that South Africa's FCR of 1,45kg feed/kg meat is not unexpected as the country's live weight at slaughter (1,82kg) is also the lowest in the sample. Compared to 2017, South Africa's average FCR improved by 6% and was achieved at a fairly consistent slaughter weight, pointing to efficiency gains over time. Based on this information, South Africa is performing extremely well in terms of feed quality and because of this, the country has improved its competitiveness in respect of animal feed compared to 2019.

Feed costs across countries

The report found that in terms of feed costs, South Africa is above the sample average on a cost-per-ton basis, while its position has improved relative to the rest of the sample on a cost-per-kilogram-produced basis, owing to its good FCR. South Africa's relatively high feed prices are influenced by the cost of raw materials as the country is typically a net exporter of yellow maize, and a net importer of soya bean meal.

According to Breitenbach, feed cost in South Africa is not competitive in terms of the prices that chicken producers will pay in Brazil and the US as an example, but it does compete with the European Union (EU) in terms of total feed costs (*Figure 1*).

The main source of energy (maize) in the ration is competitively priced, but the protein source (soya bean) is more expensive locally than in Brazil, Argentina and the US, which are net exporters of both products. With local soya bean

Figure 1: Feed costs in South Africa relative to other leading producers. (Source: BFAP)

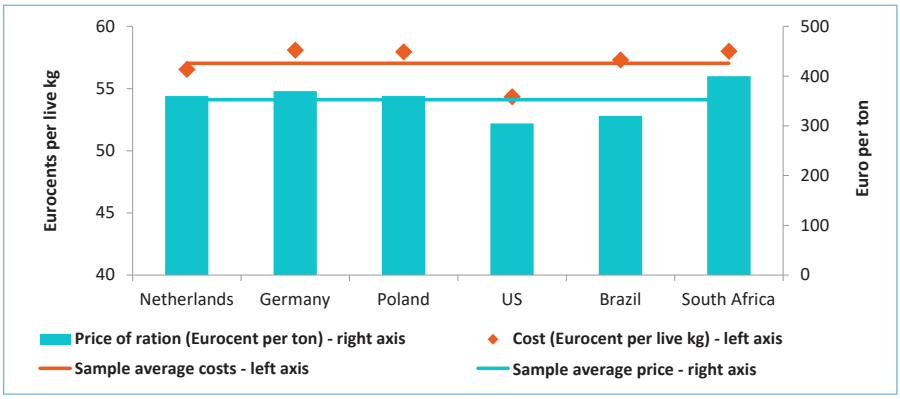


Figure 2: Cost of feed material prices. (Source: Grain SA, 2022)

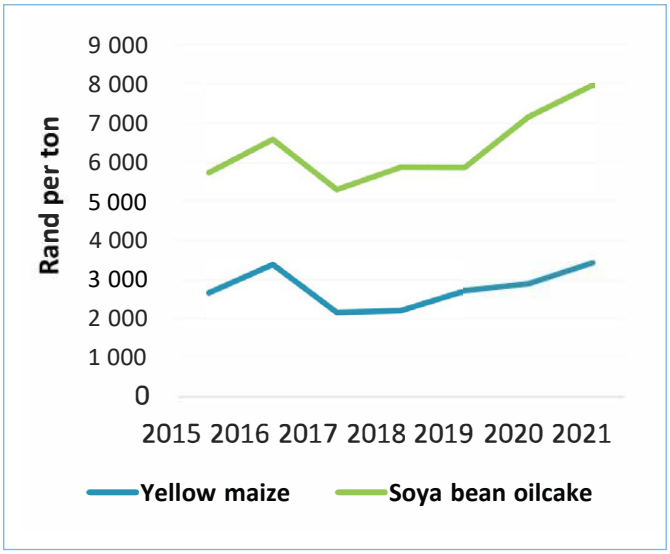
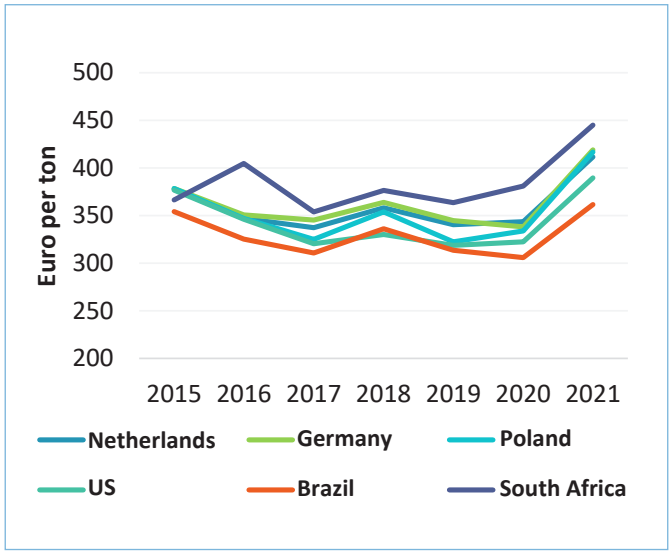


Figure 3: Soya oilcake price. (Source: ITC Trademap, BFAP 2022)



production and processing expanding rapidly, soya bean oilcake prices are expected to become more competitive.

Major drivers of local price increases

Breitenbach says the average price of animal feed in South Africa has increased by 21% since early last year to this year. This increase, specifically from April 2022 until recently, was driven by increases in the price of maize and soya beans. In volume terms, some 50% of the poultry diet consists of maize and roughly 23% of soya bean oilcake, but the value of soya bean meal is double the value of maize, which means soya bean oilcake and maize contribute almost the same in terms of value to the cost of the diet.

"Over the last year we saw a price increase due to global shortages of maize and soya bean. This is because of China placing more pigs and, in the process, drawing more energy and protein products from the global market."

The second aspect driving price increases is the Russia/Ukrainian war. Ukraine traditionally produces wheat for the European chicken market – lower wheat production due to the war led to the European market starting to use maize, which pushed up the maize price globally. Ukraine was also a large producer of soya bean and is now producing less, which has put upward pressure on the price globally.

Protein sources still expensive

Figure 2 illustrates the 2015 to 2021 price of yellow maize and soya bean as feed materials representing the primary source of energy and protein in broiler rations. It shows that soya bean meal prices increased by 49% in 2021, while yellow maize prices declined by 57% in 2021, in both cases relative to 2017.

The increase in feed and feed material prices largely emanated from global factors such as unfavourable weather conditions and supply chain constraints due to Covid-19 restrictions. It resulted in a 19% increase per ton in feed ration prices (in Euro terms) from 2017 to 2021 and by almost 36% in rand/ton, while there was a 12% increase (Euro terms) and 28% (rand terms) in the feed related costs of producing a kilogram of chicken.

Apart from raw material costs, differences in feed ration costs also originate from factors such as feed manufacturing costs and ration composition. *Figure 3* represents the relative prices of soya bean oilcake in South Africa and elsewhere.

Local soya bean prices, explains Breitenbach, are affected by the weaker rand and a stronger Chicago Board of Trade (CBOT) as well as high international premiums. SAPA's *Field Ingredient Report* of October 2022 indicated that soya bean meal prices traded at R8 300/mt (metric tons) in October 2021. At the same time last year, it traded at well over R10 000/mt depending on discounts offered by the different crushing plants.

Grain SA's *Soybeans Grain Market Outlook* of January 2023 shows that local soya bean contract prices have since November trended above export parity levels in respect of Argentina, Brazil and the US. Mid-January SAFEX prices, however, moved below US prices, while local export shipments increased significantly year-on-year.

The value of soya bean

Breitenbach reiterates that there aren't any replacements for oilcake and soya bean meal as it is a major ingredient in South African animal feed. While other types of protein sources such as fish meal and/or carcass meal (feather meal) are still allowed in feed rations in some countries, it isn't possible to replace all the soya bean meal used in diets due to nutritional constraints. In the case of fish meal, the constraints will be technical as well as costly.

"South Africa is becoming more self-sufficient in terms of soya bean production and we are very close to breaking level at present, which was not the case in the past where we were actually a net importer of soya bean meal."

In addition, South Africa harvested its biggest yet soya bean crop of well over 2,2 million tons in the 2021/22 production season, making the country almost self-sufficient. The latest crop estimate indicates yet another record planting of soya bean.

For more information, contact Izaak Breitenbach at izaak@sapoultry.co.za.

Alternative location differential: JSE tests new methodology on soya beans

On 24 January this year, the JSE issued a market notice which served to inform market participants that the JSE would begin a two-year trial as of 1 March 2024, in which it will amend the soya contract specifications and move away from a single reference point model in favour of a multiple reference point model.

The contract size, quality specification, and underlying deliverable product specification remain unchanged, the main difference being that Randfontein will no longer serve as the single reference point. Instead, the JSE will be identifying a series of processing points when determining the JSE location differential, should soya beans be delivered in conclusion of a futures contract.

The purpose of this new model is to evaluate whether the concept of recognising multiple points of demand allows for a vibrant and effective derivatives contract. The concept of location differentials remains, but it now considers the supply available to each point of consumption and models it on a linear basis.

In a letter to its members, Grain SA explained that the JSE location differential has, for many years, been a major concern for the organisation's producers who constantly requested a fair system. In order to adhere to its members' requests, Grain SA has gathered data and information to provide answers, and for a period of more than three years has been working closely with Dr Johann Strauss of the Western Cape Department of Agriculture, to develop an alternative solution that could benefit the entire industry.

Reasoning for the system

The proposed system is based on the spatial supply and demand of the product, and takes into consideration all points of processing and the impact this will have on the demand for product from each JSE-registered delivery point.

One of the reasons cited in a 2021 article on *sagrainmag.co.za* regarding the proposed system and the removal of Randfontein as a single reference point, is that its share as a processing hub has declined steadily over time for all grains and oilseeds. In the case of soya beans, the article states that only an estimated 10 to 15% of processing capacity is situated in Randfontein itself. The determination of location differentials that ensure price indifference has become more complex, given the reality of multiple processing locations and the difficulty of getting correct transport cost figures.

> The concept of location differentials remains, but it now considers the supply available to each point of consumption and models it on a linear basis.

During the completion of Dr Strauss' PhD study he, along with Grain SA, presented several workshops to the JSE to consider the new approach. The JSE's advisory committee set up a technical committee to evaluate the proposed methodology for possible implementation, which culminated in the January market notice and new methodology to be tested on 24 soya bean contracts that will soon be listed.

While Grain SA regards this as a major milestone, it is merely a two-year test phase. The JSE will be trialling the model only for the soya contract and for a two-year period, after considering all feedback. It will evaluate the performance of the derivatives contract at the end of each marketing season, evaluating its price convergence and effective hedging capabilities.

Important notes

The March 2024 soya expiry will be available for trading in March 2023. The JSE will be hosting a series of information sessions starting in March this year to allow participants to become acquainted with the model. The JSE will also publish indicative location differentials for the 2024 marketing season relying on 2023 data as an example of the impact the various reference points will have on location differentials under the new model.

In addition, the JSE each year will publish a list of the reference points that will be included in the model as well as the soya bean stock levels per registered JSE silo that was used as a source of supply data in the model.

In order to assess the model's success, the following criteria will be considered at the end of the two-year trial period.

- The pilot will run for a minimum of two years, overlapping for a further year as the success of the pilot will only be considered after the full two-year period. The soya pilot will run from

1 March 2024 to 28 February 2026, and remaining 2026 expiries up until 28 February 2027 under the same model. Should the pilot not be considered a success, the soya contract will revert to a single reference point as of the 1 March 2027 marketing season.

- The pilot is only applicable to the deliverable soya contract, and no other commodities will be considered during this period.
- Evidence will be gathered through volumes traded and open interest records to indicate whether market participants continue to support the soya contract as a means of managing price risk comparatively to the crop size.
- The number of market participants active in the current contract will be recorded and this will again be accessed at the end of the pilot period to understand how market participation was impacted.
- There is no excess build-up of physical stock at delivery points inside the zero-differential areas. The multiple reference point model strives to be more inclusive, considering processing points and the JSE hopes to see movement of such stock before the outer points become active supply points.

> The JSE will be hosting a series of information sessions starting in March this year to allow participants to become acquainted with the model.

- Redelivery of JSE silo receipts will be carefully monitored to establish any major areas of concern. This could either be due to the calculation of the location differential or simply due to clients receiving stock from sites that do not meet their requirements.
- A formal survey will be undertaken with market participants in the soya sector to gauge their views of the new model towards November each year as a further means of formulating feedback.

There are a significant number of soya bean industry role-players that are not in agreement that this system should have been implemented at such short notice. Many are of the opinion that wider consultation should have taken place with regard to soya beans, and that details should have been thrashed out on how the system works and how it will cope with changes in usage patterns, including volumes of exports.

Meanwhile, Grain SA has confirmed that work is also ongoing on other aspects within the system such as the effectiveness of outloading capacities within the JSE system, as well as the development of a basis futures market.

Producers should inform themselves on how exactly the model works and what it entails. Visit *https://bit.ly/403il2w*; JSE video *https://bit.ly/404dT3m* for more details on the new system. To register for the upcoming JSE information sessions, email commodities@jse.co.za.

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Effect of fertiliser prices on the grain industry: An update

By Christiaan Vercueil



Traditionally, between 30 and 50% of a grain and oilseed producer's existing input costs are spent on fertiliser. Fertiliser makes up such a large portion of input costs that any change, especially a price increase, can affect profitability drastically.

Because South Africa is a net importer of fertiliser, it further aggravates the situation since all imported fertilisers are not only affected by their actual price, but by a whole range of factors such as the exchange rate and transport costs.

Import volume and price changes

Figure 1 illustrates South Africa's fertiliser imports of monoammonium phosphate (MAP), ammonia, urea and potassium chloride from various countries since 2009. Although not the only fertilisers imported, these are four of the five most important products imported.

As of 2009, fertiliser imports for these four products have increased by 103% in total. During 2021, South Africa imported a total of 1 803 348 tons of just these four fertiliser products from various countries. Besides the increase in import volume, the exchange rate of the rand to other major currencies also weakened sharply from 2009 onwards, which further intensified the effect of price increases. In 2022, almost 1,6 million tons of these four products have been imported, showing a 12% decrease from 2021.

Table 1 contains the average price changes for nitrogen (N), phosphate (P) and potassium (K) during January last year, compared to January 2023. It is a welcome relief to see a slight decline in prices compared to the previous year.

Looking at the fertiliser requirements of different parts of the country, one notices that on average the Western Free State uses 72 units of N, 16 units of P and 14 units of K per hectare. The Eastern Free

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Table 1: Price comparison of nitrogen, phosphate and potassium for January 2022 and January 2023.

	Nitrogen	Phosphate	Potassium
Average price: January 2022 (R/kg)	R46,50	R68,20	R27,60
Average price: January 2023 (R/kg)	R38,90	R61,50	R34,10
Change (year-on-year)	-16%	10%	24%

State uses 100 units of N, 19 units of P and 27 units of K per hectare. Irrigated areas use 286 units of N, 52 units of P and 80 units of K per hectare.

Table 2 provides a comparison of the average fertilisation requirements for these three regions for January 2022 and January 2023. On average, the cost of fertiliser declined by 11%.

Fertiliser affordability

Figure 2 provides an indication of the affordability of fertilisers compared to the SAFEX price of maize. Fertilisers, which account for between 30 and 50% of input costs, have become less and less affordable, which means that the producer's margin for trade has weakened excessively. This puts pressure on the producer's profitability and can result in fewer hectares being planted, especially maize. Recently, fertiliser prices have declined due to the market becoming more accustomed to the Russian-Ukraine war and declining energy prices.

This information paints a clear picture of the extreme challenges that producers face every day to try and stay afloat. Fertiliser is not the only input cost that has seen sharp price hikes; the costs of energy sources such as fuel and electricity have also risen sharply, as has the price of seed and chemicals. It is becoming progressively more difficult for farming operations to remain profitable and sustainable.

Figure 1: Four of the five most important fertilisers imported to South Africa.

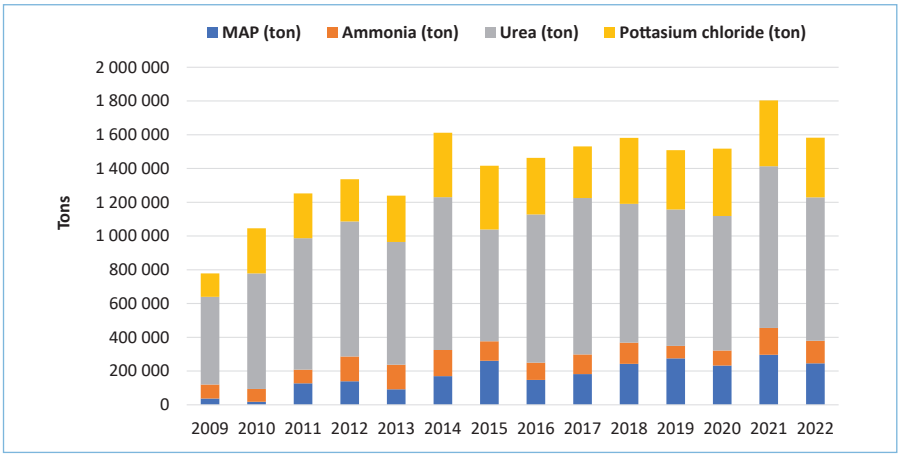


Figure 2: The affordability of fertiliser.

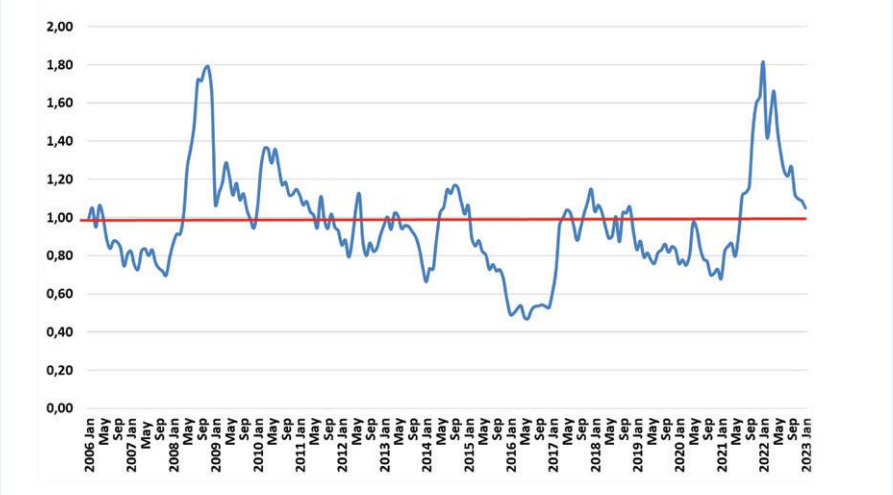


Table 2: Change in fertiliser cost per hectare for January 2022 compared to January 2023.

	Nitrogen	Phosphate	Potassium	Price: January 2022	Price: January 2023	Change
Eastern Free State: Average units (kg/ha)	100	19	27	R6 691	R5 979	11%
Western Free State: Average units (kg/ha)	72	16	14	R4 825	R4 262	41%
Irrigation: Average units (kg/ha)	286	52	80	R19 053	R17 051	-11%

Since there is little room for mistakes, producers must make sure they are not being taken for a ride by fertiliser suppliers. Do the homework, make sure the representative's prices are market related, compare offers to find the best price, and select the most suitable offer for your purposes.

For more information, contact Christiaan Vercueil of Grain SA at 086 004 7246 or visit *www.grainsa.co.za.*

Global market:
Record South American soya bean supplies forecast

Issued by the United States Department of Agriculture's Foreign Agricultural Service

In January, Argentina's 2022/23 soya bean production dropped by four million tons to 45,5 million tons due to drought conditions that strained yields. Smaller supplies put downward pressure on crush and exports, both of which also experienced a drop in January.

Argentina's exports and crush had been lethargic as producers were reluctant to sell soya beans to hedge against high inflation. However, a more favourable 'soya/dollar' exchange rate enacted in September last year temporarily boosted sales and exports for a few months. This trend is likely to continue with the new crop as supplies are forecast to tighten, further incentivising producers to hold onto stocks to maximise soya bean sales revenues.

Despite a shrinking crop in Argentina, South American supplies in 2022/23 are still forecast at a record, predominantly due to record production in Brazil. Unlike Argentina, Brazil's soya bean production was up one million tons to 153 million tons in January. In addition, soya bean carry-over increased by three million tons due to an upward revision to the 2021/22 crop and a lower crush estimate. As a result, both crush and soya bean exports in Brazil increased – this increase mostly offset Argentina's reductions in January.

The record South American crop will have major implications on the United States (US) soya bean trade, which is nearing the final weeks of the usual peak selling window before the start of the South American harvest. For one, this will put downward pressure on US exports as buyers are more likely to source soya beans from abundant new-crop supplies in Brazil.

Coupled with the smaller US crop and strong competition from Brazil through the end of 2022, US soya bean exports dropped by 1,5 million tons in January. The harvest of the South American crop will likely have a dampening effect on high global soya bean prices unless dry weather further hampers Argentina's production. However, US crush remains

Table 1: Global supply and distribution (in metric tons) of soya beans from 2018 to January 2023.

	2018/19	2019/20	2020/21	2021/22	December 2022/23	January 2022/23
Production						
Brazil	120 500	128 500	139 500	129 500	152 000	153 000
US	120 515	96 667	114 749	121 528	118 266	116 377
Argentina	55 300	48 800	46 200	43 900	49 500	45 500
China	15 967	18 092	19 602	16 395	18 400	20 328
India	10 930	9 300	10 450	11 900	12 000	12 000
Paraguay	8 510	10 250	9 900	4 200	10 000	10 000
Canada	7 417	6 145	6 359	6 272	6 543	6 543
Other	23 521	22 613	21 762	24 405	24 460	24 260
Total	**362 660**	**340 367**	**368 522**	**358 100**	**391 169**	**388 008**
Imports						
China	82 537	98 532	99 740	91 566	98 000	96 000
EU	14 346	15 017	14 786	14 549	14 400	14 400
Mexico	5 933	5 743	6 101	5 956	6 400	6 400
Argentina	6 408	4 882	4 816	3 839	4 800	5 000
Egypt	3 657	4 896	3 703	4 870	4 300	4 300
Thailand	3 155	3 831	4 157	3 243	4 100	4 100
Japan	3 314	3 325	3 085	3 455	3 350	3 350
Turkey	2 411	3 148	2 745	2 949	3 000	3 000
Indonesia	2 624	2 636	2 617	2 307	2 775	2 775
Taiwan	2 614	2 708	2 615	2 750	2 750	2 750
Other	19 024	20 406	21 180	21 643	22 337	22 243
Total	**146 022**	**165 124**	**165 545**	**157 127**	**166 212**	**164 318**

elevated on strong crush margins boosted by high product prices.

China's imports and crush drop

China's soya bean import forecast for the 2022/23 marketing year (October to September) has been reduced by two million tons to 96 million tons, as first quarter (Q1) imports have not met expectations. In addition, the new marketing year's soya bean production in China rose by 24%, partially offsetting demand growth for foreign soya beans. Soya bean imports in Q1 of the marketing year are estimated at 21,5 million tons, 5% lower than the previous year and below the five-year average. Ongoing challenges related to Covid-19 and growing economic uncertainty continue to cast shadows on prospects for demand recovery.

The beginning of 2022/23 did not bring the expected recovery in soya bean crush. The first quarter is estimated at 23,5 million tons, slightly below last year. Meanwhile, imports of other protein meals and vegetable oils that are competitively priced (rapeseed, sunflower seed meal, copra meal, palm kernel meal and palm oil) soared in the first months of the marketing year, offsetting reduced soya bean crush.

There have been dramatic shifts in the direction of China's soya bean imports over the last few years. Prior to 2018, China had been on a steady rate of import growth. Import demand started to decline in early 2018 in response to trade restrictions placed on US soya beans, and then further decelerated with the onset of African swine fever (ASF).

China's soya bean demand started to turn positive again in 2019/20 and continued through 2020/21. However, demand slowed again in 2021/22 due to Covid-19 restrictions and subsequent lockdowns, which hobbled supply chains and decreased consumption.

The pace of China's soya bean processing has slowed since October 2021 due to shrinking margins. Crushers have been hampered by both high input costs and lower feed demand. For the first half of 2021/22, China's soya bean processing slowed to levels unseen since the ASF outbreak. Soaring feed costs and continuing lockdowns did not allow crush to recover last year, leading to reduced soya bean processing levels of 87,5 million tons (*Table 1*).

Table 1: Global supply and distribution (in metric tons) of soya beans from 2018 to January 2023 (continued).

	2018/19	2019/20	2020/21	2021/22	December 2022/23	January 2022/23
Exports						
Brazil	74 887	92 135	81 650	79 143	89 500	91 000
US	47 721	45 800	61 665	58 721	55 656	54 159
Paraguay	4 901	6 619	6 330	2 250	5 650	5 800
Argentina	9 104	10 004	5 195	2 861	7 700	5 700
Canada	5 258	3 909	4 706	4 276	4 200	4 200
Other	7 316	7 089	5 448	6 637	6 671	6 673
Total	**149 187**	**165 556**	**164 994**	**153 888**	**169 377**	**167 532**
Crush						
China	85 000	91 500	93 000	87 500	96 000	95 000
US	56 935	58 910	58 257	59 978	61 099	61 099
Brazil	42 527	46 742	46 675	50 250	51 750	52 500
Argentina	40 567	38 770	40 162	38 825	39 750	38 000
EU	15 000	15 600	15 800	15 400	14 900	14 900
India	9 600	8 400	9 500	9 500	10 000	9 900
Mexico	6 150	6 000	6 200	6 350	6 550	6 550
Russia	4 650	4 650	4 500	4 800	5 000	5 100
Egypt	3 500	4 700	3 900	4 650	4 300	4 300
Paraguay	3 820	3 500	3 300	2 200	3 750	3 750
Bangladesh	1 750	2 500	2 650	2 650	2 800	2 800
Thailand	2 000	2 610	2 800	2 500	2 800	2 800
Bolivia	2 650	2 550	3 050	2 500	2 600	2 600
Iran	2 200	2 500	2 000	2 550	2 600	2 600
Japan	2 450	2 400	2 365	2 581	2 500	2 500
Other	19 820	20 969	21 284	21 960	22 918	22 924
Total	**298 619**	**312 301**	**315 443**	**314 194**	**329 317**	**327 323**
Ending stocks						
Brazil	33 342	20 419	29 404	26 805	31 705	33 455
China	18 404	24 612	31 145	31 404	31 500	31 332
Argentina	28 890	26 650	25 060	23 903	23 503	23 453
US	24 740	14 276	6 994	7 468	5 992	5 720
EU	1 387	1 721	1 560	1 553	1 688	1 688
Other	7 496	7 054	5 871	7 082	8 326	7 869
Total	**114 259**	**94 732**	**100 034**	**98 215**	**102 714**	**103 517**

Olive oil trade tight

The 2022/23 global olive oil trade is forecast at 1,1 million tons, the lowest level since 2016/17. Prohibitively dry conditions and 'off-year' bearing cycles across most of the Mediterranean region suggest that exportable supplies will be below average in most producing countries. Relatively low carry-over from the previous marketing year will also hamper trade.

In the European Union (EU) – the world's largest olive oil producer and exporter – preliminary numbers suggest that the

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Figure 1: Soya bean export prices in 2022/23.

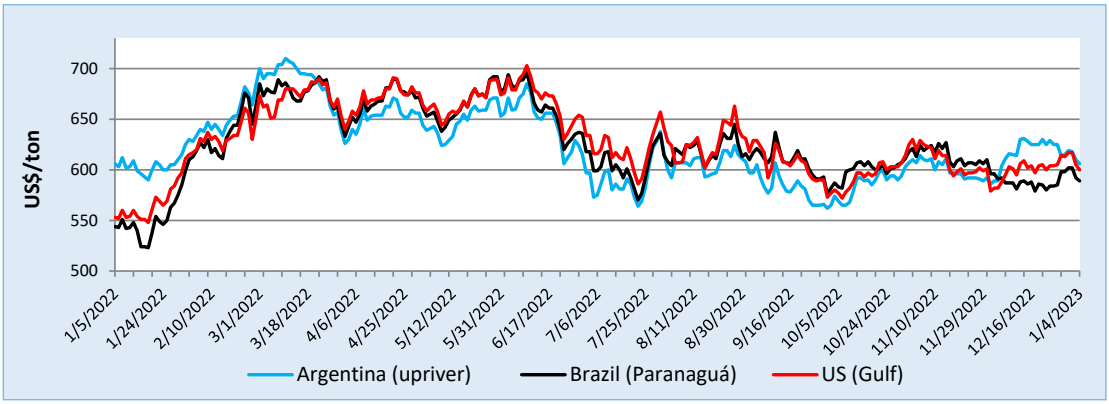
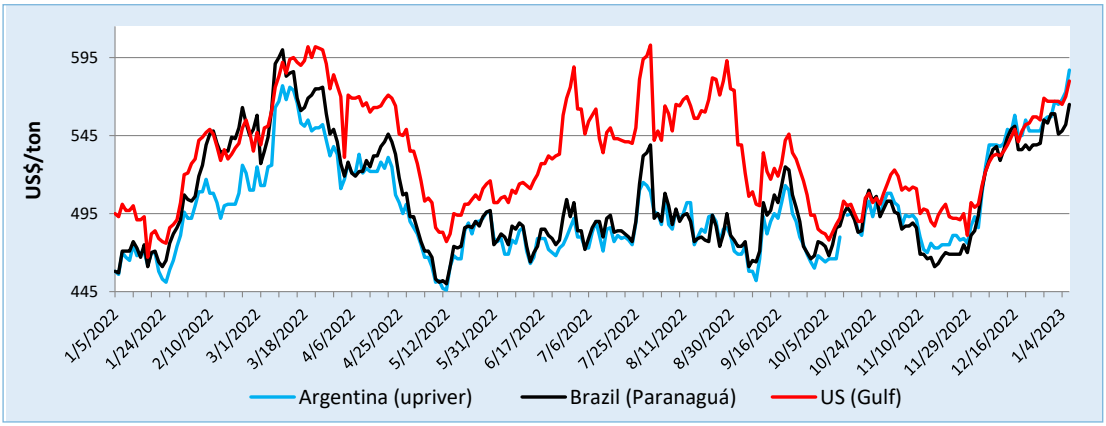


Figure 2: Soya bean meal export prices of 2022/23.



crop will be nearly a fifth smaller than last season. In contrast, optimal weather along the Aegean Sea and industry investments support the US Department of Agriculture's record production forecast for Turkey, though the increase will not be enough to offset the reduction in the EU.

The bumper crop drastically increases exportable supplies in Turkey, but trade potential could be limited by efforts to control domestic food prices, especially if uncertainty in other oilseed markets persists. Turkey's olive oil exports are projected at 100 000 tons, which is also a new record.

Global olive oil prices have risen in response to supply concerns. Though a preferred oil in much of the producing region, the tightness in the olive oil market suggests that consumption will likely give way to some substitution. The influx of imports of crush from Ukraine means higher consumption of sunflower seed oil in the EU.

Overview of 2022/23

Global ending stocks for 2022/23 are currently projected at 520 000 tons, the lowest level since 2016/17, and the third lowest level over the past two decades. Global oilseed production dropped by nearly 2,5 million tons, primarily due to a reduced soya bean outlook in Argentina and the US that was partially offset by increased production in China and Brazil. Trade is revised downwards with higher exports of rapeseed, sunflower seed, and cottonseed outweighed by lower soya bean exports in Argentina and the US.

Total meal production is also lowered due to reduced soya bean crush in Argentina and China, though trade is raised on higher sunflower seed meal exports in Ukraine. Global meal ending stocks are lowered for soya bean, sunflower seed, rapeseed and palm kernel meals. Total oil production and trade are mostly unchanged. The projected US season-average farm price for soya beans is up 20 cents (in American dollar terms) to US$14,20/bu.

Export prices

In December last year, average soya bean prices (*Figure 1*) were slightly lower as bullish sentiments over drought conditions in Argentina were dragged downward by falling soya bean oil prices. Ample global supplies of other oilseeds for crush eroded the support that soya bean oil prices had previously provided to soya beans, with meal providing a larger share of value in January. Weaker-than-expected soya bean purchases in China during Q1 of the new marketing year likely also contributed to lower soya bean prices, especially in Brazil.

December soya bean meal prices (*Figure 2*) jumped for all exporters, driven by crop concerns and declining crush in Argentina. Meanwhile, Brazil's meal exports exceeded expectations in December, which likely drove prices higher. The soya bean meal price rally continued into January as crop prospects in Argentina continued to deteriorate.

December soya bean oil prices were lower than the previous month. The largest average price decline was in the US following the announcement of lower-than-expected biofuel targets by the Environmental Protection Agency at the beginning of December.

The discount between soya bean and palm oil narrowed as average palm oil prices remained relatively unchanged. Going forward, soya bean oil prices are likely to continue to be supported by increasing biofuel production in both the US and South America, leading to reduced exportable supplies.

This article has been shortened for publication in *Oilseeds Focus*. To read the full article, visit *http://apps.fas.usda.gov/psdonline/circulars/oilseeds.pdf.*



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High-moisture soya beans:

Careful management when drying and storing soya beans is essential to maximising farm income

By Michael Staton, Michigan State University Extension



Soya beans harvested amid cool and wet conditions will need to be dried on the farm or at the elevator. Some elevators will accept soya beans with up to 18% moisture content, while others will reject loads that contain above 15% moisture.

The use of supplemental heat

Commodity soya beans used for domestic crush or export can be dried using supplemental heat. However, food-grade and seed beans should not be dried with supplemental heat. Proper management is essential to minimising damage when using supplemental heat.

Keep the drying temperature below 54°C in continuous flow dryers and below 43°C in batch dryers. Maintaining the relative humidity of the heated air above 40% will also reduce seedcoat damage and splits. This is difficult to do because the relative humidity is cut in half for each 20 degrees that the air is heated.

High temperature drying as discussed above will damage the seedcoats and increase the number of split beans. Most elevators will begin discounting for split beans when they exceed 20% and some elevators may reject loads that have more than 20% splits.

This level of damage may be exceeded when using supplemental heat (*Table 1*). However, natural air and low-temperature drying are not good options during cool and wet periods of the year. The amount of damage will vary between soya bean varieties and grain drying equipment. Check for cracked seedcoats and split beans often and adjust the drying temperature to achieve the level of cracking and splitting that is acceptable to you and your grain buyer.

Damaged seedcoats

Checked or cracked seedcoats are not discounted by elevators. However, once the seedcoat is damaged, the seed is much more prone to splitting when handled or transported. Because of this, the dried soya beans should be handled and transported carefully.

Running augers full and slow and reducing the height at which the beans fall are two ways to reduce damage and splits. Producers can use a simple and quick procedure – the hypochlorite test – to identify seedcoat damage that is not easily detected by the naked eye. Simply soak 100 beans in a 20% bleach solution for about five minutes. Beans with damaged seedcoats will swell. Wrinkled seedcoats are fine.

Moisture content and temperature

Your target moisture content depends on your storage and marketing plans. If you plan to deliver the beans shortly after drying or plan to store them until spring, aim for 13% moisture. If you plan to store the beans on-farm through the summer, dry them to 12% moisture.

Your best strategy for holding the beans through the winter is to cool the grain mass to 0 to 1,6°C using the aeration fans. If daytime temperatures are above 1,6°C, run the fans at night when temperatures fall below 0°C. Ice or frost may occur on bin vents at temperatures near or below freezing, so leave the fill hole or access door open to reduce the potential for damaging the bin roof when operating fans.

Check the temperature of the beans in several locations in each bin every two to three weeks during the winter and more frequently as outside temperatures increase in the spring. Pay particular attention to the south side of the bins in late winter or early spring as the grain temperature along the bin wall will increase more rapidly due to increasing solar energy. Keep grain cool during the spring and summer. Grain temperatures above 10°C increase the potential for insect and mould development.

Table 1: Drying temperature effects on soya bean quality. (Source: Ken Hellevang, North Dakota State University Extension Service)

Drying temperature (°C)	Cracked seedcoats (%)	Split beans (%)
38	10 to 60	5 to 20
54	50 to 90	20 to 70
71	80 to 100	30 to 80

This article has been adapted for use in *Oilseeds Focus*. To read the original article, visit *www.canr.msu.edu/news/drying_and_storing_wet_soybeans*.

Soya innovation finds a home at UFS

By Dr Brandon van Rooyen, University of the Free State

The challenge to end food insecurity and all forms of malnutrition keeps growing. The Covid-19 pandemic highlighted the fragilities in our agrifood systems and the inequalities in our societies, driving increases in world hunger and severe food insecurity.

Although South Africa is food secure at a national level, food insecurity is still prevalent at household level. While progress has been made in the country – with eight years remaining in the goal to end hunger, food insecurity and all forms of malnutrition – it is clear that more needs to be done to achieve these goals. The persistence of child undernutrition, micronutrient deficiencies, as well as overweight and obesity in children continue to be a concern.

In addition, maternal anaemia and obesity among adults continue to rise at alarming rates. Recent available evidence regarding rising food prices suggests that the number of people who are unable to afford a healthy diet could be greater now than during the Covid pandemic.



From the left are Dr Brandon van Rooyen, Vuyelwa Nkoi and Khezwo Nematshema.

Enter the soya innovation lab

The Innovative Food Solutions (IFS) soya innovation laboratory was the vision of Prof Johan van Niekerk, head of the Department of Sustainable Food Systems and Development at the University of the Free State (UFS), along with the expertise of Prof Wilna Oldewage-Theron, a leader in the field of nutritional sciences, who is currently associated with Texas State University (United States) and UFS.

For individuals to be food secure, food must be consistently available to them, accessible in sufficient amounts and diversities, and individuals must be able to afford and utilise them for a healthy life. Therefore, the IFS soya innovation laboratory was established to be a beacon for change in South Africa, directly addressing these pressing issues surrounding food availability, cost and nutrition.

> Recent available evidence regarding rising food prices suggests that the number of people who are unable to afford a healthy diet could be greater now than during the Covid pandemic.

As the name suggests, the laboratory's focus area is on utilising soya bean as a base in the development of high-protein, nutrient-rich, plant-based food products. A diverse team of innovation scientist are the driving force behind the vision. This team consists of Dr Brandon van Rooyen, Vuyelwa Nkoi and Khezwo Nematshema. Their combined food industry experience together with their food biochemistry scientific backgrounds has proven essential in their product development efforts.

The state-of-the-art soya innovation laboratory's renovations were completed in 2022. The team's unique approach to product development has already gained the attention of many industry food manufacturers and key players in the food industry.

Plant-based product development

Their focus is on harnessing the benefits of the soya bean in the development of high-protein snacks as well as alternatives to typical 'meat' products such as mince, sausages, burger patties and polony. Their product range is also aiming to develop high-protein and nutritious sipping drinks in various delicious flavours.

Making use of plant-based product development, the scientists hope to address the high costs associated with animal derived products. In addition to low-cost meat alternatives, they are focussing on the products' shelf-life, as looming electricity outages is becoming a major problem for food spoilage, especially for animal-based products.

As limited research is available regarding plant-based product development, the scientists are focussed on harnessing natural ingredients' full potential by developing scientific protocols and techniques that can be used to improve the overall texture, flavour, appearance and nutritional quality of plant-based products. They hope to alter consumer perspectives on plant-based products, promote food security and address nutritional insecurity in South Africa.



Nyama-Nuts was developed using a state-of-the-art soya-nut roasting machine, making the nuts completely digestible and edible.

Introducing Nyama-Nuts

The team has developed a high-protein, low-cost snack called Nyama-Nuts. Using a state-of-the-art soya-nut roasting machine, they have perfected the roasting of soya beans to make them completely digestible and edible. The soya nuts come in three delicious flavours, hot and spicy, chutney, and BBQ. These flavours have all passed the so-called Just about right (JAR) scale. Other flavours still in the development phase are lightly salted, cheese and chives, and cheddar.

Nyama-Nuts is a filling snack, and very important for pupils who most likely will not have a meal to eat after school. The snack's high nutrition value, with 20 amino acids – nine of which are essential for humans to consume – can also serve as a learning tool regarding the importance of nutrition.

For more information, email Dr Brandon van Rooyen at vanrooyenbb@ufs.ac.za.

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Soya in human nutrition:
Where does the research stand?

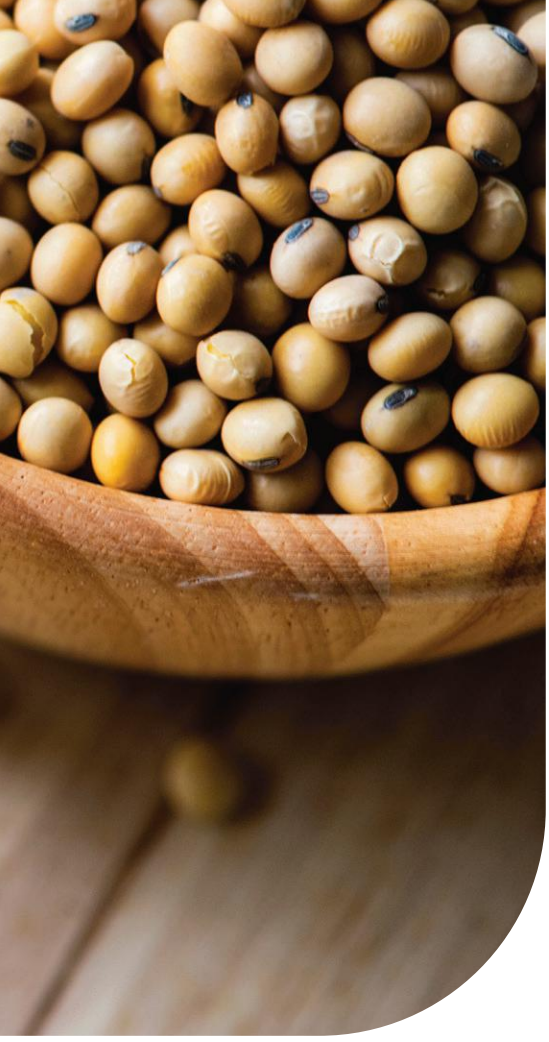
By Will McNair, director: human protein and oil, US Soybean Export Council

The health benefits of consuming soya have been studied for over 50 years. In fact, among plant sources of protein, it is perhaps the most widely researched plant protein source in the world. Research has established its benefits for weight management, muscle health and more. Despite this large and growing body of evidence, the health implications of consuming soya in human nutrition continue to be debated as public opinion and understanding of nutrition evolve.

Soya beans are a complex food and often found in the food supply as an ingredient. The soya bean is a legume in the same family as sugar snap peas or green beans. However, unlike these legumes, consumers encounter soya beans in a wide range of food and beverage products. Soya beans can be consumed whole as edamame; however, people typically consume soya in the form of an ingredient added to a variety of food products or as traditional soya foods, such as tofu or soya milk.

Consumers are familiar with how sweet corn from a field ends up on their plate, but how a soya bean arrives at the table in sauces, sides, snacks, beverages and centre-of-plate dishes may be less understood. Creating food products from soya beans requires different processes to capitalise on the lipids, protein, carbohydrates and other components of the bean. The path of the soya value chain can be hard to follow for the everyday consumer, or even the soya bean purchaser, which leads to confusion and misinformation.

This report details research and input from industry experts to discuss the known, scientifically supported health impacts of consuming soya. It also examines how new scientific findings



are changing the perception of soya food in the United States and abroad. Addressing common concerns about soya nutrition starts with building a common understanding of soya bean components.

Soya beans and food

- **Whole soya beans:** can be roasted, flavoured and cooked.
- **Soya bean meal:** an ingredient that includes all components of the soya bean, except oil. Can be further processed into ingredients used for specific purposes.
    - **Soya flour:** toasted and ground. It is made by toasting and grinding the meal. Soya flour is a source of protein, isoflavones, folate and iron, and can be used as a protein-providing substitute for other flours to make items like cookies, bread and more.
    - **Textured soya protein:** dehydrated soya flour. Textured soya protein usually refers to products made from defatted and dehydrated soya flour, although the term also applies to textured soya protein concentrates and spun soya fibre. When hydrated, textured soya protein absorbs flavours well and has a chewy, meat like texture. It is available in powder form as well as chunks and slices. It is often found in foods such as meat, but used to cook with in vegan diets.
    - **Soya protein powder:** protein isolated from the soya bean. As an ingredient, it can be used in recipes or for formulation of a variety of food. It is available as soya protein concentrate or as soya protein isolate, depending on the purity of the protein product. The general standard for soya protein products (*Codex Alimentarius* STAN 175-1989) is as follows: soya protein flour is a minimum of 50 to a maximum of 65% protein; soya protein concentrate is a minimum of 65 to a maximum of 90% protein; soya protein isolate is a minimum of 90% protein. The starting material of isolated soya protein is the defatted flakes that remain after the oil is extracted. During processing, most other portions are removed, leaving a highly concentrated source of protein. As an ingredient, isolated soya protein is used in a variety of products where high-quality protein is desired, from infant formula to beverages for children, weight-managing adults or muscle-maintaining athletes. Similar to isolate, soya protein concentrate has many uses and can boost the protein in nutrition bars, meats and meat analogues.
    - **Soya bean oil:** liquid oil is vegetable oil extracted from the seeds of the soya bean (food: salad and cooking oils); hydrogenated oil is processed to improve shelf stability and preservation of an item (food: shortening, margarine, packaged snacks); soya lecithin is extruded and dried (used as an emulsifier or stabiliser in processed food).

Background

Soya in Asian diets

Soya has been enjoyed around the world for many centuries, especially in Asia. Traditional Asian soya foods can be broken down into two categories, namely fermented and unfermented. Fermented foods include miso, soya sauce and tempeh; unfermented foods include edamame, soya milk and tofu.

There has been considerable research interest in examining the relationship between soya intake and Asian cancer prevalence rates, which for many cancers tend to be lower than in the West. There are also new health outcomes of interest that appeal to consumers in this region, such as research suggesting soya foods may decrease wrinkles.

Consumer awareness and understanding of the health benefits of soya foods differ around the world as familiarity with many different types of soya products varies from region to region.

Soya research

Because much research has been conducted to better understand the health benefits to humans from the consumption of soya, consumer interests have shifted over time. Dr Michelle Braun, global protein and scientific affairs lead for DuPont, believes this is a positive thing because it demonstrates soya research has been far ahead in research compared to other food ingredients. "There is so much work that was conducted compared to protein sources, animal or plant," she says. Braun adds advances in research methodology have been a positive step forward for soya research.

She echoes this by sharing the focus of soya nutrition has broadened and changed over the years, leading to wider consumer interest. "The health outcomes we are investigating have changed and are more aligned with current consumer needs," Braun says. "Some consumers are choosing food to support near-term health goals, such as feeling of fullness, weight management or lean muscle mass gains. Others choose food to include in their diet for health concerns that are longer term, such as heart health or metabolic syndrome."

Braun adds early studies often researched cancer and heart disease. These topics are still significant, but soya research has expanded. "Topics like satiety, weight management and muscle health

are important. These are some of the areas where we have new research to support consumer interests."

Health benefits from soya food

The health benefits associated with soya consumption are abundant, as are the studies that demonstrate these effects. From well-established benefits, like health, to emerging areas of research, the positive implications of adding soya to any diet are becoming more evident to consumers around the globe.

To some, questions about soya start with how it should be consumed. Recent trends, such as incorporating soya through plant-based diets and body building workouts, provide new avenues for soya inclusion.

Braun says that while people have traditionally consumed soya as tofu, soya milk and miso, today soya can be found in many mainstream, plant-based food in the supermarket.

According to Innova Market Insights, global new product launches containing soya protein grew 9% annually from 2014 to 2018. Globally in 2018, over 7 000 new products were launched containing soya protein. Among the fastest growing categories for new launches containing soya protein included sports nutrition (nutrition bars and beverages), snacks and energy bars, meat substitutes and dairy alternatives.

Soya's versatility drives its inclusion in so many food items today. Soya foods are packed with plenty of nutrients including B vitamins, fibre, potassium and magnesium, and also offer high-quality protein. Soya is considered a complete protein, containing all nine essential amino acids which the human body cannot make and must be obtained from the diet.

Consumers make food choices based on taste, price, nutrition and other trends. Exploring new consumer trends through research is important in helping consumers make healthy decisions.

Heart health

Soya foods have long been recognised for their high protein and lower saturated fat content, but over the last 20 years, an impressive amount of research has evaluated the role these foods may have in reducing chronic disease risk.

According to the World Health Organization, cardiovascular diseases are the number one cause of death globally. Consuming soya protein as part of a diet low in cholesterol and saturated fat has been found to reduce the risk of heart disease. Diets containing soya protein can have a favourable impact on blood lipids, lowering low-density lipoprotein cholesterol, total cholesterol and triglycerides without lowering cardio-protective, high-density lipoprotein cholesterol.

Plant-based diets and weight management

In the consumer space, the conversation around soya has changed. "Recently, the trend for plant-based eating and its associated benefits has become a driving trend for new and existing product positioning," Braun says.

> Consuming soya protein as part of a diet low in cholesterol and saturated fat has been found to reduce the risk of heart disease.

Around the world, plant-based diets are becoming increasingly popular. The United States Department of Agriculture MyPlate initiative defines a healthy plate as one-half plate of plant foods (non-starchy vegetables and fruits), one-quarter whole grains or unprocessed starchy food and one-quarter lean protein. Recent research has shown that plant-based diets may also reduce the number of medications needed to treat chronic diseases and lower ischemic heart disease mortality rates.

"There has certainly been a lot of innovation when it comes to plant-based diets in the meat alternative category," Linda Funk says, executive director of The Soyafoods Council. "You'll find a lot of soya protein in the products, and I think it's important for farmers, consumers and manufacturers to understand why soya is a preferred plant protein and a powerhouse of nutrients."

Soya has been a part of vegan diets for years but now has become part of the larger movement toward plant-based diets. "Soya is the original plant-based protein," Braun says. "It enables the development of great-tasting alternatives that deliver protein nutrition." She offers soya milk as an example, which can be formulated to include the same amount of protein as dairy milk (8g). "Some other plant-based milks have little to no protein, and what protein is present is often of lower quality."

Further, research shows that protein intake, especially from high-quality sources such as soya, increases satiety. A 2015 study published in the *Journal of Nutrition* measured appetite and subsequent food intake, aiming to determine how a high-protein beef lunch compares to a high-protein soya lunch in terms of satiety. When comparing those two high-quality protein sources, the study found the type of protein consumed elicited very few differences in effect on appetite, satiety and food intake in healthy adults.

Soya's support of weight management goes beyond short-term satiety effects. Feeling fuller longer is important for a sense of well-being and helps people adhere to diets that support their weight loss or management goals. Higher-protein diets, especially those containing high-quality protein, have been shown to be effective at curbing food intake and promoting weight management. The evidence suggests that high-protein diets tend to preserve more lean body mass than high-carbohydrate diets during weight loss. Soya protein has been found to be as effective as other high-quality protein at increasing satiety and promoting weight management while offering the additional advantage of promoting heart health.

The evidence is clear that higher-protein diets help preserve fat-free mass (FFM) or muscle during weight loss. Several studies have demonstrated soya protein is as effective as dairy and mixed protein sources for the retention of FFM during weight loss in adults. In fact, a daily supplement of soya protein reduces the gain in total abdominal fat and subcutaneous abdominal fat compared with a daily isocaloric casein placebo in post-menopausal women. An additional study using a similar approach

found results of reduced abdominal fat among women supplemented with 20g of isolated soya protein.

While soya protein is on par with other high-quality proteins in producing satiety and promoting weight loss, it offers the unique advantage that it may help reduce coronary heart disease risk as part of a diet low in saturated fat and cholesterol. Several meta-analyses, summarising dozens of human studies of soya protein, have been published since 2005 affirming that soya protein may reduce cholesterol.

Body composition

Protein supplements are a growing category around the world, and soya is a key ingredient in these products. Soya protein is often used in products to support weight loss or lean tissue gain goals. "One trend that emerged about a decade ago was the growing consumer interest in protein, fuelled by its association with effective weight loss," Braun says. As an ingredient, isolated soya protein is used in a variety of products where high-quality protein is desired, including products targeting weight-managing adults or muscle-building athletes.

Funk mentions that dairy has historically been the accepted standard for building muscle, but recent studies have shown that soya similarly supports muscle gain and recovery in active individuals.

A 2018 meta-analysis of nine randomised control trials compared the longer-term effects of soya proteins versus animal proteins on muscle mass and strength in combination with resistance exercise. The results indicate that soya protein supplementation produces similar gains in strength and muscle mass compared to animal protein.

When it comes to trained athletes, a 2016 study in the *Asian Journal of Sports Medicine* investigated the effects of isolated soya protein in muscle recovery in well-trained athletes and the findings suggest soya protein is effective in mitigating the negative effects of exercise-induced muscle damage for sports such as long-distance running, plyometrics or resistance activities.

No matter what diet or supplement choices people may make, Funk reminds people that the quantity and quality of protein, along with the timing of intake, is of great importance to athletes to ensure they are receiving the highest benefit from their protein sources.

Scientific conclusions

Though nutrition research has improved and expanded in its focus and methods, some deep-seated beliefs remain among consumers in terms of common soya food perceptions. Influential studies and up-to-date research can substantiate the benefits of consuming soya.

Soya allergies

According to the Food Allergy Research and Education group, soya bean allergies are one of the more common food allergies, especially among babies and children, and about 0,4% of children are allergic to soya. The majority of children with a soya allergy will outgrow the allergy by age ten. Certainly, an allergy to soya could start a lifelong battle with soya foods, though research shows fewer adults have a soya sensitivity. The incidence of soya allergy is actually much lower than other common food allergens.

Women and breast cancer (oestrogen)

Over the years, isoflavones, naturally occurring components in soya, and their structural similarity to oestrogen have raised concern that soya foods might have adverse effects in some individuals. Although isoflavones are classified as phytoestrogens, research has shown they differ from the hormone oestrogen at the molecular and clinical levels.

Clinical studies show that even large amounts of soya do not adversely affect markers of breast cancer risk. Furthermore, observational studies involving more than 11 000 breast cancer survivors show that consuming soya after a diagnosis of breast cancer may reduce recurrence and mortality.

Population studies in the Asia-Pacific region show soya food intake is associated with a decrease in breast cancer risk. However, several lines of evidence support the hypothesis that consumption must occur early in life for soya to reduce risk. In fact, these studies have found consuming one or more servings of soya food per week during childhood and/or adolescence may reduce risk.

Soya oils and trans fats

Soya food processing is the most recent discussion about the impact of soya foods. The Soyafoods Council serves a key role in this conversation, working as a facilitator for mainstream soya-based foods in the global marketplace.

Funk says soya is surrounded by confusion in the US. She adds most people in the US, especially in the Midwest, did not grow up eating traditional soya foods. Although they likely consumed soya in other ways, mostly through soya oils, those consumers can easily misunderstand what is not familiar to them.

Many people do not know soya bean oil is by far the most widely used cooking oil in the world. Soya oil production worldwide is three times that of its closest competitors (sunflower oil and butter).

Research substantiates soya bean oil as a healthy cooking option; however, the negative association of trans fats in other kinds of vegetable oils has affected the consumer perspective of soya beans. A 2015 study, published in *Toxicological Research*, analysed and tested trans-fat content in six vegetable oils. The study showed soya bean oil did not have a detectable amount of trans fat content. Soya oil contains a high percentage of polyunsaturated fatty acids and is rich in linoleic acid, the two essential fatty acids required by the body.

Conclusion

As the global population expands and consumers look to incorporate more protein in their diets, research continues to explore the value of soya as a healthy, sustainable source of protein to meet future protein demand. As the research stands, soya beans in their many forms meet various consumer needs: heart-healthy oil, a plant-cantered diet, weight loss or maintenance, muscle-building or overall diet quality.

This article has been condensed for publication in *Oilseeds Focus*. To read the full article, visit *www.ussoya.org*.

Why soya? How soya? Wow soya!

By Izak Hofmeyr

In 2021, *Oilseeds Focus* reported on the activities and successes of the Eden Social Development Foundation (ESDF) based in Bergville, KwaZulu-Natal. The ESDF has been active since 2004 in addressing malnutrition and protein deficiency in impoverished rural communities, especially in Bergville and surrounding areas.

During a recent visit to Henry Davies, manager and driving force behind ESDF, to get an update on their activities, he said that much has changed, and all for the better.

"We are incredibly indebted to the Oil and Protein Seeds Development Trust (OPSDT) and the Oilseeds Advisory Committee (OAC) for their support of this project. Not only are we planting more hectares to soya every year, but the areas we are involved in have also expanded. Where only a year ago I had two project co-ordinators, we now have six in different areas. Our co-operation with the Department of Agriculture, Land Reform and Rural Development has also strengthened and there has been a marked increase in the focus on conservation agriculture."



The Eden Foundation is currently trying to find out how many implements are available in the different areas that can be brought back into service.

All-round growth

Regarding the four newly appointed project co-ordinators, Henry explains that they themselves are farmers in the areas in which they operate. "These are well-educated people. They all have degrees from prominent universities. One has an honours degree – well-qualified, but unable to get work. So, we employ them on a part-time basis and they are doing sterling work."

Where the area planted to soya beans last year was around 800ha, this year it increased to 1 600ha. Apart from a larger region of KwaZulu-Natal, they are also active in Limpopo, the Free State, Mpumalanga and the Eastern Cape.

"We have reached the point where we are starting to shed participants who do not perform. It is no use nursing along people who simply do not bring in a proper harvest year after year. It is much more productive to focus on those who are efficient and making progress."

To illustrate exactly how well some of the producers are doing, Henry referred to a specific farmer in the Jagersrust area in KwaZulu-Natal who harvested 3,8 tons per hectare from the 2ha that he was able to plant this past season.

Driving home efficiency

"A very important point that we try to drive home is not to chase hectares. If you have fertiliser for 2ha, plant 2ha. Do not try and spread your fertiliser over 10ha, for you will achieve the same yields on 10ha with insufficient fertilisation than on 2ha with the correct fertilisation. Efficiency is key."

Henry is convinced that they are making a significant difference. "Last year, the project value was R4,1 million in terms of inputs that we provided to participants. We paid out R10 million for soya delivered."

Part of the motivation to increase soya in especially communal areas, he said, is theft. Maize simply disappears from the fields before it can be harvested. Soya beans are not that easy to steal.

A long-term approach

The ESDF's mission is to create job opportunities, both in the planting of soya beans as well as in the micro and macro soya agro-processing sphere, so as to promote food sustainability. Looking beyond short-term nutrition solutions, the ESDF believes in a sustainable, long-term approach by empowering local people to take control of their own nutritional needs. An important aspect of this control is access to appropriate food processing knowledge and technologies.

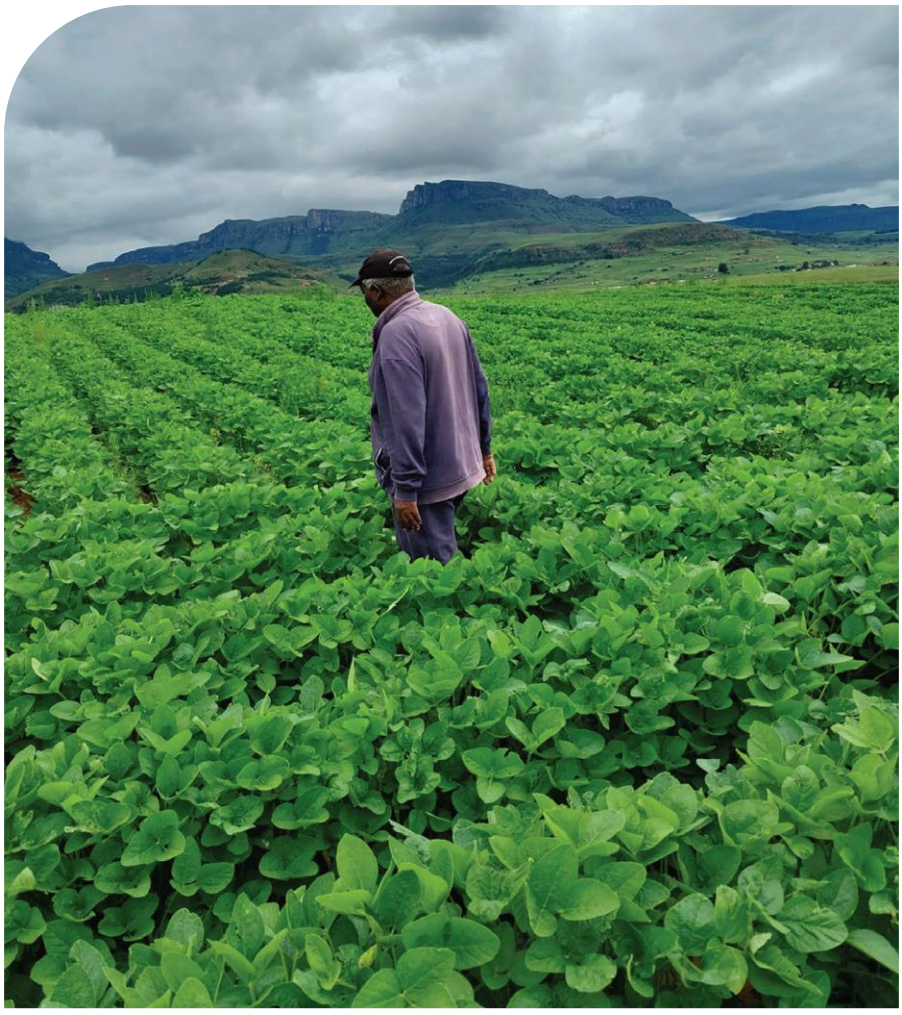
This approach, he explains, is based on three steps. The first is providing the knowledge and associated training within communities to increase knowledge regarding the health benefits of soya. The second is support and training in the planting and harvesting of soya, and thirdly, utilising soya to manufacture affordable food products in individual home kitchens.

"Our approach has changed somewhat over the past year, however. During the Covid-19 pandemic we found that many households were eager to learn how to make soya-based yoghurt. However, this petered out significantly after the pandemic, so we have shifted our focus to the soya producers that we support, training members of their households to make products from the soya they produce themselves. If they then choose to develop this into a business, it is their choice."

Production categories

Henry works with two types of soya producers – those who produce on communal land and those who produce on private land.

"Producing on communal land is extremely difficult. The number of hectares is small, and it is distributed all over the place. Despite these obstacles, the farmers are doing well. Those on private land, in contrast, have it much easier, with fewer of the obstacles associated with communal land.



A proud producer in a healthy soya bean stand.

"We have set specific categories in terms of the number of hectares per farmer. We assist farmers up to 50ha for three years, then we allow them to fly on their own. On the other end, the smallest area on which we will support a farmer is two hectares to start with. We will assist such a farmer to 10ha. The next category is between 5 and 20ha, and the third between 10 and 50ha."

This does not mean that a producer who exceeds 50ha is suddenly left to his or her own devices. The Eden Foundation is always available for advice and moral support. There are, for example, farmers in the Free State who are now planting more than 150ha to soya, who have benefited from support from the foundation.

"Given the current price of soya seed, it is simply impossible for new entrants to buy their own seed and break even. With support from the OAC, we support these producers with 10% of their new seed, which is more or less in line with commercial producers who retain a percentage of their own seed every year."

Infrastructure

A very real challenge in supplying small-scale farmers with the correct inputs is appropriate quantities. For this reason, Henry re-packs some of the inputs, such as *Rhizobium* inoculates and herbicides, in his own storage facility in Bergville into one-litre containers and even smaller.

"Apart from this type of challenge, the other very real hurdle is equipment. It is amazing to see some of the implements used. It would not be out of place in a museum!"

New challenges

There is still a lot to be done, expansion into other provinces being the first point of order. "I don't want to get involved in an area if there is not a support structure

that will remain when our project has been concluded. In an ideal world, once we leave an area, there will be a number of established producers there who are able to continue on their own. In this ideal world, they will also serve as role-models for other producers."

The Bergville area is a good example. "The ESDF has been active in the Bergville area for five years now. I can name 11 producers who collectively plant 285ha of soya beans and who will be able to continue without our support. Some of these farmers started with 2ha and are now planting 10ha with a yield of more than 3t/ha. That, in my opinion, is how the success of the Eden Foundation should be measured."

Mechanisation challenges

Access to appropriate implements, especially for harvesting, remains a major challenge. There are several harvesters around that were made available by the government over the years, but many of them are not serviceable. They are currently trying to find out how many implements are available in the different areas that they can get back into service.

"Once we have a fleet of equipment, we are planning a structure according to which the implements can be rented out to the producers in that particular area. At the same time, we are also training technicians to service and calibrate the implements. In the process we want to create a network of serviceable implements along with the necessary service support in the various areas."

There is a specific market for smaller equipment. "We will have small-scale farmers with us for a very long time yet, and their needs are very different from those of large, commercial producers. There is a gap in the market for manufacturers of small but effective equipment."

Henry is, however, quite disillusioned with the use of contractors to plant and harvest crops. "I have first-hand experience of how little regard some of these contractors have for the success of their clients. As long as they can book the appropriate hours and hectares, they are happy. I believe the only way a contractor can be used effectively is if he hails from that area and has a stake in the outcome of his services."



Henry has a soft spot for those individual small-scale farmers with very limited resources who are truly doing their best.

Facets of training

Currently, the Eden Foundation focusses on various categories of training, planting being the first. When the foundation gets involved in a certain area, the beneficiary farmers are taken through a basic one-day planting training course. The OAC in conjunction with departmental advisors and Eden Foundation mentors, along with some of the bigger producers in an area, are then subjected to a technically more advanced two-day training programme.

Soya in Food Awareness is another training programme aimed at the utilisation of soya in food products, and specifically yoghurt from soya milk.

"We also present farmers' days in the various areas we are involved in. During these events we study the soya on the fields and answer any questions. The ideal would be to start study groups in these areas, but Eden simply does not have the capacity for it. We hope the department will drive such an initiative.

"There are wonderful cellphone apps available with relevant information on soya production, such as Smart Soya. One can even attend on-line courses via this app. Especially the younger farmers are quite clued-up in using this kind of technology. I think a local, South African orientated app should be on our to-do list as well."

Final thoughts

"We are not transformation agents. We develop soya bean producers. My dream is to see soya bean producers increase their yields so that they are able to create a better life with the resources available to them. I personally have a soft spot for those individual small-scale farmers with very limited resources who really try. There are some who are increasingly successful whom I am convinced will become fully fledged commercial farmers in future. Those are the ones that I really try to help."

For more information, contact Henry Davies at office@edenfoundation.org.za or visit *www.edenfoundation.org.za*.

Alternative accommodation is not the landowner's duty

By Clarissa Pienaar, Moolman & Pienaar Incorporated

The *Prevention of Illegal Eviction and Unlawful Occupation of Land Act, 1998 (Act 19 of 1998)*, or the *PIE Act*, distinguishes between unlawful occupiers who have occupied land for less than six months and those who have occupied land for more than six months.

Section 4(6) of the *PIE Act* states that, if an unlawful occupier has occupied the land in question for less than six months, a court may grant an eviction order if it considers it to be just and equitable, taking into account the rights and needs of the elderly, children, people with disabilities, and female-headed households.

Section 4(7) of the *PIE Act* states that, if an unlawful occupier has occupied the land for more than six months, a court may grant an eviction order if it considers the order to be just and equitable, given the circumstances – specifically whether land has been made available or can be made available by a municipality or other organ of state for the resettlement of the unlawful occupier.

Extended occupation

In the case of *Grobler vs Phillips and Others 2022 JDR 2648 (CC)* (the Grobler case), the Constitutional Court had to consider whether our courts ought to take into account, when considering an eviction order, an unlawful occupier's wish to remain on the property and not be moved to alternative accommodation.

The applicant, Mr Grobler, purchased a property at a public auction for his parents to reside in. The property, however, was occupied by Mr and Ms Philips (the respondents). Ms Philips was 85 years old at the time of the proceedings, and had been occupying the property since the age of 11 in 1947.

After the property was transferred to Mr Grobler, he informed Ms Phillips on three occasions that she needed to vacate the property and that he was prepared to pay for her relocation, or to provide her with alternative housing at his own expense. She did not accept either proposal and made it clear that she was not prepared to vacate the property.

After Ms Phillips had rejected all his proposals, Mr Grobler turned to the court. The Magistrate's Court granted the eviction order. Ms Philips' appeal to the Cape High Court was upheld. Mr Grobler then approached the Court of Appeal, which dismissed his appeal, after which he approached the Constitutional Court.

Final findings

The Constitutional Court found, *inter alia*, that:

- Although the *Extension of Security of Tenure Act, 1997 (Act 62 of 1997)*, or the *ESTA*, as well as the *PIE Act* offer protection to different categories of occupiers, both *Acts* were enacted with the aim of preventing unlawful evictions; hence, the same principles apply.
- The *ESTA* (and therefore also the *PIE Act*) does not grant an occupier security of tenure in a house of his or her choosing.
- In terms of the *PIE Act* an unlawful occupier's wishes and personal preferences are irrelevant when an application for eviction is being considered. An unlawful occupier, such as Ms Philips, cannot refuse to be evicted from the premises because she prefers staying.
- Although section 26 of the *Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)* grants every person the right of access to adequate housing, the *Constitution* does not grant Ms Philips the right to choose where she wants to live.
- Section 4(7) of the *PIE Act* specifies that the municipality or another organ of state is responsible for providing alternative housing.
- The fact that Mr Grobler repeatedly offered Ms Phillips the opportunity to move to alternative housing does not mean that Mr Grobler is obligated to offer alternative housing, neither is it a condition for the granting of an eviction order.
- The Court of Appeal failed to balance the rights of both parties. Mr Grobler, as the owner of the property, endured Ms Phillips' unlawful occupation for 14 years and offered alternative accommodation several times.
- The offer from Mr Grobler still stands and an eviction order will not leave Ms Phillips homeless. The offer should not be considered as a precedent that binds other landowners, as a private landowner is not obligated to provide alternative accommodation to an unlawful occupier.

In short: The wish of a party to remain unlawfully on someone else's property and not be moved to alternative accommodation is not a consideration when determining what is just and equitable, and a private owner is not obliged to make alternative accommodation available to such an occupier.

For more information, call Clarissa Pienaar on 033 032 0241 or email clarissap@mmlaw.co.za.

Layoffs:
Five common mistakes to avoid

By Abrie Bronkhorst, senior legal advisor, LWO Employers Organisation

Case study:

Your business has shown no growth the last eight months and rising fuel prices are exacerbating matters. You decide that layoffs are the only solution and inform your employees, in writing, of the business's financial situation. The letter also indicates that you have no choice but to lay off four of the employees. You address another letter to the four employees in which you inform them that their services will be terminated due to the operational requirements of the business. Their last working day will be at the end of the month. However, you receive a CCMA reference informing you that the layoff is unfair. How do you proceed?

South Africa's labour environment is strictly regulated and complying with legislation requires specialist knowledge. In many cases employers fall victim to the numerous pitfalls in relation to layoffs (retrenchment). Employers often believe that they are acting in accordance with what is stipulated, when in fact they are putting their business at risk.

Given the current economic climate, employers must consider various options in order to adapt to a changing environment. Layoffs are a no-fault dismissal as the employee has done nothing wrong and the dismissal is in line with operational requirements. As with all dismissals the process must be both substantively and procedurally fair. An employer who does not follow the correct procedure risks receiving a referral from the CCMA (Commission for Conciliation, Mediation and Arbitration), which could lead to an order against the employer and a financial payout to the employee and/or re-employment.

The following are five common layoff mistakes employers should avoid.

No decisions beforehand

When it becomes clear that layoffs are the only option, the employer must guard against identifying employees to be laid off beforehand – this is one of the most common mistakes and can lead to automatic unfair dismissal. As stipulated by labour legislation a specific process must be followed, the first of which is to consult with all employees in order to investigate alternatives to layoffs, draw up timelines and limit the negative impact of layoffs.

A fair reason for layoff

A fair reason in respect of operational requirements must exist before layoffs can be considered. The employer must guard against having any ulterior motives for terminating some employees' employment agreements under the banner of layoffs – for example, in lieu of dismissal for misconduct, poor work performance or incompetence. There are three basic reasons for layoffs, namely economic, technological and structural.

Consult with all parties

When the employer is considering layoffs, all employees who might be affected must be notified – this also applies to trade unions, where applicable.

Selection criteria

In terms of Section 189(7) of the *Labour Relations Act, 1995 (Act 66 of 1995)*, there are two types of recognised criteria an employer can utilise to determine which employees are to be laid off, namely:

- One the consulting parties agree upon.
- One that is fair and objective, if criteria cannot be agreed upon – the employer must, however, be able to prove that the criteria used are fair and objective, without any ulterior motives.

Final compensatory payout

This payment consists of the wage/salary, annual leave payout, statutory notice period payout and severance package. The severance package is only payable in the case of retrenchments and consists of one week's wage/salary for each completed year of service. The notice period must still be paid out to the employee, even if he or she is not required to work it.

The goal of employers is to operate their business as profitably and sustainably as possible. Employers must therefore continuously evaluate factors that can have an impact on the long-term success of the business, as this will create a cost-effective environment within which the business can continue to function competitively in the market.

The LWO Employers Organisation assists employers to comply with labour law, and to use it to their advantage to protect their business. As a registered employers' organisation with the Department of Employment and Labour, the LWO has the right to represent members at the CCMA. Contact the LWO on 086 110 1828 or send an email to info@lwo.co.za.

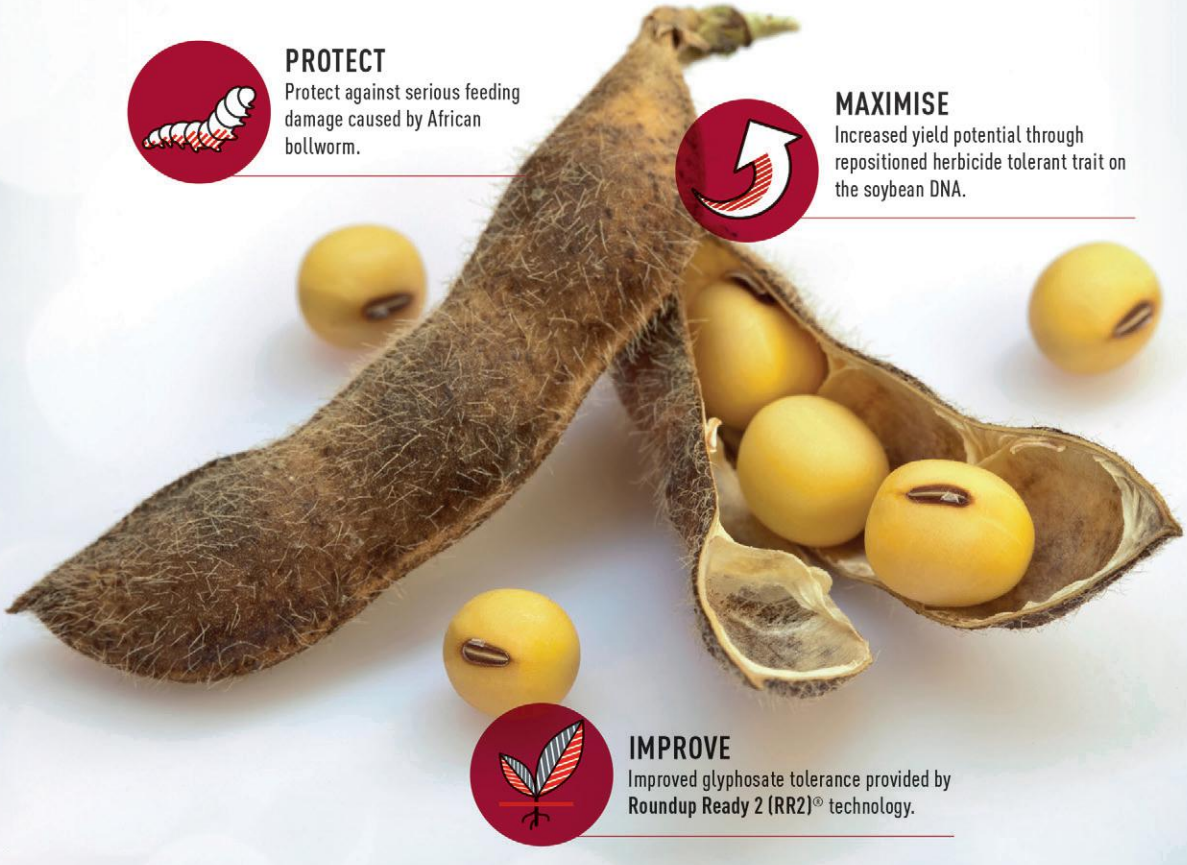
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