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DAY ZERO: Fear and anger vs. challenges and opportunities

By Andries Theron, chairman, PRF

With the Western Cape caught in the grips of an extreme drought – the worst in over one hundred years – and with Day Zero quickly advancing amid heightening fears, people are reacting in different and interesting ways. As leaders in the oilseeds industry, we can learn a lot from these reactions.

Being a farmer from Moorreesburg in the heart of the Swartland, I have first-hand experience of the impact that the drought has had on my community – fear has triggered mass sales of water tanks, large containers and bottled water. This is also the perspective usually portrayed by the media.

Real effect of the drought

Unfortunately, this is merely one part of our reality. I will refrain from commenting on opportunistic statements by political parties, but it is a pity that party gain is becoming a greater priority than the needs of South Africans.

The real effect of the drought in the Western Cape is its impact on the livelihood of the residents: farmers are losing hope and enormous carry-over debt is jeopardising cash flow and sustainability. This is the experience of not only the winter grain producers, but also of those with permanent and cash crops. The impact on seasonal workers is vast – income has been reduced (or completely forfeited) because of small or no crops, resulting in households without income. This, in turn, creates enormous social challenges.

Creating opportunities

This catastrophic situation is not without irony, since the fear among some is creating opportunities among others. Entrepreneurs are developing grey-water

systems, moisture is being harvested, and many highly innovative ideas are being put into practice.

Which brings me to the real responsibility of and challenge facing role-players in the oilseeds industry: thinking creatively, climbing out of one's comfort zone and creating a sustainable value chain from the farm to the table. The Western Cape is not the only province with growth potential. The real growth lies waiting in the northern parts of the country, specifically the western regions.

In this case, the opportunities are not created by the drought, but rather by 2017's bumper maize crop, and with normal rainfall later in the season, most probably an average crop for this season. This alone will keep maize prices under pressure, with the same devastating results as the drought in the Western Cape.

Oilseeds have the potential to stabilise this uncertain situation by taking its rightful place in crop rotation systems. This will bring balance to the supply of both commodities and create a sustainable production system for maize and oilseeds, benefiting producers and the entire value chain.

Oilseeds can fill the void

The Western Cape faces the exact same challenge. Wheat production must be brought in line with demand and consumption, which is 300 000 tons lower than current production. This presents an opportunity for oilseeds to step in.

The challenge in triggering this growth, requires innovative thinking and a pragmatic approach. We will have at our disposal all the right cultivars after the implementation of an end-point royalty system for soya beans. We have the necessary expertise and knowledge of production practices

and production systems, and we have enough crushing capacity and off-takers for substantial growth in the oilseeds industry, both in the north and south.

What is needed now is for all role-players in the industry to take up the responsibility and convey a positive message to farmers regarding a sustainable win-win solution. In addition, they must, where needed, transfer as much technological information as possible, become involved in farmers' days and training, and address research needs when required. A positive outcome is possible, and we can experience phenomenal growth in the oilseeds industry within the very near future.

While the focus is on delaying or preventing Day Zero in the Western Cape, a more positive 'day zero' – one where South Africa's hefty reliance on imported oilseed products will be replaced by increased self-sufficiency – is fast approaching. 🌱



Embracing technology

Improvements in technology remain inevitable and its progression critical. In 1984, the personal computer was not even available in South Africa. A telex was the preferred method of document transfer in 1985 and only in 1987 did it become the norm for a business to communicate via fax.

By using the Internet, the first IP connection in South Africa was made between Rhodes University and Oregon in the United States in 1991. Business and private use of the Internet began in 1992 with the advent of the subdomain .co.za.

In 1994, the first cellular phones were introduced on commercial scale in the country. Even though they were the size of a brick (Ericsson GH197), it was an amazing technological advance. Two decades later the use of smartphones in South Africa reached nine million; it then exploded to an estimated 20 million in 2018.

Technology and agriculture

The ability of agricultural producers to monitor live prices and do transactions on futures exchanges with mobile devices anywhere in the world, is but a small example of how we have progressed. Social media as a means of communicating has also become part of our daily lives.

At Tesla, Elon Musk is changing the future of power with leading battery technology. Overcoming the challenge of powering homes in South Australia by making use of solar and battery technology seems a logical contribution to global power demands.

Desalination technology has also improved and reduced rapidly in cost. The Sorek desalination plant in Israel is the world's largest, with a seawater capacity of 650 000m³ per day.

Water resources are a challenge

Using available technology to recover used water and processing this resource back to potable water must receive urgent attention, and it seems logical that this advanced technology is being embraced across the world where water resources are a challenge. South Africa, however, is lagging behind – it may take the Cape Town crisis to embark on a new path.

Accurate forecasting of the effect of climate change on weather patterns, incorporating the ability of early and long-term predictions, seems a challenge. Cloud seeding to induce rainfall at appropriate times, while having received major attention and funding in the past, seems to have fallen by the wayside.

Effect on oilseed production

The progressive attitude of many South African farmers has been a large part of their success, and the reason why they have been able to adapt to countless challenges. Embracing technology on many fronts will make a significant contribution to success in the future.

We salute all companies/institutions that are assisting to empower producers with technology that will result in a mutually beneficial partnership. The Protein Research Foundation and Oilseeds Advisory Committee are proud to be partners in this process.

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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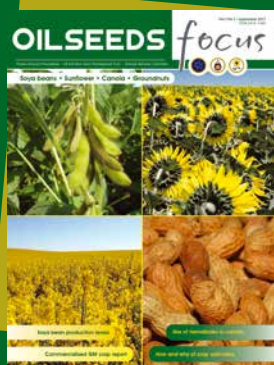
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FDA authorises health claim for soya oil

Soya bean oil can be part of a healthy diet and, thanks to a petition for a qualified health claim recently authorised by the US Food and Drug Association (FDA), soya bean farmers and food manufacturers can proudly tout its heart-health benefits. Soya bean oil, and products containing soya bean oil, can now use a heart-health claim on packaging, menus and more.

The claim is similar to those associated with canola and olive oil and states that eating 1,5 tablespoons of soya bean oil daily may reduce the risk of coronary heart disease when replacing saturated fat and not increasing calories. The FDA announced that it had no objections to the claim for foods that qualify. The application for the claim was submitted by Bunge, one of the leading soya bean processors in the US.

"The food industry is by far our largest customer for soya bean oil and by submitting this claim, Bunge is really looking out for soya bean farmers and our long-term profitability," says John Motter, United Soybean Board chairman and soya bean farmer from Jenera, Ohio. "This claim really helps US soya bean farmers maintain their competitiveness in this critical market and helps us compete with other oils that have become synonymous with heart health."

The American Heart Association recently went on record regarding the cardiovascular benefits of the fats found in soya bean oil. These positive movements for soya bean oil will help in US markets primarily. The claim will also be used to position US soya in international markets.

– United Soybean Board



Cargill launches hybrid high-oleic canola oil

Cargill has launched the world's lowest saturated fat hybrid high-oleic canola oil for commercial customers. The oil, which is made from hybrid canola, contains 4,5% saturated fat or less – 35% lower than other traditional canola oils on the market – while also having a long shelf life, superior taste, and high fry performance. The canola hybrid was developed using traditional breeding methods that targeted increased resistance to clubroot and blackleg disease.

After ten years in development, deliveries of the new oil variety, which will be marketed under the Clear Valley brand name, will begin this year. The timeline for the product is advantageous for Cargill, as the 2015-2020 Dietary Guidelines issued by the US Department of Agriculture (USDA) Health and Human Services suggests that saturated fat intake in typical diets is reduced to less than 10% of daily calorie intake. – Oilseedsandgrains.com

More factors control soya bean oil content

Research teams typically focus their work on genes that affect soya bean seeds when trying to develop higher oil varieties. However, a study conducted at Purdue University has discovered that genes associated with other parts of the plant, also have a significant impact on oil content.

A team at Purdue's Department of Agronomy, led by Jianxin Ma, found that changing from a single cytosine to a thymine within the B1 gene, would not only eliminate bloom – a powdery substance that coats seeds in the pod and is harmful to animals and humans – from wild soya beans, but would also significantly increase the seed oil content compared to wild varieties.

The findings indicate that other genetic avenues for increasing soya bean oil content exist, other than directly modifying the seed itself.

– Oilseedsandgrains.com.

Brazil steals US soya bean share in China

US soya bean growers are losing market share in the all-important Chinese market, because the race to grow higher-yielding crops has robbed their most prized nutrient: protein.

Declining protein levels make soya beans less valuable to the \$400 billion industry that produces feed for cattle, pigs, chickens and fish. And the problem is a key factor driving soya bean buyers from the US to Brazil, where warmer weather helps offset the impact of higher crop yields on protein levels.

A decade ago, the US supplied 38% of soya beans to China, the world's top importer, compared to 34% from Brazil. Now, Brazil supplies 57% of Chinese imports compared to 31% from the US, according to China's General Administration of Customs.

Soya beans are by far the most valuable US agricultural export, with \$22,8 billion in shipments in 2016. However, declining protein levels and market share pose a vexing problem for soya farmers already reeling from a global grains glut and years of depressed prices. – Reuters.com

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Argentina to cut soya export taxes

Argentine soya bean farmers can look forward to lower costs as a plan was announced to cut the 'retentions' – or export taxes on soya beans – by half a percent monthly. In December 2017, the withholdings were at 30%. It will end 2018 with a rate of 24% and, by December 2019, will be at 18%.

Argentina's soya retentions were at 35% during the previous presidency and were cut to 30% four days after the new administration took over the reins of government in 2015. Similar export taxes on wheat, maize, meat and other products were wiped out altogether, but the soya retentions were not. Those taxes go, in part, to support individual infrastructure projects in the provinces, and to help support pension schemes – both popular items among the Argentine electorate. – *Blackseagrains.net*

Consolidation continues in agriculture

Consolidation continues in the commodities arena as market conditions remain a challenge. Shifts in consumer demand, advances in technology, global bumper crops, and a multi-year low commodity cycle have created a difficult atmosphere for the world's top traders.

In response, global giants such as Cargill, Louis Dreyfus, ADM and Bunge, among others, are turning to consolidation and diversification as ways to fight back through gaining scale and expanding into higher margin businesses.

Amid these shifts, Archer Daniels Midland (ADM) has made an undisclosed bid to take over rival US-based global trader Bunge, according to the Wall Street Journal. The move will likely be met with rigorous regulatory examination, and could spark a bidding war with Swiss commodities giant Glencore, which made an unsuccessful play for Bunge last year. – *Oilseedsandgrains.com*

Tourists damage sunflower crops in Australia

Farmers in Australia have expressed their increasing concern at seeing thousands of tourists stream onto their sunflower fields to take selfies. In the process they destroy fields and crops, leave rubbish behind or steal sunflower heads. Some even dig holes in sunflower heads to draw faces. This follows after a tourism photo competition offered a \$2 500 holiday as prize for the best photograph taken travelling in the region.

Sunflower grower Craig Smith from Nobby on Queensland's Darling Downs said on some weekends he had to chase hundreds of tourists out of his field.

The chair of the Australian Sunflower Association, Kevin Charlesworth, said that it was getting a bit over the top with tourists walking into the sunflower fields. He said although the tourists pose only a small biosecurity risk to the sunflower paddocks, it is there and something to think about. There is a possibility that they could bring in weed seeds or diseases. – *Abc.net.au*



Get recognition for industry achievements

Role-players in the oilseeds industry are reminded to nominate candidates for the Protein Research Foundation (PRF) Achievement Awards as well as the achievement awards of the Oil and Protein Seeds Development Trust (OPDT) and the Oilseeds Advisory Committee (OAC).

Both competitions have four categories available for entries:

- Best doctoral thesis.
- Best master's degree treatise.
- Best article in a scientific journal.
- Outstanding contributions by an individual, which promotes the institution's objectives.

The nominated work must have been completed between 1 January 2017 and 29 March 2018. In order to qualify for these awards, nominations must be accompanied by a short motivation and must reach the PRF not later than 29 March 2018.

– *Press release* 🟡

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Nematode pests of leguminous and oilseed crops in South Africa

By Dr Sonia Steenkamp, ARC – Grain Crops Institute, and Prof Driekie Fourie, North West University, Potchefstroom

During the past three decades, extensive nematological research has been conducted on especially soya beans and groundnuts. Limited information is available on the impact of nematode pests on other oilseed and leguminous crops, namely cowpeas, dry beans, lupins and sunflower. All of these crops are, however, parasitised by root-knot and lesion nematodes in particular, causing extensive damage and yield losses.

The peanut pod nematode is also known as an economically important nematode pest that causes qualitative damage to local groundnut crops. Various other nematode groups also infect oilseeds and leguminous crops, but generally do not occur as commonly as root-knot and lesion nematodes, and subsequently show lower damage potential.

Root-knot nematodes

Locally, *Meloidogyne incognita* and *M. javanica* are the two main root-knot nematode species that damage oilseeds and leguminous crops. They have a very wide host range and will, therefore, also infect and damage those crops planted in rotation. A root-knot nematode population in any given field will mostly consist of a mixed population of these two species, often also with one or two other species.

At present, an extensive survey is being conducted to identify root-knot nematode species and determine their abundance in local grain production

areas. Such knowledge will enable more focused application methods to manage these pests.

Above-ground symptoms of root-knot nematode infestation include patches of poorly growing plants that may be stunted and/or wilted with yellowing leaves. These symptoms will often accompany yield loss manifestations such as smaller or only partially filled soya bean or dry bean pods.

Symptoms below ground are characterised by elongated to roundish, knot-like protuberances that form on roots, pegs and/or pods carried below ground (e.g. groundnut). Should producers suspect nematode infestation, it is crucial that they remove plants from the soil and check for such below-ground symptoms.

Galls formed by root-knot nematodes are often confused with *Rhizobium* nodules, but can be easily distinguished. *Rhizobium* nodules are easy to rub off the roots, while galls form an integral part of the root system that cannot be removed without damaging the root. The inside of a *Rhizobium* nodule is either whitish, greenish or pinkish in colour, depending

on their developmental stage.

In cases of severe root-knot infestation in soya bean fields in the late 1990s in Mpumalanga, total destruction of the crop had been recorded. Yield losses ranging from 25 to 70% have also been recorded for the crop as a result of root-knot nematode infestation. Dry bean crop losses that ranged between 30 and 87% have been reported for a microplot trial.

Lesion nematodes

Lesion nematodes are usually the second most prevalent nematode pest infecting oilseeds and leguminous crops. Various species have been identified from oilseed and leguminous crops, with *Pratylenchus brachyurus* and *P. zaei* being the most abundant. This genus also has a wide host range.

Above-ground symptoms caused by lesion nematode infestations are similar to that of root-knot nematodes. Lesion nematodes cause distinct necrotic lesions on infected plant parts below ground, which can easily be confused with symptoms caused by other soil-borne pathogens.

Pod nematodes

Although not a threat to crops other than groundnuts, this nematode pest needs to be mentioned because it has a huge impact on groundnut production in South Africa. Pod nematodes (*Ditylenchus africanus*) seem to be endemic to South Africa and has not yet been reported in other



Galls on soya bean roots caused by root-knot nematode infection.
(Photograph by Philip Holtzhausen)

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Science For A Better Life

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parts of the world. They survive on crops other than groundnuts, as well as on weeds commonly found in groundnut fields, but cause damage only to groundnuts.

This nematode increases rapidly at the onset of pegging and the largest part of the population will occur in the pods at harvesting. They do feed on the roots, but to a lesser extent. For this reason, groundnut pod nematode infestations generally show no above-ground symptoms.

Below ground, the first symptoms appear at the connection point of the peg to the pod where the nematode primarily enters the pod. This causes weakening of the cells at this connection point, which causes the pods to break off when lifted. In severely infested fields a producer can lose 40 to 60% of his crop in this way.

The main effect of this nematode on groundnuts, however, is qualitative. Infected pods appear dark brown to blackish, sometimes with darker veins. Infected seeds are shrunken with dark brown to black micropyles, and flaccid testae showing darker vascular strands. Testae of infected seeds can easily be removed by gentle rubbing and reveals a distinct yellow discolouration on its inner layer.

Damage caused by the hull and the destruction of the seed testae by these nematodes, result in the occurrence of second-generation seedlings and germinated kernels even before harvest. The feeding of the nematodes near or in the vascular bundles of the seed testa also results in the unattractive appearance of infected seed.

These symptoms increase the percentage of unsound, blemished and soiled (UBS) kernels and are highly correlated with the number of nematodes present in the testae of the seeds. Consignments are often downgraded because of the higher UBS percentage caused by this nematode. For this reason, pod nematode infestations have substantial financial implications for producers.

Grading of groundnut consignments is specified by law and the supply and



Kernels infected with peanut pod nematodes have dark testae and veins (left), a germinating kernel (right) and infected pods with germinated kernels inside.

(Photograph by Johan Els, Agricultural Research Council – Grain Crops Institute, Potchefstroom)

demand dictate the prices of each grade. The economic importance of pod nematode is determined by the loss of income from infected groundnut consignments, which in turn depends on current prices for each grading class.

Other nematodes

Although a wide range of other nematode groups infect groundnut locally, the testa nematode (*Aphelencooides arachidis*) also impact adversely on groundnut quality. So far, this nematode has been found in various groundnut pods from fields located in the Northern Cape and North West. The distribution of this nematode and another nematode that closely resembles the testa nematode morphologically is currently under investigation.

Management strategies

All these nematodes are difficult to control because of their wide host range and high reproductive potential. These characteristics enable them to quickly build up to large populations that cause substantial damage to crops.

Chemical control

Although still the most popular management strategy, nematicides are not always capable of sufficiently reducing nematode population densities, especially those that produce numerous generations during a single growth season. During the past few years, a strong movement has been initiated towards using more environmentally friendly products to reduce nematode population densities in crop fields.

Crop rotation

Crop rotation is generally not an effective strategy to reduce root-knot and lesion nematode populations, because of the wide host range of such pests. However, using a poor host or resistant cultivar within each crop cycle should be the main strategy to combat root-knot nematodes.

The effectiveness of this strategy in combating pod nematodes is limited, because of the ability of the pod nematode to survive on weeds and crops other than groundnuts. Its high reproductive potential and short lifecycle of seven days cause this nematode to build up to damaging populations, even if they are present in small numbers at the beginning of the growth season.

Host plant resistance

Rotation with poor hosts or resistant plants is one of the most effective management tools to manage nematodes. A limited number of root-knot nematode resistant cultivars are available for oilseed and leguminous crops in South Africa, while their host status for lesion nematodes must still be determined.

There are no resistant groundnut cultivars available against the pod nematode on the local market. Research is still needed to identify groundnut cultivars resistant to root-knot and lesion nematodes.

Sunflower cultivars tested so far are all susceptible to root-knot nematodes. Although four sunflower cultivars show resistance to a lesion nematode species, more cultivars should be tested. Most dry bean cultivars tested against root-knot nematodes proved to be susceptible. There is no information available in terms of dry bean resistance to lesion nematodes.

Research on the impact of these nematodes on the most important oilseed crops and the development of strategies to combat them should be pursued. This much needed research should provide producers with practical and cost-effective strategies to ensure sustainable crop production. 🌱

Gerbil control for crops

By Dr Gerhard H Verdoorn, CropLife South Africa

Crop farming has developed tremendously over the past two decades, largely due to new technology such as genetically modified crops, no-till practices and improved pest control. Unfortunately, nature is hampering progress in its own unique way. As many crop producers have discovered, there are some cons to no-till farming, one of them being an explosion in the gerbil population.

These little rodents, also known as the *nagmu* or *springhaasrot*, can easily become a dangerous – and costly – pest

in both the summer and winter rainfall areas, where their impact can result in seed having to be planted three times over. Given our continuously rising input costs, no producer can allow a single pest to make the production season even more costly.

Gerbils are approximately the same size as a common roof rat, and have long hind legs. They are grey in colour and live in colonies of up to 40 000/ha, where they burrow a network of holes and tunnels in the soil. Their manure resembles tiny torpedoes in the grass. They survive dry periods in

headlands, living off natural food. However, once crops start germinating, these little creatures move in on the fields, tackling the germinating plants. Gerbils can destroy as much as 30% of a planting in just a few days.

Investigations indicate that gerbils usually strike when the grain plant is in the two-leaf stage. The plant is cut neatly above the seed and the seed is then either eaten or taken to their burrows for a family meal.

Combating an outbreak

How do you control such an outbreak? Firstly, every farmer should properly inspect his fields, including the headlands, before planting. Any group of holes of approximately 50mm in diameter, must be regarded as a tell-tale sign of gerbil infestation. The producer should then start with control treatment.

If the colonies are small, owls and raptors can be used for control. Perches of around 2,4m in height must be erected in the fields and headlands, from where raptors and owls can hunt gerbils. It is advisable to scatter a few handfuls of crushed grain around the perches. Gerbils will soon discover the food and lure owls and raptors to the perches. Colonies established in fallow fields must be destroyed through deep tilling, regardless of whether they are fields under normal tilling or no-till.

If rodenticides are used, perches for owls and raptors must not be erected. Various anti-coagulants are registered for gerbil control, but it should be handled with great care to prevent secondary poisoning.

Using bait

Wax block bait must be placed in bait stations. Farmers can make their own bait stations by cutting 75mm plastic piping into 500mm lengths. Wax blocks are the



Gerbils that go unmanaged can cause extensive damage to crops. (Photographs: www.agric.wa.gov.au)



A dead gerbil that cannot cause damage.

most effective method, because they can be strung on a wire loop inside the pipe, preventing the gerbils from removing it.

Zinc phosphide and aluminium phosphide are also registered for gerbil control. After it was discovered through experiments that gerbils do not like hard grain in zinc phosphide bait, the problem was solved by soaking grain kernels in water until they germinate. They are then dried and treated with cooking oil and zinc phosphide, according to label instructions. As a safety measure, the bait must also be placed inside pipes.

Farmers preparing bait with zinc phosphide must take note: It is an extremely poisonous chemical compound and if it is inhaled it can cause severe poisoning. Preparation should be done in a completely windless area and the handler should wear latex gloves and a face mask.

Effective control

Aluminium phosphide is only cost-effective in controlling smaller numbers of gerbils. It is labour-intensive, but can be very efficient if applied correctly. The soil must not be too dry, because moisture is required to activate the tablets. Firstly, close all burrows and place the tablets in the newly opened burrows the next day.

When the tablet is put into the burrow, it must be closed to allow the released phosphine gas to do its job. The advantage of zinc phosphide and aluminium phosphide is that the phosphine gas quickly kills the gerbils, after which it swiftly dissolves into phosphoric acid. The risk of secondary poisoning of raptors and other animals is therefore quite small.

Rodenticides must be used in a pulsed programme. This entails applying rodenticides for short periods, e.g. two



Gerbils live in colonies of up to 40 000/ha, where they burrow a network of holes and tunnels in the soil. (Photographs: www.agric.wa.gov.au)



Perches for owls and raptors from where they can hunt gerbils.

weeks. This must be followed by two weeks off, then another short application period.

The reason for pulsed application is to prevent the animals from becoming wary of rodenticides. When animals start dying from ingesting rodenticides, they can emit alarm signals in the form of pheromones that can warn those not affected against the danger of the bait.

More clever ideas

Gerbil control can also include other clever plans. Most fields have an odd piece of land where a specific crop can be planted to attract gerbils. The idea is that the attracting crop must

germinate along with the cash crop, so that gerbils can find food there rather than in the production crop field.

Surplus seed can usually be purchased inexpensively. The seed should then be planted in a dense stand of about 1-2m wide around the fields. It also makes sense to erect owl perches in such a field. Once gerbils start feeding on the plants, the owls will be present to reduce their numbers.

Water traps are also effective. The tops of empty drums are cut open and the drums are planted level with the ground. They are then filled one-third with water and some grain or sunflower seeds are added. At night when gerbils are active, they will smell the food and end up drowning when they fall into the drums as they go after the seed.

Raptors and owls are invaluable

All these methods must be integrated to control gerbils effectively. Raptors and owls are invaluable in gerbil control. Under no circumstances should acute poison such as aldicarb and carbofuran be used illegally. It will kill everything that eats the gerbils. If a large enough population of owls has been established, chances are that they will keep the gerbil population in check. 🦉

For a comprehensive gerbil management plan, contact Dr Gerhard H Verdoorn of CropLife South Africa at neshier@tiscali.co.za or 082 446 8946.



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Six essential plant breeding questions answered

By Jen Del Carmen, communications consultant, USSEC

Farmers rely on tools such as plant breeding innovation to maintain US soya's global competitive edge, keep up with demand for sustainable soya production and meet the needs of the future with fewer resources. The following are six commonly asked questions regarding plant breeding, gene editing and genetically modified organisms.

What is plant breeding innovation?

Plant breeding involves plant scientists and breeders using methods that work within the genetic makeup of plants' own families. This results in improved seed that can thrive despite challenges – such as droughts, plant diseases and pests – all while reducing crop inputs. Innovative plant breeding methods, such as gene editing, build on what plant scientists and breeders have been doing for years and allow them to reach the same endpoint more precisely than traditional methods.

What is the difference between a plant developed through new plant breeding methods, such as gene editing, and a GMO (genetically modified organism)?

Newer plant breeding methods, such as gene editing, can work within the genetic makeup of a plant's own family to produce a new variety. A GMO is

a plant with genetic material from another organism that was introduced using genetic engineering techniques. Both are important tools to deliver improved varieties that enable soya bean farmers to produce more with less.

What is gene editing?

Gene editing is an example of plant breeding innovation that allows plant scientists and breeders to make precise, specific changes to a plant's DNA using that plant's own internal processes. Like traditional breeding methods, gene editing allows plant breeders and scientists to develop new varieties without incorporating foreign DNA. CRISPR-Cas9 is one example of a gene editing tool.

How does plant breeding innovation benefit soya bean farmers?

To meet the future demands of a growing population while using fewer resources, plant breeding innovation brings more sustainable solutions to the market in a quicker way. Plant breeding innovation helps improve farmers' profit opportunities by lessening the impact of common challenges, such as droughts, plant diseases and pests. It also ensures that farmers remain stewards of the land, allowing them to use crop inputs and other natural resources efficiently.

Will seed cultivars developed through plant breeding innovation be regulated?

All foods derived from plants are regulated in the US by the Food and Drug Administration (FDA), and seeds are comprehensively

regulated by the US Department of Agriculture (USDA). Global regulatory policies for products of plant breeding innovation are currently under development. In early 2017, the USDA published, for public comment, a sweeping proposed rule revising USDA's biotechnology regulations.

That proposal included a section recognising that some applications of gene editing result in plant cultivars which are essentially identical to cultivars developed through more traditional breeding methods and treats these cultivars accordingly. While the USDA indicated that they support the general direction of the broader proposal, they decided to withdraw the proposed rule to allow additional time for stakeholder input in late 2017. The issue will likely be discussed again this year.

Is gene editing technology also used in animal agriculture, a key market for US soya?

Following in the footsteps of traditional breeding, scientists say gene editing technology can boost the sustainability of livestock production while also enhancing livestock health and welfare. Gene editing technology has already prevented livestock disease in pigs by making them resistant to some viruses. It has also improved animal welfare in dairy cattle by eliminating the need for horn removal. Research is underway on other applications. However, it is not yet clear what regulatory challenges livestock produced with gene editing will have. 🌱

Article courtesy of www.ussoy.org.

Overview of weather conditions and water availability

By Ursula Human

In February this year, Cooperative Governance and Traditional Affairs reclassified the drought in the Western Cape, Eastern Cape and Northern Cape from provincial disasters to a national disaster. This article gives an overview of the current prospects for weather conditions in the summer and winter rainfall areas of South Africa. Information concerning water availability and restrictions is also discussed.

It is believed that farmers in the summer rainfall areas of South Africa can look forward to continuing positive weather and rainfall conditions in the new year.

"Following the 2015/16 drought across most of South Africa, above-normal rainfall during 2016/17 brought welcome relief for the summer rainfall region. The current summer therefore began on a much more positive note than 2016/17, which started with reservoirs over the summer rainfall region at low levels and extreme drought conditions over the Lowveld," says Dr Johan Malherbe, senior researcher at the Council for Scientific and Industrial Research (CSIR).

Dam levels over this region increased on average by 12% compared to the levels for the same time last year. Only dams in the Western Cape are at lower levels than a year ago.

"For the time being, it seems as though the positive climate conditions over the summer rainfall region is set to continue in broad terms. Coupled global climate models, used for seasonal prediction, have recently trended more favourably in their outlook for summer rain over Southern Africa," says Dr Malherbe.

A possible La Niña summer

This recent positive outlook for a reasonable summer over much of the interior, is based on the reaction of climate models to the changing sea surface temperature anomalies (SSTAs) found mostly in the equatorial Pacific Ocean.

Over the central to

eastern Pacific, the negative SSTAs have recently crept downward across the so-called La Niña threshold. Persistently

Positive climate conditions over the summer rainfall region is set to continue in broad terms.

stronger than normal easterly trade winds across large sections of the equatorial Pacific during the 2017 winter – and continuing to this day – have resulted in a very late developing La Niña, a global ocean-atmosphere state that is associated with above-normal rainfall over the summer rainfall region. "If these anomalies persist for another two months, this year will be counted as a La Niña summer."

According to Neel Rust, chief operating officer at Laeveld Agrochem, it is encouraging to see that the forecast points to a continuation of good rains in the second half of the summer rainfall area.

"This is good news to especially producers in the western parts of the Free State and the North West, seeing that plantings happen later – which has been the case the past four years. The last few seasons' good rains, an essential component before planting can commence, moved on by approximately six weeks.

"However, late plantings carry a greater risk as the summer row-crops are still in



their growth stage when early frost occurs. Under normal conditions producers would welcome early frost as it helps in reducing the summer row-crops' moisture content,

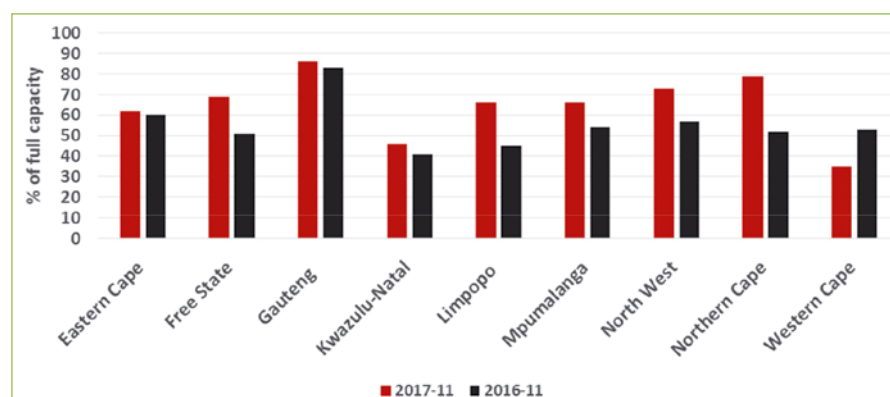
According to the non-profit organisation Green Cape, agricultural users have already reduced water usage from 60 to 85%.

but with late plantings there is a risk that the plant may be damaged, since it is still in its growth phase."

The effects of strong easterly winds

Dr Malherbe says that anomalous SSTs over the equatorial Pacific Ocean will not necessarily force weather anomalies across South Africa, although there exists a strong statistical correlation between the SST anomalies and rainfall over South Africa.

This correlation may also simply mean that both rainfall over the subcontinent and the SSTs across the equatorial Pacific Ocean are influenced by the same factor, namely the strength of easterly winds at a global scale. That is, the strength of the easterly winds throughout large parts of the world may



Dam levels per province, expressed as a percentage of the full capacity, for November 2016 (black bars) and November 2017 (red bars). (Data courtesy of the Department of Water Affairs)

drive both the SSTAs and rainfall across the summer rainfall area.

"As the trade winds across much of the equatorial Pacific are stronger from the east than normal, it can be an indication that the forcing associated with the La Niña event during the coming summer may be sufficient to result in wet conditions over large parts of the summer rainfall region," Dr Malherbe says.

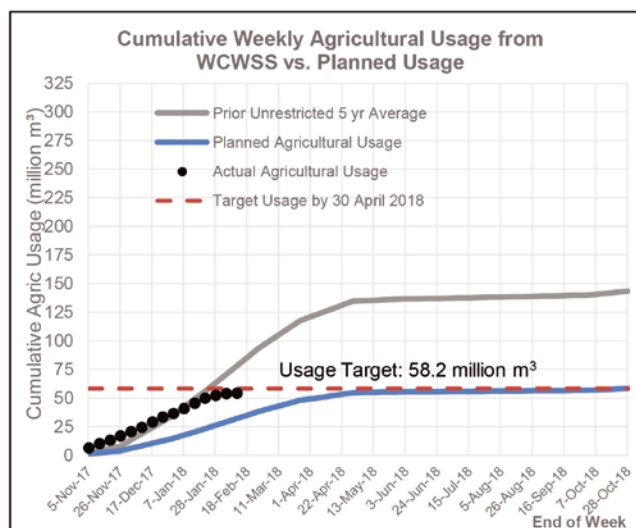
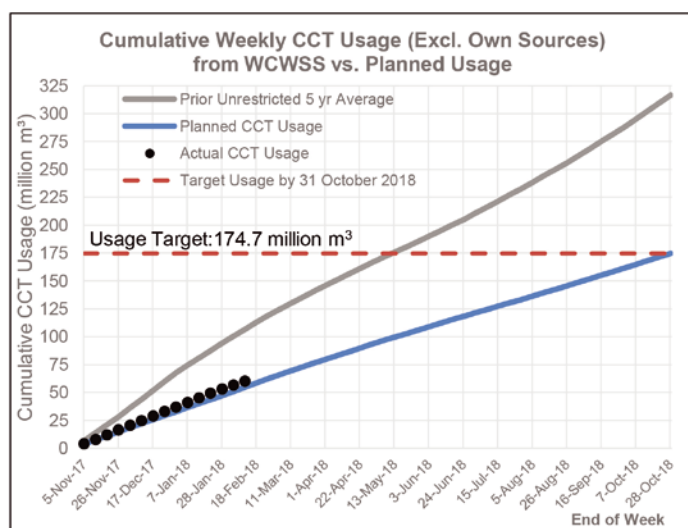
These effects might already be benefiting soya bean crops. According to Wandile Sihlobo, head of economic and agribusiness intelligence at Agbiz, several regions of the eastern Free State and Mpumalanga received light showers of between 10 and 45 millimetres in early February. This boded well for soya bean crops that were already in a fair condition. The weather forecast for the next three

months is favourable in this region, with prospects of good rainfall.

Western Cape water restrictions

The south-western winter rainfall regions are unlikely to see relief from the crippling drought this summer (normally a dry period) and will have to wait until the winter of 2018 to learn their fate. There is also little hope that irrigation will be of any help, with the Western Cape water usage being under a level 6b restriction. In February, day zero was moved to June 2018 due to measures taken to limit water usage.

With agriculture currently consuming >40% of shared dam resources in the province, they will not be receiving any further water releases this summer. In response to continued high water consumption, a recent gazetted notice



Water usage from large dams comprising the Western Cape water supply system (WCWSS).

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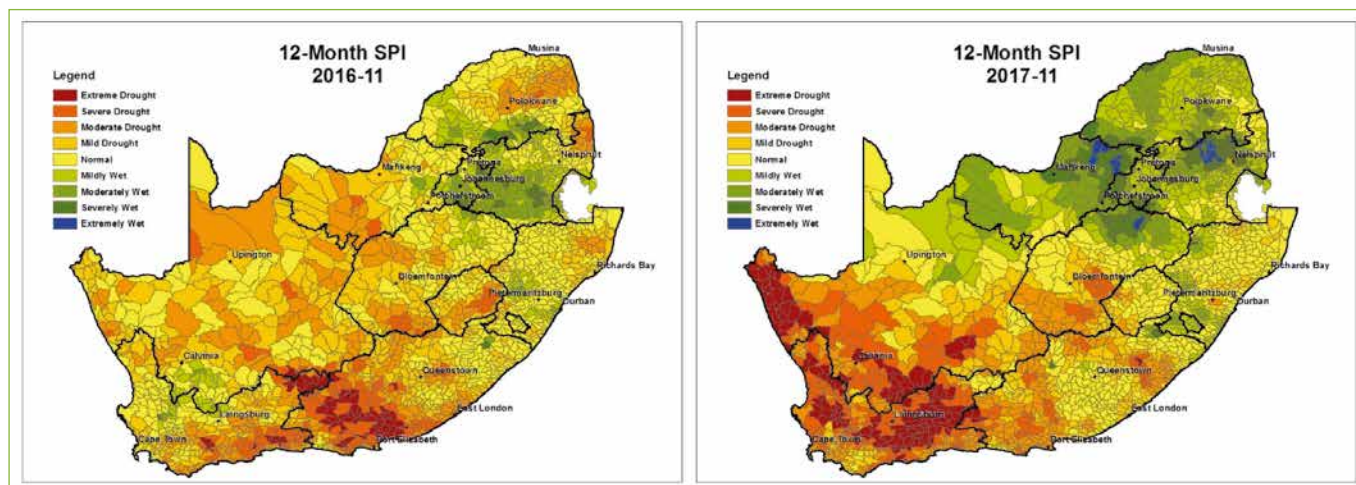
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A 12-month Standardised Precipitation Index for November 2016 (left) and November 2017 (right).

(12 January 2018) instructed the Western Cape provincial head to cease any further releases from the system dams once an agricultural bulk water user association, irrigation board and/or individual water users had depleted their curtailed seasonal bulk volumes.

With agriculture in the Western Cape not receiving any further water releases this summer, it will have a significant impact on that sector, with downstream impacts on the local economy. R40 million in agricultural workers' wages had already been lost in October 2017.

According to information supplied by the non-profit organisation Green Cape, agricultural users have already reduced water usage from 60 to 85%. Irrigation access to the Berg River for producers in the Berg River area has been cut off. Irrigation users must implement monitoring devices on pumps to keep record of all the data obtained from the water measuring device. Many farmers have redirected water from less profitable to more profitable blocks. This drastically reduces the quantity of crops produced.

Reduced agricultural production

In a press statement in February, Agri Western Cape CEO, Carl Opperman, stated that "due to the limited water allocation, agriculture had to make serious financial decisions, such as taking out vines and orchards, not planting vegetables in certain regions and using the limited available water

for higher value crops that are earning the country a massive amount of foreign income. Due to the limited water, 50 000+ seasonal workers couldn't be accommodated this year."

With agriculture in the Western Cape not receiving any further water releases this summer, it will have a significant impact on that sector, with downstream impacts on the local economy.

For canola, a reasonable performance is expected for the 2017/18 season, thanks to timely rainfall in large parts of the southern Cape (BFAP, 2017). According to the sixth production (January 2018) estimate for winter cereal crops, the expected canola crop was adjusted slightly upwards by 1,16% or 1 068 tons to 93 468 tons.

The estimated area planted this season is 84 000ha – 23,4% more than the 68 075ha planted in 2016. However, compared to the total crop in 2016 (105 000 tons), the total crop for the current season is expected to be approximately 100 800 tons, a 4% decrease (Crops Estimates Committee, 26 October 2017).

As for predicting winter rainfall in the southern parts of the Western Cape, according to Dr Peter Johnston, a climate scientist at the University of Cape Town who specialises in agriculture and water related activities, there is no forecast that can predict winter rain in this region, especially during a neutral El Niño-Southern Oscillation (ENSO) year.

Plan according to scenarios

"Statistically there is a higher chance of a wetter year occurring after a prolonged drought, but stats can be wrong," says Dr Johnston. "Keeping in mind the status of the soil due to the current drought, it would be useful to create scenarios of possible rainfall outcomes and plan accordingly."

He gives the following as an example:

- What if there is no/reduced rain during May and June?
- What if the rainfall comes early (May, June) and then stops?
- What if the rainfall is normally distributed (May to Sept)?
- What if the rain is heavier than normal?

"The industry would then allocate the risks and responses for each scenario and monitor the season, choosing management strategies that would best ensure the maximum possible yield and quality. Of course, there are also many other unknowns, such as wind and temperature," he concludes. 🌧️



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Canola cultivar evaluation: Western and Southern Cape 2017

By PJA Lombard, L Smorenburg and J Strauss, RTDS, plant sciences

During the 2017 season, a total of 18 canola cultivars were tested in the cultivar evaluation programme. Four conventional, eight CL (ClearfieldR, Imasamox tolerant) and six of the TT (Triazine tolerant) group were included in the programme.

All 18 cultivars are hybrids, the same as in 2016. One new CL (43Y92) and three new TT cultivars were tested (Hyola 650 TT, AG4510 TT and CHTB2112 TT).

National cultivar trials

The Western Cape Department of Agriculture planted eight trials in the Southern Cape in the 2017 season. The data of only seven was collected, as the trials at Riversdal and Heidelberg were poorly established due to insufficient soil moisture. In the Swartland, eight trials were planted in seven localities, of which three were not harvested (also due to insufficient soil moisture at Darling, Pools and Eendekuil).

Climate of localities

The 2017 season in the Swartland was characterised by extremely dry conditions in April and May. The region, however,

received a fair amount of rain on 6 and 7 June. Trials that were planted from late April up to the first week in June only germinated after 7 June. The Swartland's rainfall is summarised in Table 1. The Pools and Eendekuil areas experienced an extremely dry season. High average temperatures in September coupled with insufficient soil moisture affected yields negatively (Figure 1).

Little rain fell in the Southern Cape during the summer, with rainfall ranging between 52 and 82% of the long-term average (Table 1) in the growth season. As in the Swartland region, May was a dry month. Most plantings took place in April, except in the western parts, where it took place until the beginning of May.

At Langgewens, the rainfall received from April to October was 1,4mm more than in 2015 (the 2015 season had been the driest since 1978). Tygerhoek received 24% less rain over the corresponding period

Figure 1: Monthly and annual rainfall at Langgewens for 2017 and long term.

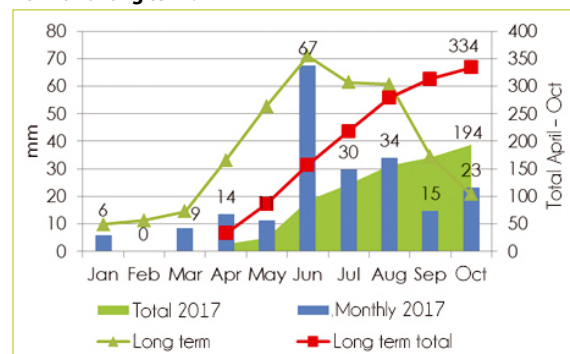
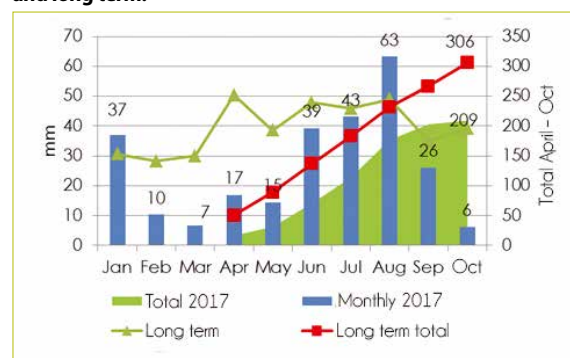


Figure 2: Monthly and annual rainfall at Tygerhoek for 2017 and long term.



than the long-term average (Figure 2). It was very dry at both localities in May.

Table 1: Rainfall in the Swartland and Rùens area, 2017.

	Bredasdorp	Caledon	Caledon	Heidelb.	Mossel Bay	Riversdal	Swellend.	Riviersd.	Piketb.	Malmesb.
	Prinskraal	Dunghye P.	Protem	Voorstekop	Patryfontein	Uitkyk	Napky	Tygerhoek	Pools	Langgew.
Jan	55,9	75,2	27,7	70,9	62,5	0,4	29	37	5,1	6
Feb	19,1	28,2	16,8	23,4	25,4	12,8	2,3	10	0,5	0
Mar	2,5	5,8	4,8	15,5	16,8	12	4,6	7	2,5	9
Apr	29,2	36,6	15,8	25,2	14,5	10,4	16,3	17	8,4	14
May	9,1	4,6	6,6	16,5	17	16,4	7,4	15	3,8	11
Jun	51,6	66,6	26,2	46	13,7	26,6	120,4	39	51,1	67
Jul	37,9	52,6	25,4	43,9	17	25,4	32,5	43	20,1	30
Aug	61,5	62,7	38,1	72,9	61,5	53,2	32	63	18,3	34
Sep	21,8	21,8	25,2	22,1	47,8	17,0	17,0	26	4,3	15
Oct	24,1	26,7	9,9	22,6	44,5	23,8	4,3	6	11,9	23
Apr-Oct	235,2	271,6	147,2	249,2	216	172,8	229,9	209,2	117,9	194

Rainfall received in June was near average at Langgewens and below average at Tygerhoek. The remainder of the growth season was below average at Langgewens, which resulted in 46,4% less rainfall in the growth season than the long-term average. Rainfall in August was above average at Tygerhoek.

The minimum and maximum temperatures at Langgewens were near the long-term average, with the exception of September – the month was on average 1,5°C hotter (Figure 3). The high temperature experienced in September during the seed-filling period affected seed yield negatively. The average maximum temperature in the Southern Cape was 1,5°C higher in the growth season than the long-term average (Figure 4). The monthly maximum temperature for September at Langgewens was 0,9°C higher than the long-term average.

Results of trials

The yield results for the respective areas are summarised in Table 2 and 3. The data of the Clearfield (CL) and Triazyn tolerant (TT) cultivars were separated from the conventional cultivars.

Figure 3: Monthly minimum and maximum temperature at Langgewens for 2017 and long term.

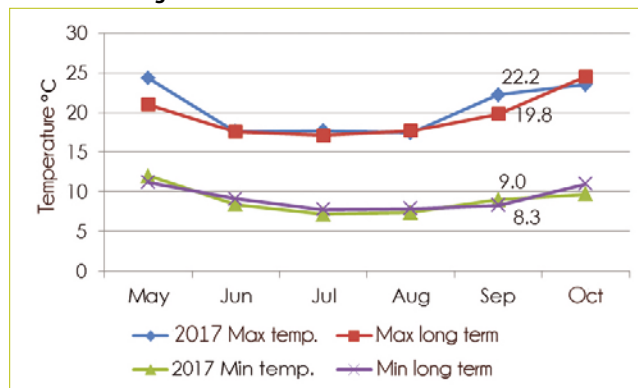
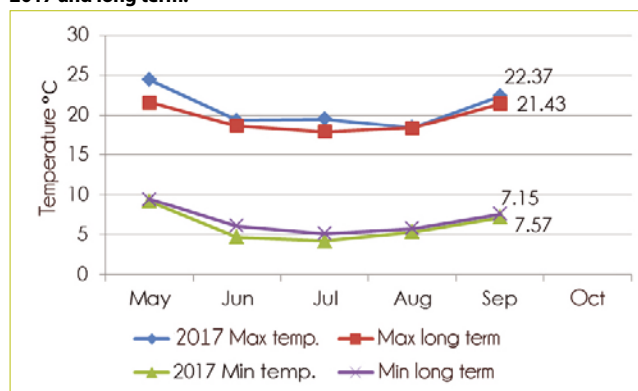


Figure 4: Monthly minimum and maximum temperature at Tygerhoek for 2017 and long term.



In the 2017 season, the Swartland trials were exposed to below normal moisture conditions and disaster drought in the northern and western areas. Little sclerotinia occurred in 2017. Black stem infection was found on all trials in the Swartland, with an increase of 10% compared to the 2016 season.

As with previous seasons, white leaf spot occurred at Grasrug. In the Swartland, average yields were 1 777kg/ha as opposed to the 2 746kg/ha and 1 320kg/ha harvested in 2016 and 2015, respectively. In 2015, the trials at Pools, Eendekuil and Darling were in fact harvested compared to no yield in 2017.

Table 2: Swartland seed yields for 2017 (kg/ha).

	Langg. 1		Langg. 2		Grasrug		Philadelphia		Porterville		Swartland	
Diamond	1 896	abcde	1 966	abcd	1 920	a	2 092	bcde	1 820	a	1 928	ab
CB Tango	1 954	abcde	2 013	abc	1 692	cde	2 391	abc	1 786	ab	1 874	bcd
Belinda	2 035	abc	1 987	abc	1 681	cde	2 456	ab	1 431	cde	1 829	bcd
Hyola 50	2 018	abc	1 802	bcd	1 590	de	2 386	abc	1 596	abc	1 776	cde
CB Agamax	1 870	bcdef	2 024	ab	1 584	de	2 206	abcde	1 469	bcd	1 746	de
Conv. ave.	1 955		1 958		1 693		2 306		1 620		1 831	
44Y90	2 244	a	2 216	a	1 898	ab	2 590	a	1 652	abc	2 038	a
44Y89	2 146	ab	1 935	abcd	1 839	abc	2 293	abcd	1 497	abcd	1 897	bc
43Y92	2 062	abc	2 048	ab	1 702	bcde	2 585	a	1 416	cde	1 864	bcd
45Y91	2 137	abc	2 233	a	1 642	cde	2 447	ab	1 375	cde	1 854	bcd
Hyola 575 CI	1 906	abcde	1 796	bcd	1 781	abcd	2 275	abcd	1 344	cde	1 791	cde
45Y88	2 044	abc	1 674	cd	1 739	abcd	2 429	ab	1 330	cde	1 789	cde
Hyola 577CL	1 784	cdef	1 722	bcd	1 669	cde	2 262	abcd	1 175	de	1 686	ef
CI ave.	2 046		1 946		1 753		2 412		1 398		1 846	
AG4510 TT	1 974	abcd	2 029	ab	1 614	de	1 941	de	1 125	e	1 691	ef
CHYB2112TT	1 641	def	1 773	bcd	1 700	bcde	1 859	e	1 407	cde	1 676	ef
Hyola 555TT	1 873	bcdef	1 709	bcd	1 668	cde	2 022	cde	1 222	de	1 675	ef
Hyola 650 TT	1 615	ef	1 767	bcd	1 640	cde	2 121	bcde	1 332	cde	1 664	ef
Hyola 559 TT	1 822	bcdef	1 641	d	1 510	e	2 068	bcde	1 319	cde	1 610	f
CB Atomic HT	1 587	f	1 867	bcd	1 597	de	1 830	e	1 162	de	1 595	f
TT ave.	1 752		1 798		1 622		1 974		1 261		1 652	
Average	1 923		1 900		1 693		2 236		1 414		1 777	
kbv	355,75		342,11		202,92		3 92,9		340,27		129,98	
kv	11,15		10,85		7,2		10,58		14,49			

* Cultivars marked with the same letter do not differ significantly.

Table 3: Rûens seed yields for 2017 (kg/ha).

	Tyg. 1		Tyg. 2		Klipdale		Napier		Roodebl.		Swell.		S Cape	
Diamond	2 753	a	2 009	abc	2 818	a	3 092	abc	2 843	abc	2 410	a	2 601	a
CB Tango	2 103	cdef	1 505	f	2 260	bcd	3 075	abc	2 904	a	2 185	abc	2 277	def
CB Agamax	1 972	def	1 849	abcde	2 064	cde	3 006	abcd	2 333	defg	2 021	abcdef	2 200	efg
Belinda	1 813	f	1 906	abcde	2 526	ab	2 842	bcdef	2 096	efgh	1 899	bcdef	2 189	efg
Hyola 50	2 378	abcde	1 698	def	2 243	bcd	2 908	bcde	2 297	defgh	1 768	def	2 185	efg
Conv. ave.	2 204		1 793		2 382		2 985		2 495		2 057		2 290	
44Y90	2 404	abcd	1 923	abcde	2 500	ab	3 132	ab	2 482	bcde	2 361	a	2 501	ab
43Y92	2 484	abc	1 883	abcde	2 508	ab	3 285	a	2 952	a	2 216	abc	2 434	bc
44Y89	2 279	bcde	1 932	abcde	2 571	ab	2 986	abcd	2 426	def	2 171	abcd	2 379	bcd
45Y91	2 143	cdef	2 058	ab	2 368	bc	3 044	abc	2 863	ab	1 715	ef	2 366	bcd
45Y88	2 674	ab	2 090	a	1 742	efg	2 980	abcd	2 665	abcd	1 818	cdef	2 315	cde
Hyola 575 CI	2 203	cdef	1 705	def	2 018	cde	2 767	cdef	2 044	fgh	2 263	ab	2 133	fgh
Hyola 577CL	1 954	ef	1 748	cdef	1 939	def	2 943	abcd	2 202	efgh	1 723	ef	2 082	gh
CI ave.	2 306		1 906		2 235		3 020		2 519		2 038		2 316	
AG4510 TT	2 286	bcde	1 696	def	2 277	bcd	3 041	abc	2 460	cde	2 086	abcde	2 268	def
Hyola 559 TT	1 976	def	1 637	ef	2 041	cde	2 501	f	2 306	defgh	2 155	abcd	2 066	gh
Hyola 650 TT	2 244	bcdef	1 779	bcdef	1 994	cde	2 510	f	1 943	gh	2 095	abcde	2 070	gh
Hyola 555TT	2 135	cdef	1 976	abcd	1 613	fg	2 681	def	1 932	h	1 699	ef	2 022	h
CB Atomic HT	2 018	def	1 758	cdef	1 935	def	2 662	def	1 913	h	1 670	f	1 993	h
CHTB2112TT			1 532	f	1 471	g	2 561	ef	2 398	def				
TT ave.	2 132		1 730		1 889		2 659		2 159		1 941		2 084	
Average	2 225		1 832		2 201		2 909		2 392		2 015		2 240	
kbv	438,27		299,89		379,92		357,24		399,58		404,83		148,61	
kv	11,84		9,95		10,59		7,45		10,07		12,08			

* Cultivars marked with the same letter do not differ significantly.

All the trials (except the second planting at Langgewens, which was sown at a later stage) germinated after the first rainfall on 6 and 7 June 2017. The trial averages for the Swartland ranged between 1 414kg/ha for Porterville and 2 236kg/ha for Philadelphia (Darling, Pools and Eendekuil had no yield).

Diamond (1 928 kg/ha), a conventional cultivar, gave the highest yield in its group and second highest average yield in the Swartland after the CL cultivar 44Y90. However, Diamond's yield was not significantly lower than 44Y90. The yields of CB Tango (1 874kg/ha) and Belinda (1 829kg/ha) were not significantly lower than that of Diamond.

The yield of the CL cultivar 44Y90 (2 038kg/ha) was significantly higher than the other cultivars in the group and the highest in the Swartland. The CL cultivar with the second highest yield was 44Y89 (1 897kg/ha), followed by 43Y92 (1 864kg/ha) and 44Y91 (1 854kg/ha).

Three new TT cultivars tested

Three new TT cultivars were tested the past season. The TT cultivar with the

highest average yield in the Swartland was AG4510 TT (1 691kg/ha), followed by a new cultivar CHYB2112TT (1 676kg/ha), Hyola 555 TT (1 675kg/ha) and another new cultivar, Hyola 650 TT (1 664kg/ha). The difference between the four TT cultivars with the highest yields was only 27kg/ha.

The average yield of the TT cultivars in 2017 was 9,8% lower than the conventional cultivars. In the 2016 season, the yield was 13% lower. The average yield of the CL cultivars was 15kg/ha higher than the yield of the conventional cultivar group.

In Rûens (Table 3) the trial average ranged between 2 659kg/ha at Napier and 1 730kg/ha at Tygerhoek's second planting date. The average yield was 2 240kg/ha compared to 2 885kg/ha in 2016 and 1 320kg/ha in 2015.

The conventional cultivar Diamond (2 061kg/ha) produced the highest average yield in the conventional group and the trial as a whole. It was followed by CB Tango, CB Agamax, Belinda and Hyola 50, although the yields were significantly lower than that of Diamond.

The new CL cultivar 44Y90 (2 501kg/ha) produced the highest yield in the CL group. The (new) cultivar 43Y92 (2 434kg/ha) was second in the CL group, followed by 44Y89 (2 379kg/ha) and 45Y91 (2 366kg/ha). There was no significant difference between these cultivars and 44Y90.

In the TT group, AG4510 TT (2 268kg/ha) had a significantly higher yield than the other cultivars. This cultivar was followed by Hyola 650 TT (2 070kg/ha), Hyola 559 TT (2 066kg/ha) and Hyola 55 TT (2 022kg/ha).

The average yield of the TT cultivars was 9% lower than the conventional cultivars. In 2016, the difference was 14,2% compared to 18,1% in 2015 and 8,1% in 2014. The average yield of the TT cultivars was 10% lower than the CL cultivars. On average, the yield of the CL and conventional cultivars differed by only 26kg/ha. As in the Swartland, the CL cultivars also performed a little better. 🌱

Source acknowledgement:
Canola Focus 80: December 2017

Aspects influencing the choice of canola cultivars in 2018

By PJA Lombard, L Smorenburg and J Strauss, RTDS, plant sciences

When choosing a canola cultivar, producers should bear in mind that the season determines the speed of physiological development. As a result, the Swartland region and Southern Cape will differ each year. It is also important that cultivars maintain their position in relation to other cultivars – fast cultivars must remain fast and slow cultivars must remain slow. *Table 1* contains a summary of the characteristics of all locally tested cultivars.

When choosing a cultivar, it is important for producers to know whether

seed of their cultivar of choice is available and whether it is a proven cultivar that has previously been tested in the national cultivar trials. Yield potential and yield over years are summarised in *Table 2* and 3. The ideal is to compare more than one year's data.

In addition, it is important to evaluate the cultivar's performance in the Swartland and Southern Cape region, as it is an indication of adaptability.

Hybrids are the preferred choice

Open pollinated cultivars are almost unobtainable, and were not tested in 2017. Hence the choice of

cultivars resides mainly in the hybrid group, as hybrids are more vigorous with a higher yield potential.

Weeds that exhibit resistance, can determine cultivar choice. Producers must plan properly beforehand and consider weed history before deciding on a cultivar. A chemical herbicide programme is determined by the type of cultivar (conventional, TT and CL).

Conventional and CL cultivars are more vigorous than TT cultivars. Average yields obtained from the first two groups, were approximately 10% higher than the TT group in 2017.

Table 1: Characteristics of cultivars tested from 2015 to 2017.

Cultivar		Type		Year 1st test	Days to flower			Days to end flowering (Long.)	Black stem index #	Black stem index + Jockey #	Black stem resistance group #
					Rûens	Swartland	Growth period.				
CB Agamax	Hybrid	Conv	Agricol	2008	96	72	med. early	med. early	ms ²⁰¹⁴	mr ²⁰¹⁴	AB
Hyola 50	Hybrid	Conv	K2 Seed	2009	98	77	med.	late	r ²⁰¹⁶	r ²⁰¹⁶	AD
CB Tango	Hybrid	Conv	Agricol	2013	91	66	early	early	ms ²⁰¹⁴	mr ²⁰¹⁴	B
Belinda	Hybrid	Conv	Bayer	2014	100	76	med.	med.	-	mr ^s	-
Diamond	Hybrid	Conv	Agricol	2015	90	65	early	early	mr ²⁰¹⁷	-	ABF
Hyola 575 CL	Hybrid	CL	K2 Seed	2011	97	75	med. early	med. late	r ²⁰¹⁷	r ²⁰¹⁵	BF
45Y88 CI	Hybrid	CL	Pioneer	2013	103	80	med. late	med. late	ms ²⁰¹⁷	r-mr ²⁰¹⁷	A
44Y89 CI	Hybrid	CL	Pioneer	2014	100	74	med.	early	mr ²⁰¹⁷	r ²⁰¹⁷	BC
Hyola 577CL	Hybrid	CL	Barenbr.	2014	103	79	med. late	late	r ²⁰¹⁶	r ²⁰¹⁵	B
44Y90 CI	Hybrid	CL	Pioneer	2016	100	76	med.	early	r-mr ²⁰¹⁷	r ²⁰¹⁷	B
45Y91 CI	Hybrid	CL	Pioneer	2016	103	80	med. late	med.	mr ²⁰¹⁷	r ²⁰¹⁷	B
43Y92	Hybrid	CL	Pioneer	2017	98	72	med. early	early	w-mr ²⁰¹⁷	r ²⁰¹⁷	B
CB Atomic HT	Hybrid	TT	Agricol	2013	99	77	med	med.	ms ²⁰¹⁵	mr ²⁰¹⁵	AB
Hyola 555 TT	Hybrid	TT	K2 Seed	2011	94	74	med. early	early	mr ²⁰¹⁴	r ²⁰¹⁴	D
Hyola 559 TT	Hybrid	TT	Barenbr.	2014	96	75	med. early	late	r-mr ²⁰¹⁷	-	ABD
Hyola 650 TT	Hybrid	TT	Barenbr.	2017	99	75	med.	late	r ²⁰¹⁷	-	ABD
AG4510 TT	Hybrid	TT	Agricol	2017	97	75	med. early	med.	ms-mr ²⁰¹⁷	r ²⁰¹⁷	BF
CHTB2112 TT	Hybrid	TT	Agricol	2017	98	71	med. early	early	-	r-mr ^s	-

w = resistance; mr = moderate resistance; ms = moderately susceptible; s = susceptible. # Data from Australia in "Blackleg Management Guide Fact Sheet - Western and Southern Regions" (2014-2017). Swartland black stem data was used when no other data is available.

Table 2: Swartland seed yields expressed as a percentage for 2015 to 2017.

	2015	2016	2017		2016 & 17		2015-2017	
Diamond	125	112	108	1	110,3	1	115,3	1
Belinda	103	101	103	3	101,7	3	102,3	3
CB Tango	111	103	105	2	104,0	2	106,3	2
Hyola 50	102	102	100	4	100,7	4	101,2	5
Agamax	105	102	98	5	99,9	5	101,6	4
44Y90		106	114	1	110,0	1		
45Y91		109	104	4	106,7	2		
Hyola 577CI	88	90	95	7	92,4	6	90,8	4
44Y89	120	105	106	2	105,5	3	110,2	1
45Y88	84	103	100	6	101,6	4	95,8	3
Hyola 575 CI	98	96	100	5	98,1	5	97,9	2
43Y92			105	3				
Hyola 559 TT	93	91	90	5	90,6	2	91,3	1
CB Atomic HT	89	90	89	6	89,9	3	89,6	2
Hyola 555TT	82	90	94	3	92,2	1	88,9	3
Hyola 650 TT			93	4				
AG4510 TT			95	1				
CHTB2112 TT			94	2				

Table 3: Rùens seed yields expressed as a percentage for 2015 to 2017.

	2015	2016	2017		2016 & 17		2015-2017	
Diamond	125	112	108	1	110,3	1	115,3	1
Belinda	103	101	103	3	101,7	3	102,3	3
CB Tango	111	103	105	2	104,0	2	106,3	2
Hyola 50	102	102	100	4	100,7	4	101,2	5
Agamax	105	102	98	5	99,9	5	101,6	4
44Y90		106	114	1	110,0	1		
45Y91		109	104	4	106,7	2		
Hyola 577CI	88	90	95	7	92,4	6	90,8	4
44Y89	120	105	106	2	105,5	3	110,2	1
45Y88	84	103	100	6	101,6	4	95,8	3
Hyola 575 CI	98	96	100	5	98,1	5	97,9	2
43Y92			105	3				
Hyola 559 TT	93	91	90	5	90,6	2	91,3	1
CB Atomic HT	89	90	89	6	89,9	3	89,6	2
Hyola 555TT	82	90	94	3	92,2	1	88,9	3
Hyola 650 TT			93	4				
AG4510 TT			95	1				
CHTB2112 TT			94	2				

The rate of physiological development and, in particular, the number of days until flowering and flowering period, are important. Early moisture will occasionally be available in the Rùens, which could lead to fast cultivars being planted too soon. In areas experiencing brief rainfall periods, short growth season cultivars should preferably be planted (Table 1).

It is recommended that producers in areas with high black stem risk, plant cultivars with good black stem resistance (Table 1 and *Canola Focus* 51). In 2017, the occurrence of black stem in the Swartland and Southern Cape was higher than during the previous season. Alternating cultivars with different resistance genes are recommended.

Few cases of sclerotinia occurred in 2017. Yet the sclerotia (the source of infection) are still present in the soil and the disease will re-occur if the climate is favourable. The disease should be managed (see *Canola Focus* 63). Sclerotinia is a common disease in the Rùens and there is unfortunately no resistant cultivar available. The Swartland is showing an increased occurrence of sclerotinia.

Information and characteristics of the cultivars are contained in Table 1. The information includes days to flowering and flowering period. The black stem index is divided into two columns. The second column shows the black stem index after seed has been treated with the seed treatment agent, Jockey® or Galmano. Where international information for specific cultivars is not available, local data was used. The last column indicates the resistance genes of cultivars with the best black stem resistance.

Higher yield

The yield per cultivar, expressed as a percentage of the area average for 2015 to 2017, is summarised in Table 1 and 3. In 2017, 14 of the 18 cultivars were tested for two or more seasons.

In the Swartland, the conventional cultivar Diamond (110,3%) and the CL cultivar 44Y90 (110%) had the highest average percentage yield over the last two seasons. The TT cultivar with the highest percentage yield for 2016 and 2017 in the Swartland, was Hyola 555 TT, followed by Hyola 559 and CB Atomic HT. The best cultivars in their respective groups measured over three seasons were Diamond (conventional), 44Y89 (CL) and Hyola (TT).

In the Rùens, the conventional cultivar Diamond (114,8%), followed by the two CL cultivars 44Y90 (110,9%) and 45Y91 (110,6%), had the highest percentage yield (measured against the Rùens average) the past two seasons. The TT cultivar with the highest percentage yield for 2016 and 2017 in the Rùens was CB Atomic HT (89%), followed by Hyola 559 TT (88,8%) and Hyola 555 (88,4%). The best performing cultivars in their respective groups measured over three seasons were Belinda (conventional), 44Y89 (CL) and CB Atomic (TT). 🌱

Source acknowledgement:
Canola Focus 80: December 2017

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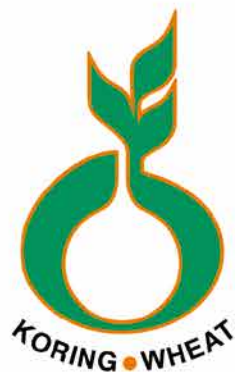
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SENSAKO presents new winners to the market



By Willem Otto and Roean Wessels, Sensako

Sensako is back! The well-known brand is making its return to the summer crop market with three new SSS soybean cultivars and the new Clearfield sunflower hybrid SY 3970CL.

A proudly South African company, Sensako aims to develop competitive seed products for the local market in a bid to help keep profitable producers in business.

The soybean cultivars recently released by Sensako for production in South Africa, originate from the breeding programme of Argentina's Estación Experimental Agro-industrial Obispo Colombres (EEAOC) – the country's oldest agricultural research station. It was established in 1909 with the aim of improving and supporting agricultural production in the Tucumán province through research and extension services.

Development of soybeans

Since its inception, the institution has been playing a major role in the development of new crops for the area. In the early 1960s it was instrumental in the development of soybeans as a grain crop. Today, EEAOC continues to introduce quality cultivars for several production areas through ongoing and effective research by its team of experts.

The cultivars and advanced breeding lines developed by EEAOC were extensively tested in statistical trials in the local soybean production areas over the last six seasons. The Sensako trial programme is also visited annually by the EEAOC research team to evaluate statistical trials and seed production.

Soybean cultivars (indeterminate growers with Roundup Ready resistance) released from the programme vary in their agronomic characteristics, maturity groupings and ability to adapt to different environments. Independent results from commercial strip trials, in conjunction with several study groups and farmers' associations, have also confirmed the exceptional yield performance, adaptation, stability and stress tolerance of the winning cultivars.

Three new cultivars available

The new range of SSS cultivars produced competitive yields compared to the control cultivars across all production seasons. The seed of three of these cultivars is commercially available for planting next season.

- **SSS 6560tuc – exceptional yield potential and adapted for warmer irrigation areas.** Long grower, bushlike cultivar with exceptional yield potential that is adapted for the warmer irrigation areas, the moderate and cooler areas as well as dryland.
- **SSS 5052tuc – stable and adapted high-yield potential cultivar for dryland and irrigation.** A bushlike but upright cultivar with good lodging resistance and resistance to shattering.
- **SSS 5449tuc – Eastern Highveld winner, adapted for high-yield potential in the cooler dryland and irrigation areas.** Semi-bushy cultivar with indeterminate growth pattern, excellent pod height and lodging resistance, as well as good resistance to shattering.

Cultivar and growth class must be selected for maximum utilisation of the two yield-determining aspects: leaf area (length of vegetative growth phase) and grain-filling period. The planting date is, of course, an inextricable part of the process as the daylight length pattern for the remainder of the season is directly linked to it.

Soil water determines planting

Changes in the planting date necessitates an adjustment in the choice of growth class that will be affected least by the planting date. If planting is postponed to a later date, the row width and plant population should also be adjusted. Under dryland production conditions, the planting time is determined by soil water conditions, which, in turn, is affected by rainfall and cultivation activity.

When considering the available planting window, flexibility in cultivar choice is key. Choose the most suitable growth class and cultivar, and adjust the row width and plant population to achieve the best yield reaction.

New sunflower hybrid

Sensako also offers the best yield in sunflower plantings with the new Clearfield sunflower hybrid SY 3970 CL, developed by Syngenta. The tested effect of a focused product – yield plus better weed control – is a winning combination in cultivation. The cultivar has excellent agronomic characteristics and resistance against prevailing diseases.

For more information on cultivar characteristics, yield results and seed availability for the next production season, visit www.sensako.co.za.

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TOP TEN REASONS why your herbicide did not work as expected

By Dr Charlie Reinhardt

Despite the best efforts of manufacturers or registration holders of herbicides to provide the best possible products, cases of poor weed control and even injury to crops occur from time to time.

The discussion points in this article are not arranged in order of importance, but number 10 is at the basis of human responsibility, and number 1 is arguably the main natural (biological) reason why we struggle to control weeds effectively.

10. You neglected to read the product label, or to apply recommendations/instructions correctly.

Effective weed management begins with the reading, studying, understanding and correct implementation of recommendations and instructions conveyed on product labels. Many complaints and even court cases have resulted from inadequate and wrongful implementation of label prescriptions.

Failure to give the herbicide label proper attention and credibility, can lead to significant economic loss. Regard the product label as a legally binding contract between the manufacturer and/or registration holder of a product and the user.

9. Following its application, the herbicide is not where it is supposed to be.

Herbicides can be grouped based on how they are taken up (absorbed) by plants: Application directed at the soil surface intended to make herbicides accessible for uptake by roots of target plants (weeds), and application on plant foliage to allow herbicide uptake through leaves and green stems.

Irrespective of how they are applied, all herbicides sooner or later end up in one or more of the three environmental



compartments – air, soil and water. Numerous natural factors in these compartments influence the herbicides to such an extent, that the prognosis of herbicide activity (herbicidal effect) and persistence of herbicide residues in the environment is complicated.

For any herbicide to be effective, it needs to reach the 'site-of-action' within the target plant. Here the herbicide has one or more 'mechanisms-of-action' through which the target plant (weed) is injured or, at best, killed.

For example, the herbicide glyphosate is taken up through the green or living tissue of plants and translocated to all parts (foliage and roots) where it binds to, and blocks the functioning of, the critically important EPSPS enzyme, thus resulting in injury and death of affected plants.

8. Herbicide resistance has evolved over time.

Weeds have the natural ability to gradually evolve or develop resistance to herbicides. Two types of resistance have been identified.

Metabolic resistance is when a herbicide's uptake by certain plants in a particular weed population is less than that of other plants of the same species, and/or herbicide

translocation following uptake is reduced. Another form of metabolic resistance is accelerated neutralisation or inactivation of the herbicide within the plant system.

Site-of-action resistance happens when there is spontaneous (natural) genetic change (mutation) of the target enzyme, e.g. the EPSPS enzyme (the target of glyphosate), with the result that the herbicide can no longer inhibit the enzyme, and consequently the weed with this genetic adaptation survives.

Since poor weed control can be confused with real herbicide resistance, confirmation of resistance can only be done through research conducted under controlled conditions (e.g. glasshouse trials). Main drivers of resistance development are the type of weed and herbicide, use of the same herbicide or herbicide mechanism-of-action without alteration of the latter, and both under- and over-dosing.

7. The herbicide or herbicide mixture is not suited for the weed spectrum on a field.

Mistaken identity of weeds can result in inappropriate choice and use of herbicide products, and subsequently

poor weed control. Weeds are sometimes wrongly identified, and in South Africa certain weed species are not listed on any herbicide label, albeit that they occur widely and are serious weeds.

Species within a particular genus can differ significantly in terms of their susceptibility towards herbicides. For example, recent research by Dr Elbé Hugo (2014) revealed that *Digitaria sanguinalis* is confused with *Digitaria nuda*, which has gradually surpassed the former as important grass weed in certain areas of the main maize production region.

She found that *Digitaria nuda* is more difficult to control with grass herbicides than *Digitaria sanguinalis*, which explains why the former tends to dominate on crop fields where they occur together.

6. Environmental factors weakened herbicidal activity.

Several environmental factors influence the amount and rate at which a herbicide reaches its site-of-action within the plant system. For post-emergence applied herbicides, air temperature not only determines spray droplet size and distribution on the target, but also the ability of target plants to absorb the herbicide.

Hot conditions (>30°C) are neither favourable for ideal spray droplet size, nor for optimal uptake through plant foliage. Extremes in temperature, i.e. both low and high, can impede herbicide uptake through both leaves and roots.

Extremes in soil moisture content have a similar effect on soil-applied herbicides. Low soil moisture content reduces the uptake of herbicides by plant roots, whereas overly wet soil can result in excessive herbicide uptake, to the extent that crop injury might occur. Weed plants that suffer environmental stress are likely to respond less to herbicides than unstressed plants that are growing actively.

5. The dosage was cut to save pennies.

The herbicide dosage (litres or kilograms product per hectare) you select only determines the potential amount of herbicide that will reach the site-of-action inside the plant. Dosages appearing on product labels are the result of many years of research and development, and

disregard of dosage recommendations is therefore a seriously perilous human trait!

Under-dosing is likely to result in poor weed control, and over-dosing can cause crop injury and result in carry-over of herbicide residues to a following season. Both promote herbicide resistance.

4. Herbicide application was delayed for too long.

Actively growing weeds are generally more susceptible to herbicides, and young plants are likely to respond more and quicker than older plants. Besides older plants not taking up as much herbicide as younger plants, the herbicide is also subject to greater dilution in bigger (higher biomass) plants compared to smaller/younger plants.

Therefore, weeds that are at an advanced growth stage, in particular at flowering, are more likely to survive treatment compared to plants treated timeously and in accordance with label recommendations. The dilution factor in plants having high biomass is equitable with under-dosing.

3. New cropping practices affected herbicide activity.

Conservation agriculture (CA) has made sustainable agriculture achievable. However, we should be cognisant of how CA, particularly zero-tillage practices, changed soil characteristics that determine the behaviour and fate of pesticides, including herbicides.

A key attribute of zero-tillage is increased carbon content of soil, specifically the humic fraction. This colloidal fraction (particle size <1 micron) of soil is far more important than clay content in determining the strength of herbicide retention on soil particles, and thus the amount of herbicide available for uptake by plant roots.

Therefore, soil-applied herbicides are likely to be less efficient in soil in which organic carbon content has increased significantly, with clay content remaining stable. In South Africa, soil-applied herbicide dosage recommendations are generally based on soil clay content alone.

Increased soil organic matter content

also stimulates microbial activity. Most soil-applied herbicides are prone to microbial breakdown, therefore high microbial activity will contribute further to the reduction of herbicide uptake and activity in zero-tillage systems.

Furthermore, dense 'trash blankets' (organic mulch) on the soil surface can, temporarily at least, trap soil-applied herbicides that must reach the soil in order to be activated.

2. Your herbicide sprayer is not in good working order.

No matter how expensive and modern the spraying equipment is, it is delivery of the optimal herbicide dosage in ways that allow a critical concentration to reach the site-of-action within the target plant that ultimately determines whether weed control is effective or not. Obviously, all parts of spraying equipment must be in good working order, and not only certain parts of it.

1. Weed pressure is high due to high seed numbers.

Weeds are especially adept in the ways their seeds are distributed and able to survive under extreme conditions for months, years and even decades. Be mindful of the fact that with high numbers of weed seeds in the soil seed bank, even 90% weed control may appear as if the herbicide was ineffective, because the 10% of plants not controlled represent unacceptably high weed numbers.

Ten million weed seeds per hectare in the soil seed bank represents 1 000 seeds per square meter. If 90% of those fail to develop into plants due to herbicidal action, the remaining 100 seeds (10%) can produce 100 weed plants per square meter, which is a very conservative estimate of the real situation on most crop fields. Hence, best practice is to prevent weeds from setting seed. 🌱

Dr Charlie Reinhardt is dean of the Villa Academy and extraordinary professor of weed science at both the University of Pretoria and Stellenbosch University. Contact him at creinhardt@villaacademy.co.za or 011 396 2233.

Is local still *lekker* in the soya bean market?

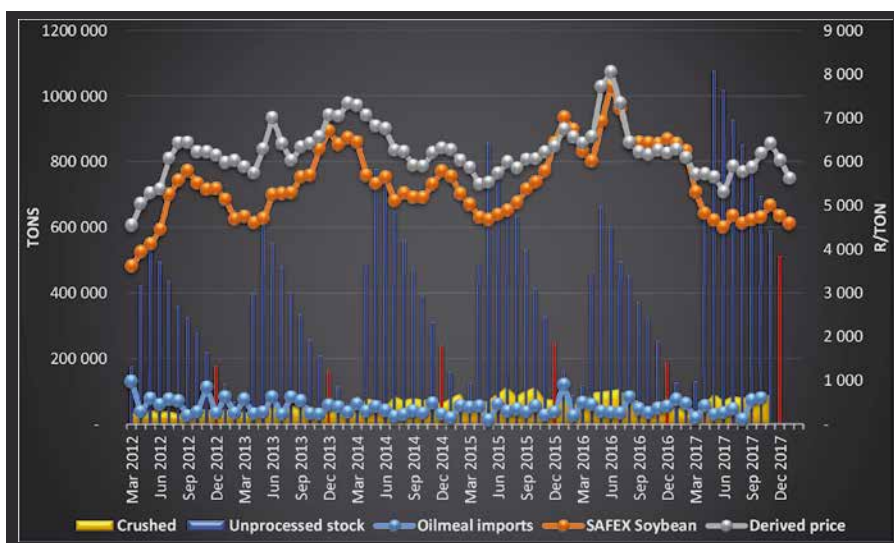
By Dr Dirk Strydom, Grain SA

Supplies in the local market are slowly building up with each season. The new production year started off slowly with very late planting dates. Soya bean plantings on the eastern side of the country were mostly behind schedule, although most producers managed to reach their planting goals.

On the western side of the country, the situation was more challenging. Some producers had to make use of alternative crops and could not plant all the hectares as planned. According to the Crop Estimates Committee (CEC), the preliminary planting estimate of soya beans is 701 000ha, which is lower than intended but still higher than the previous season's 573 950ha.

In terms of sunflowers, planting of hectares took place far beyond the optimal planting dates, with some still being planted by mid-February. The CECs preliminary estimate of hectares planted is 560 100ha, which is lower than the previous year's 635 750ha.

Figure 1: Supplies processing and prices of soya beans. (Source: Grain SA)

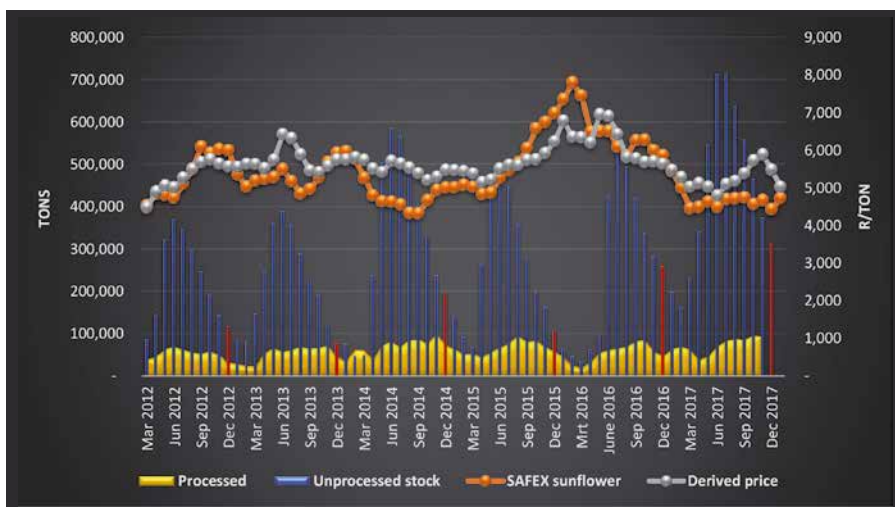


Carry-over stocks

If one examines the current marketing season, however, it is expected that there will be some carry-over stocks from the previous production season. In the soya bean market, the carry-over is 340 862 tons

and in the sunflower market it is 183 031 tons, according to the Supply and Demand Estimates Committee (*Figure 1 and 2*).

Figures clearly indicate that soya bean stocks have increased over the past few years, especially in terms of unprocessed

Figure 2: Supplies processing and prices of sunflowers. (Source: Grain SA)

stocks in the last season. There are various reasons for this, including facilities experiencing breakdowns, explosions influencing the total crushing capacity, and an unexpected record crop.

Over the past ten years, imports of soya bean meal have decreased as a result of an increased crushing capacity. However, during the past few years we have seen a more sideways movement of imported soya bean meal. Although South Africa currently has an estimated 1,8 million ton crushing capacity, soya bean meal imports are putting pressure on local stock levels.

The country imported 560 000 tons of soya bean meal, which is roughly equivalent to 760 000 tons of soya beans. This, in addition to the large crop, resulted in the sizeable carry-over stock and downward price pressure, which moved prices closer to export parity levels.

According to local role-players in the market, reasons for importing soya bean meal ranges from quality to logistics – specifically within the Western Cape market. There are, however, different views in this regard. If most of the imported meal can be replaced with local meal, it will free up some market space for soya bean production.

Yet, if imported meal is not substituted with local meal, it would discourage the expansion of soya bean production due to risk exposure (profitability). A solution to this problem would be to export soya beans and import soya bean meal, although this does not make

economic sense from an agro-processing perspective.

The sunflower industry

Within the sunflower industry, the South African market is utilising 850 000 tons on average. If production is higher than this threshold, prices will experience downward pressure. In addition, the sunflower seed market is experiencing a similar challenge as the soya bean industry in terms of carry-over stock.

The sunflower export market, though, is very limited and challenging. Therefore, if the new production season exceeds the barrier of 850 000 tons, some price pressure towards export parity will be experienced, and even below export parity in extreme cases.

International market

Although the global soya bean market has very large ending stocks, demand is strong. A change can also be seen in the South American market. In the 2017/18 marketing season, the global soya bean consumption is expected to exceed production, because of the additional deterioration of the South American crop.

The Argentine soya bean crop has been adjusted downwards even further, and the total South American soya bean production for the season is expected to be roughly 13 million tons lower than last year's production. A decline in soya bean production in Argentina would lead to lower soya bean crushing, due to lower stock levels. That would bring certain

bullish fundamental changes to the global soya bean meal market.

The United States (US) soya bean market is likely to benefit from the lower crop in South America, since the biggest importers of soya beans will turn to the US as South American supplies start to dry up. Expectations are that the global demand for US soya beans will increase in the next few months after year-on-year reductions in US exports were seen in the previous few months.

Global sunflower seed crushing is declining, both seasonally and year-on-year, compared to the same time last year. This is the first year-on-year decline since the first quarter of 2016.

Processing of sunflower seed

Although the processing of sunflower seed in the CIS countries has shown major decline, the total reduction in global processing was partly offset by higher processing in the European Union (EU), Turkey and Argentina. The production estimates regarding sunflower seed in the EU has been raised to a new high, which will keep the EU processing of sunflower seed elevated in the second half of the season.

While sunflower seed stocks are likely to remain high in the EU in coming months, the lower stocks in Russia and the Ukraine will probably be a supportive factor to the international prices of sunflower seed. In Argentina, sunflower seed production will also be lower for the season.

In the EU, canola and rapeseed supplies are fairly high for the season, which will probably keep the EU prices under pressure, unless the global prices start to increase due to factors such as lower production estimates in Argentina.

Rapeseed and canola imports to the EU for the season are slightly down from the previous year's record imports, but are still higher than the initial expectation for the season. An upward revision in the imports will thus be made. The upward revision in the EU imports of canola and rapeseed is mostly due to record imports from July to December 2017 and large Australian export supplies. 🟡

For more information, contact Dr Strydom on email dirks@grainsa.co.za.

African Economic Outlook 2018:

Growth, but ...

Press release: African Development Bank

African economies have been resilient to negative shocks, but poor infrastructure is a serious impediment to inclusive growth, according to the 2018 edition of the African Economic Outlook (AEO) presented to delegates in Addis Ababa at the African Union Summit.

The African Economic Outlook was presented to key stakeholders on the sidelines of the ongoing 30th ordinary session of the assembly of heads of state and government of the African Union in the Ethiopian capital.

The African Economic Outlook puts average real gross domestic product (GDP) growth in Africa at 3,6% in 2017 – a good recovery from the 2,2% recorded in 2016. The 2017 figure is projected to grow by 4,1% per year in 2018 and 2019.

Improved global economics

Growth was driven by improved global economic conditions, better macroeconomic management, recovery in commodity prices (mainly oil and metals), sustained domestic demand (partly met by import substitution), and improvements in agriculture production.

However, Africa is still experiencing jobless growth largely due to limited structural change. Consequently, sustained high growth has not had a substantial impact on job creation. About two-thirds of countries in Africa have experienced growth acceleration.

According to the report, a growth acceleration period is one in which the average growth rate of GDP per capita over a period of eight years is at least 3,5% per annum.

Inclusive growth

The commissioner for economic affairs at the African Union Commission, Victor Harrison, endorsed the report, urging African countries to adopt the recommendations for inclusive growth.

“These studies present the behaviour of African economies in the face of difficult external conditions and announce the revival of growth with an estimated rate of 4,1% in 2018. We all know that growth is not yet inclusive in Africa, and unemployment affects more women and young people,” he said.

Harrison urged member states to improve the



business climate and stimulate the private sector to participate in the development.

According to the Outlook's findings, Africa's infrastructure is still behind those of other regions in quantity, affordability and quality, due to lack of investment. At the same level of GDP per capita, South Asia, East Asia and Latin America have higher access to electricity and water than most African countries.

Rising debt levels

The AEO observed that Africa needs higher growth and investment rates, but debt levels must be monitored closely. Public debt ratios are rated to be on the rise, stoked by an appetite for infrastructure spending. Details provided by the Outlook indicate that 40 countries in the region recorded increases in external debt from 2013-2016. Nine countries experienced a decline.

Although there are growing concerns about the debt levels in Africa, the report indicates that if used productively, debt may be necessary to unlock long-term growth potential.

“Tackling poverty will need efforts to increase employment elasticity of growth. The employment elasticity of growth of 0,41 in Africa is below the desirable 0,7 for all developing countries. Pressing policy concern is therefore to ensure that growth is reflected in creation of high and quality jobs,” according to the Outlook.

The report notes that Africa could be the next investment frontier, and recommends three options for the international financial community to resolve the savings glut: The adaptation of a policy of more negative real interest rates in high-income countries; the

use of excess savings to finance public investment in rich countries; and the facilitation of the flow of capital to developing countries.

Investment needs

Estimates show that investment needs for infrastructure will be in the range of \$130 to \$170 billion a year.

The problem with the infrastructure deficit approach is the underlying assumption that one day Africa and the world might be able to resolve it.

Yet throughout history, infrastructure deficit has been a perpetual policy problem and solving this remains a work-in-progress, said Abebe Shimeles, acting director for the macro-economic policy, forecasting and research department at the African Development Bank.

The bank proposed that many new financing mechanisms could be implemented in all African countries,

taking into account the specific economic circumstances and the productive structures of national economies.

The report urged countries to better leverage public funds and infrastructure investments while encouraging private sector participation.

"But the different stages of development of African countries mean the policy approaches need to be country specific. Universal access to high-quality infrastructure is likely to be a long-term goal," Shimeles said.

Strategic targeting

Strategic targeting will be essential. Trying to achieve development with limited resources has led governments to spend too much on too many projects with low economic returns and little impetus for industrial growth and employment creation.

However, African countries do not need to solve all their infrastructure problems

before they can achieve sustained and inclusive growth, the report notes. Instead, African countries should focus on how to best use scarce infrastructure budgets to achieve the highest economic and social returns. One pragmatic approach, the report notes, is the creation of industrial parks.

The AEO also called for infrastructure in special economic zones and industrial parks, and the mobilisation of domestic resources through well-targeted subsidies and rigorous collection of fees using technology.

It urges Africa to attract more private funding to infrastructure projects, focusing on risk mitigation; to create an infrastructure asset class to attract institutional investors; and to choose appropriate financing instruments to develop infrastructure. 📍

Visit www.afdb.org/aeo to read the full report.

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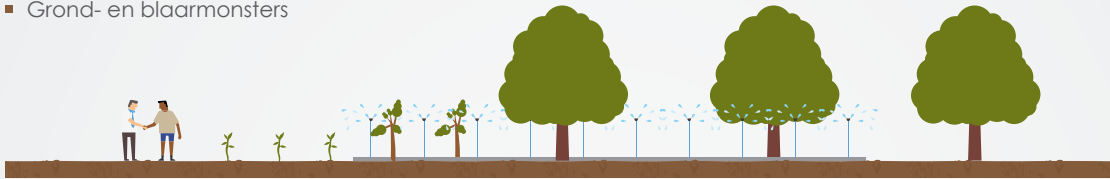
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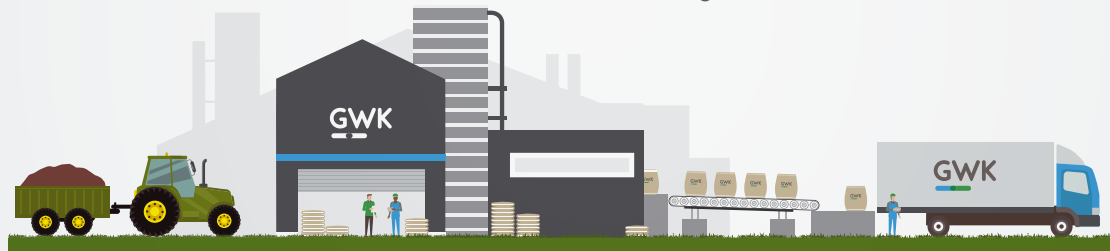
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Building bridges: Groundnut industry receives Japanese group visit

Compiled by Adri Botha, chairperson of the Groundnut Forum

In what can be seen as a unique generic marketing opportunity, a Japanese groundnut study group visited the local groundnut industry from 28 August to 1 September 2017. The group of 14 consisted of representatives of not only medium to large groundnut importers, but also influential trading house delegates.

The trip to South Africa formed part of an ongoing effort by the study group to, over the course of a few years, visit major groundnut production and exporting countries. An interesting fact shared by some of the younger members of the group was that similar visits to South Africa had been undertaken many years ago by their fathers or other members of family businesses.

It highlights the long-standing relationship the local groundnut industry has with this important export market, specifically its traders and importers. In addition, the importance of understanding the structure of Japanese business and how it affects business relationships was once again confirmed.

The local industry, via the SA Groundnut Forum, requested support for the visit and with partial funding obtained from the Oilseeds Advisory Committee (OAC), the group was afforded the opportunity to get first-hand



Various sites were visited and the Japanese contingent were able to view some of the facilities currently used in the South African groundnut industry.

information relating to the industry, recent developments such as the application of technology at farm level, mass intake capabilities, capital investment, as well as possibilities with regard to future exporting opportunities.

The SA Groundnut Forum wishes to thank the OAC for their financial support that made

this visit possible. They also wish to thank all the parties involved for their professional conduct, which supports the notion of a generic marketing opportunity that focused on larger industry objectives.

A more informal approach

The Japanese group coordinator nominated

four selection facilities they wished to include in their tour, but due to time and travel constraints, there was regrettably no scope to expand the visit further. However, to ensure that the industry had the opportunity to participate, a general meet-and-greet session had been arranged at the offices of the oilseeds industry on the day of the group's arrival.

Presentations on matters such as the structure of the industry, quality



The visiting group in front of GWK's building in Douglas.

control and grading, laboratory services, crop estimates as well as producer and trade volume data had been prepared. Regrettably, flight delays caused by a typhoon in the Hong Kong region meant that the information had to be shared more informally during the trip.

Importance of the groundnut industry

Until 2007, South Africa had been the second largest exporter of groundnuts to Japan – admittedly not to the extent of the market leader China, but in terms of local supply, still a substantial and vitally important market for the industry. Up to that point, Japan had a very predictable annual import demand of 40 000 to 45 000 million tons which,

in just three short years, dropped to the current average of approximately 25 000 to 35 000 million tons.

One may speculate that the drop was due to decreased availability and/or acceptability of Chinese product and a move towards other snack options. In any event, South Africa was not able to fill the gap and our own exports to this market showed the same downward trend in terms of volume – from pre-1997 exports of a stable 10 000 million tons per year to our current margin of below 5 000 million tons per year.

Viewed against our total exports, volumes still reflect the importance of this market and in terms of percentage market share, our contribution remains relatively stable (see *Figure 1 and 2*).

As we are aware, larger crops in the United States (US) resulted in aggressive marketing in Japan, with Argentina coming to the fore as an alternative origin to South Africa. With the US and China competing for the top spots, South Africa finds itself just staying ahead of Argentina.

Regaining our competitiveness

In recent years, the South African industry (in contrast to the US and Argentina) had no basis from which to launch major generic marketing drives aimed at Japan, or any other destination for that matter. Our supply has been under pressure, or at best unstable, and we have only recently seen more investments being made by the industry, which will hopefully allow us to regain our competitiveness. However, it is mainly left to individual entities – each with its own interest and agenda – to market themselves, and by extension South Africa.

The visit by the Japanese study group offered a unique opportunity to showcase the entire industry and attract the attention of major role-players and prominent members of the Japan Nut Association. In contrast to other individual or company focused marketing visits, this group was interested in the challenges the industry had experienced in recent years.

It presented us with a chance to engage with them directly, and without the burden of sales negotiations, to ascertain what would be required to regain our earlier position in Japan, and to establish what the driving forces behind their import volumes and decisions are.

Accompanied by Gerhard Keun, CEO of the Oil and Protein Seed Development Trust, and Adri Botha, chairwoman of the SA Groundnut Forum and OAC member, the group left Johannesburg via bus for a three-day trip to RE Groundnuts in Viljoenskroon, Vaalharts Groundnuts Marketing and Golden Peanut and Tree Nuts Co in Hartswater, and GWK in Douglas.

A fresh perspective on the industry

The visits afforded these organisations and other exporters and traders the opportunity to make valuable contributions by means of sponsorships, as well as visiting with the delegates

Figure 1: Japanese groundnut imports.

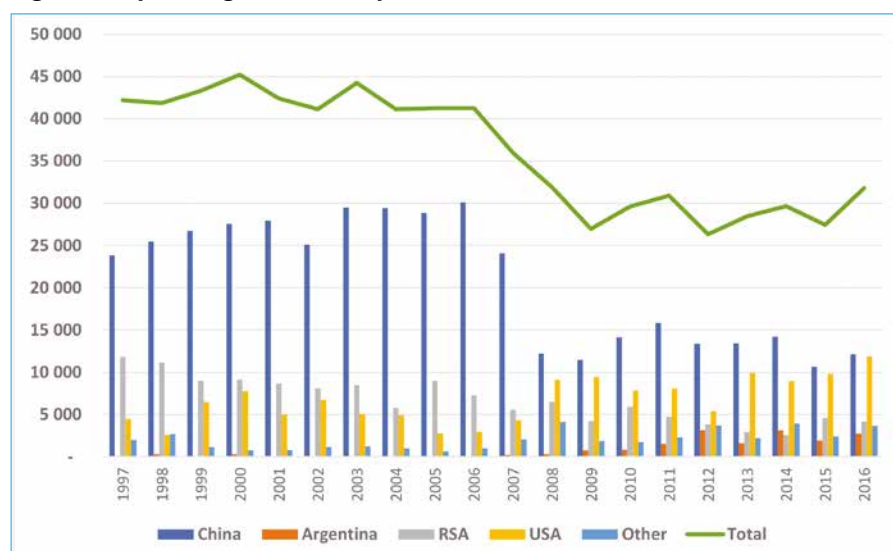
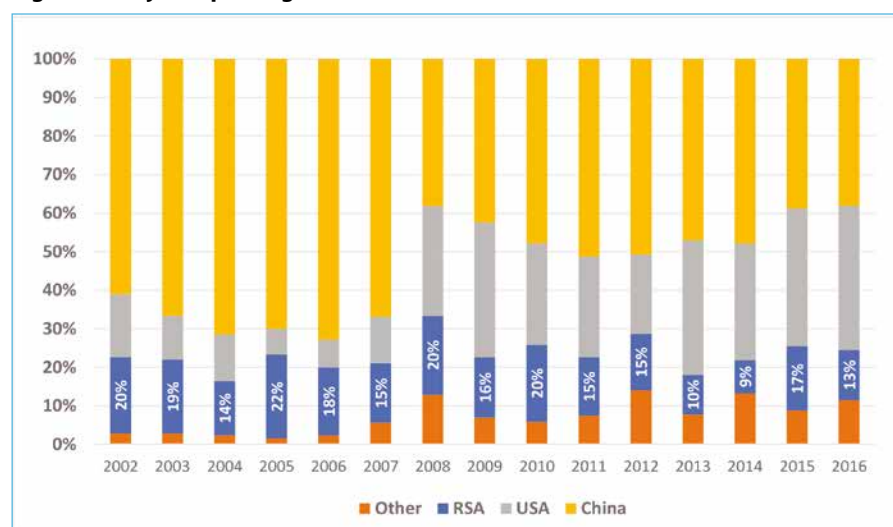


Figure 2: Major exporting countries market share.



to provide a fresh and personal perspective on the whole industry.

During the facility visits, each professional had the opportunity to explain the reason behind their passion for the industry and their unique view on the process of supplying quality products, which will continue to be the best the world has to offer, to our markets.

Matters of particular interest included aflatoxin control (from farm to export), chemical use management, foreign matter, cultivar choice (including the growing demand for high oleic varieties to compete with other varieties), as well as general food safety and the need for a continued and stable supply from South Africa.

Grading and certification

Peet van Heerden of the Perishable Products Export Control Board (PPECB) joined the group during the facility visits and was on hand to explain

how export grading and certification are executed in terms of the relevant regulations and as additional safeguard for our international buyers.

The group was interested in the challenges the industry had experienced in recent years.

The general feeling at the end of the tour was that, although the local groundnut industry certainly faces particular challenges, a willing market remains in place. Additionally, it is left to us to ensure that we can supply both stability and the historically high-quality standards that South Africa's groundnut industry has traditionally been famous for.

This visit broadened the opportunity

for future generic marketing efforts to be aimed at the Japanese market. It was also decided between the group and the industry representatives that due consideration should be given to an industry tour to Japan in the near future.

Feedback received from all parties was positive, and although no measurable business can be linked directly to the visit, there is no doubt that the goodwill created during this visit will certainly pave the way for individual negotiations, and a renewed interest in South African produced groundnuts.

In the months to come, industry role-players ought to build on this opportunity. They must discuss and agree on ways to expand and maintain the relationships already built and, by default, the sound reputation of the local industry. The work done will not only be aimed at strengthening ties with the Japanese market, but will also provide a platform for re-introducing ourselves to our other main market – Europe. 🌍



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South African logistics:

Does it measure up?

By Marike Brits

If Africa increases its agricultural productivity, but does nothing about the effectiveness of getting its products to the market, it will not be able to meet its demand for food. This is according to JC Greyling, associate of the Africa Division at Mott MacDonald Africa. His viewpoint illustrates the vital role of healthy logistics in a thriving agricultural sector.

According to a recent report, South Africa's logistics are comparatively more efficient than most industrialised countries. The World Bank's Logistics Performance Index (LPI) ranked South Africa at number 20 out of 160 countries surveyed, with Germany leading globally. The LPI reflects perceptions of a country's logistics system and various sub-indices make up the overall LPI.

The report ranked South Africa's logistics as follows out of 160 countries:

- Efficiency of customs clearance process: 18th
- Quality of trade and transport related infrastructure: 21st
- Ease of arranging competitively priced shipments: 23rd
- Quality of logistics and competence: 22nd
- Ability to track and trace consignments: 17th
- Frequency with which shipments reach the consignee within the scheduled or expected time: 24th

Logistics key for exports

"With growing expectations that South Africa could potentially have large agricultural surpluses for export markets, particularly in maize, logistics services will play a critical role in ensuring the success of the activity," says Wandile Sihlobo, head of agribusiness intelligence at Agbiz.

Commenting on the LPI, Sihlobo believes that the most important message that agriculture can take from the report relates to the country's ability to handle exports. "Although the index is not specifically targeted at the agricultural sector, it provides a perspective of South Africa's logistics performance and ability to export large volumes of commodities with minimal interruptions. In the context of the current expected record crop, this is good news, and at Agbiz we expect that this season's agricultural export activity will run smoothly."

SA logistics in good shape

Prof Jan Havenga of Stellenbosch University's logistics department says there is both good and bad news regarding South African logistics. "The good news is, of course, the results of the LPI. South Africa does quite well among developing nations by, for example, outperforming all our BRICS counterparts.

"Our logistics infrastructure compares better than we often believe, with new investments in railways, a satisfactory

national road system and reasonably competitive ports.

This good news can be attributed to the fact that South Africa has a well-developed, world-class logistics private sector."

"The logistics network in South

Africa is largely driven by private sector service providers and because it is a very competitive market, logistics seems to be in very good shape," agrees Greyling.

The cost element

However, there is some bad news too. The fact that the system is mostly private

sector driven makes logistics very expensive. "Logistics is still considered a major element of the cost of any product. This is mainly due to the fact that road transport remains the preferred mode of transportation and that it is private sector driven," says Greyling. "From an agricultural perspective, this places further pressure on already slim profit margins in this industry and places upward pressure on the food price.

"The system also fails to support rural areas as these areas mostly have poor access to the country's logistics systems, which is very bad news from an agricultural perspective. We should have invested more in rail a long time ago and developed rail corridors between main centres for high volume traffic. Furthermore, some of the national road corridor efforts should have gone to provincial and rural roads."

Big gap to be filled

Prof Havenga says if we ask how South Africa's logistics can be improved from an agricultural perspective, the most important solution will be improved provincial and rural roads with rural logistics hubs. Many decades ago railway stations fulfilled this role, but there is currently a big gap that needs to be filled.

Greyling suggests that, if logistics is to be improved from an agricultural perspective, more value-added processing and consolidation at or near sources need to be implemented to reduce the need to transport commodities in bulk.

"This will stimulate more local job creation and a diversification of economies in the smaller communities, and will relieve pressure from the South African transport system. In addition, agri commodities, especially bulk commodities, must ideally be shifted to an effective alternative transport mode, such as rail. This,



One of the major logistical challenges from an agricultural viewpoint is the state of our roads.

of course, will depend on increased efficiency in said mode of transport.

"Healthy logistics is key for a healthy agriculture sector. Poor logistics leads to product deterioration and product loss. In the challenging economic climate, this cannot be tolerated and will affect food security negatively in the long run."

Several unique challenges

According to Prof Havenga, South Africa's cost of logistics relative to economic output is too high. "This is especially true for agricultural products and is a situation the agricultural sector cannot afford. One simple statistic is that less than 10% of products shipped in the country are agricultural, but that the agricultural sector contributes more than 20% of logistical costs in South Africa.

"This shows that logistics costs are skewed compared to other expenses. Another negative impact South African logistics challenges may have on the agricultural sector is that emerging commercial farmers will struggle with access to markets."

The South African logistics system faces a few unique challenges. "A poor policy environment might just be our biggest challenge. Our private sector is doing its job and Transnet, as the big state-operated entity in this environment, has improved over the last decade, but there is little leadership from the Department of Transport. This will have to change, especially if we want to improve rural logistics," Prof Havenga explains.

Greyling once again focuses on the plea of the rural community and the smaller agricultural producer. "If we use agriculture as an example, the effect of the private sector driven logistics system is clear. In my view, most of the major producers have take-off agreements with big corporate clients that do not really care about the logistics challenges of smaller producers. We need to have systems in place that will enable smaller producers to compete effectively with larger producers, and in that way, we will improve our collective yield."

Another concern, says Prof Havenga, is that challenges might increase in

future and the positive aspects of our logistics system might not be sustainable. "A major challenge is our ailing school system, which is not only worse than our BRICS counterparts, but in some important areas, such as mathematics and science, also the worst in the world.

Skilled professionals

"Currently, the country has well-educated and skilled professionals working for some of our biggest logistics companies, hereby sustaining private sector driven logistics systems. An ailing school system might change this reality.

"The eastern BRICS countries, i.e. India and China, are investing a lot in infrastructure and teaching. In fact, all the other BRICS countries are catching up with South Africa in the LPI measurement and are improving at a faster rate. In short, we are well positioned, but I foresee future challenges." 🌱

For more information, email JC Greyling at jc.greyling@mottmac.com and Prof Jan Havenga at janh@sun.ac.za.

Where do we **STAND** on soya?

By Jacqueline Howard, CNN

Soya has become a big component of a plant-based diet, but debates have raged for decades over whether soya really produces certain health benefits. Here is a look at the controversial history of soya – and what science currently says about it.

1940s: The root of the soya dispute

Soya contains a naturally occurring oestrogenic compound called isoflavone, which seems to have stirred a storm of confusion around how soya impacts public health.

"Isoflavones are considered phytoestrogens. In other words, plant oestrogens," says Dr Omer Kucuk, a medical oncologist at Emory University's Winship Cancer Institute, who has studied the benefits of soya isoflavones. "Isoflavones are part of a larger group of compounds called flavonoids, and there are many, many flavonoids in nature."

Yet evidence of isoflavones possibly having harmful effects appeared in the 1940s, spurring one of soya's first controversies. A 1946 study in *The Australian Veterinary Journal* indicated that sheep that

subterranean, isoflavone-rich clover in Western Australia experienced fertility issues and breeding problems.

"The breeding problem appears to be of purely nutritional origin," the authors of the study wrote. "A further possibility is the presence in the clover of some substance which potentiates the animal's natural oestrogen, or abnormally stimulates its production."

The infertility may have resulted from a hormone imbalance, triggered by the herbage the sheep ate, according to the study. Still, this was found only in sheep and not in humans. Soon enough, researchers would conduct more studies on these oestrogenic effects in various farm animals, and the animal feed industry would develop an interest in soya.

1950s: Soya used in animal feed

Approximately 80% of the soya currently produced in the United States (US) is used as animal feed, Kucuk says. Soya is a billion-dollar industry that spans continents and feeds millions of livestock worldwide, according to the World Wide Fund for Nature, but it was not always that way.

In the 1950s, the soya industry was just beginning to explore how soya could be used in animal feed and how isoflavones could affect animals. By 1959, soya bean oil meal was described as 'an excellent source of growth promoters' for young farm animals, such as turkeys.

In the decades to come, soya studies would shift away from soya's role in farm animal diets and towards its role in human diets.

1960s: Soya bean industry grows in the US

"Soya consumption is not an uncommon thing. More than two billion people consume soya every day," Kucuk says.

"If you put China, Japan, Korea

and southeast Asia together, you have more than two billion people, and these people consume 20 to 30 times more soya than the average American every single day of their lives. It's part of their diet. This has been going on for not just hundreds of years, but for thousands of years."

With a long history in Asia, soya slowly emerged as a common food source in the US in the 1960s. During this time, states formed soya bean industry groups affiliated with the American Soybean Association, which was funding research to find uses for soya beans and ways to reduce production costs.

1970s: The rise of soya in the American diet

By the early 1970s, more studies shed light on the use of soya proteins in baked foods and the functional properties of these proteins.

The American Soybean Association established its headquarters in St Louis in 1978. Around that time and later, contradicting studies concerning the potential health benefits of soya arose, creating confusion.

1980s: Setting the record straight

Two animal studies – one on monkeys published in 1986 and another on rats published in 1987 – suggested that soya diets caused an enlarged pancreas and were associated with the growth of pancreatic cancer in those animals.

In response to those studies and others, the National Cancer Institute's Division of Cancer Etiology organised a workshop to discuss the state of research on soya in relation to cancer risks. After the workshop, participants published a report in the journal *Cancer Research* in 1989.

They wrote that there was no evidence that soya bean-derived foods had adverse effects on the human pancreas. Rather, it



was observed that human populations with high levels of soya in their diets had decreased rates of pancreatic cancer. In the years to come, cancer researchers would tout the potential cancer prevention benefits of soya foods.

1990s: Breast cancer, soya connection explained

Among the first of many studies to suggest that soya beans contain potentially anti-carcinogenic benefits, providing something of a protective effect against cancer, was a 1991 study published in the journal of the American Dietetic Association.

Things changed in 1996. That was the year a pilot study, published in the journal *Cancer Epidemiology, Biomarkers and Prevention*, suggested that consuming soya protein might actually stimulate the growth of breast cancer cells.

This confusion regarding whether soya is good or bad for cancer risk, stems from the fact that soya isoflavones can mimic oestrogen in the body and can bind to oestrogen receptors, says Kucuk.

"Some people naively thought, 'Well, since they're oestrogenic, they must be bad, because oestrogen causes breast cancer.' We all know that in women, oestrogen levels are associated with a higher risk of breast cancer. There are two oestrogen receptors in the human body: alpha and beta.

"Alpha is the bad one. That's the one where, if something binds to alpha, it may increase the risk of breast cancer, because it makes breast cells grow. But beta, on the other hand, causes the opposite effect. Soya isoflavones bind preferentially to oestrogen receptor beta. Even though soya isoflavones bind to both oestrogen receptors, they preferentially bind to the good oestrogen receptor."

More studies would indicate that women in regions where soya is primarily consumed, such as Japan and China, tend to experience lower cancer rates than women who consume Western diets, Kucuk says.

However, those studies would not end the soya and cancer debate – which continued into the 2000s.

2000s: More studies on soya and health

Another study, published in the journal *Cancer Research* in 2001, suggested that soya isoflavones stimulated the growth of oestrogen-dependent human breast cancer cells.



Then, a 2007 review paper published in the journal *Cancer* suggested an apparent lack of association between soya and breast cancer. Rather, the paper suggested that avoiding weight gain and limiting the consumption of alcohol reduces the risk of breast cancer.

But there were other benefits too, including that replacing junk food in your diet with soya can aid in avoiding weight gain, according to research published in 2004 and 2009. Around that time, soya protein and isoflavones also gained attention for having a potential role in improving cardiovascular health.

An American Heart Association (AHA) paper published in the journal *Circulation* in 2006 found that "soya products should be beneficial to cardiovascular and overall health, because of their high levels of polyunsaturated fats, fibre, vitamins

and minerals and low levels of saturated fat". In 2008, the AHA then stated that there was not enough evidence to claim a strong link between soya and reduced risk of coronary heart disease.

The cholesterol link

"Soya has the antioxidant properties that can lower our LDL, so basically the bad cholesterol," says Jenna Stangland, a registered dietitian at Twin Cities Orthopedics in the Minneapolis area.

"It doesn't necessarily increase our HDL, or our good cholesterol," she says. "But we know it is able to lower bad cholesterol, and it prevents the bad cholesterol from being oxidised. When bad cholesterol gets oxidised, it ends up clogging our arteries."

In the mid-2000s, research offered more information on how soya intake may impact thyroid function. The evidence suggested that soya can interfere with the body's ability to absorb a synthetic thyroid hormone often used to treat hypothyroidism. Generally, it is recommended to wait four hours before consuming any soya products after taking thyroid medication, according to the Mayo Clinic.

Additionally, some studies have suggested that eating soya foods can help reduce certain menopause symptoms such as hot flashes. But others have suggested otherwise. A review paper in the journal *Menopause*, released in October 2010, called for more clinical studies to evaluate the role of soya isoflavones in menopausal health. "There are mixed results of the effects on midlife women," the authors write about soya.

Meanwhile, as the types of soya foods consumed by Americans continued to expand and diversify, experts noticed that the way soya was eaten impacted on its health benefits.

2010s: Natural, processed and fermented soya

"From where we stand, it is a beneficial protein and healthy fat source, with more research showing the benefits of a plant-based diet," Stangland says of soya.



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“Twenty-five grams a day is a good estimate or a good guideline to follow in trying to incorporate it into what we are eating. Yet, while natural soya food products offer health benefits, processed soya foods provide a different story. I think soya milk is one that would be OK, and tofu and tempeh and edamame. Again, those being more on the natural side,” she says.

“As we go into a lot of vegan and vegetarian products, like when they use soya to make a meat patty and it’s not just soya beans in there but also additional soya product to make it into a meat patty, that’s where I would say it’s more processed. Any of the bars and the powders out there that are manipulated are not giving us the same benefits that we are finding in the research.”

In other words, the health boost you would get from soya foods might depend on how the soya was prepared, says Dr Cate Shanahan, a Newtown, Connecticut-based family physician who also consults as a nutritionist with the Los Angeles Lakers.

“In Asian countries, much of the time, they are using soya in a traditionally fermented, cultured dish, which to some degree has a different nutritional profile,” says Shanahan, author of the book *Deep Nutrition: Why Your Genes Need Traditional Food*.

“Fermenting just means allowing microbes to work on the food to grow in it. Microbes make amino acids that we need, they make a variety of fatty acids, and they also make a lot of vitamins,” she says. “So, when you have a fermented soya product, you’re

getting more of those nutrients in massive quantities than the non-fermented product.”

Now, as Americans are gaining a better understanding of soya, uncertainty over the cancer and soya connection finally seems to have been settled in new research.

2017: Soya consumption is beneficial

Soya may not pose a risk for women with breast cancer after all, according to a study published in the journal *Cancer*.

On the contrary, it might be associated with a reduced risk of death over a nine-year period in some women, says Dr Fang Fang Zhang, a cancer epidemiologist and assistant professor at Tufts University’s Friedman School of Nutrition Science and Policy. “Results from our study and those from others are consistent that soya food consumption in women with breast cancer does not have a detrimental effect on prognosis or survival.”

The study involved data on 6 235 American and Canadian women with breast cancer, including their diets, and cancer survival and death rates, between 1995 and 2015. The data came from the Breast Cancer Family Registry, an international database funded by the National Cancer Institute.

Zhang and her colleagues analysed the data, taking a close look at each woman’s diet and survival outcome, which were tracked over 113-month (or roughly 9.4 year) follow-up periods in the data. The researchers controlled other factors that might influence death rates, such as socio-economic status, exercise, weight, and habits such as smoking or drinking alcohol.

The researchers then sorted the women into four groups based on the amount of isoflavones they consumed through soya foods. The researchers found that the women in the highest quartile – who consumed the most isoflavones, approximately half to one serving a week – were 21% less likely to die compared to the lowest quartile over the nine-year period in which mortality data was measured.

This study puts that argument to rest
“I would say this study is probably

the strongest one that we have right now in North American women, showing that soya consumption in breast cancer patients is not only safe but also beneficial,” Kucuk says. He wrote an editorial on the new study in the journal *Cancer*.

“Previous studies were in Asian women in China, Japan and Korea,” Kucuk says. “One of the things that people criticising soya will say is that, ‘Oh, well, soya may prevent breast cancer in China and Japan because they eat it all their lives, but in the US, it may not prevent it because US women don’t start eating it as a child, they may start it later, and this may not be beneficial.’ Well, this study puts that argument to rest.” Kucuk adds that more research is needed to investigate the impact of soya foods on public health. “Where there is a great need is more clinical studies looking at prevention of cancer, not just breast cancer but other cancers as well. One area where soya isoflavones can be beneficial is in preventing the side effects of the cancer treatments we use, like chemotherapy, radiation therapy and hormone therapy.”

In his editorial, Kucuk notes that most Americans do not consume appreciable levels of soya foods, even though the US is the top soya producer in the world, producing nearly 40% of the global soya supply.

“Imagine in areas of low socio-economic status where a lot of women have a high risk of breast cancer, especially African-American women; there could, for example, be some large public health type of studies where people can be given vouchers to obtain soya milk or have soya products given to them at a discount,” Kucuk says.

“This could result in huge healthcare savings. So far, we know that soya foods are good, they are safe, and they prevent breast cancer. They also improve treatment results and decrease mortality in breast cancer patients.” 🌱

This article has been shortened for publication in *Oilseeds Focus*. For the original version, visit www.edition.cnn.com.

Determination and prediction of the amino acid digestibility of sunflower seed meals in growing pigs

By JD Liu, QY Li, ZK Zeng, P Li, X Xu, HL Wang, S Zhang and XS Piao – Ministry of Agriculture Feed Industry Centre, State Key Laboratory of Animal Nutrition, China Agricultural University, Beijing

This article's featured experiment was conducted to evaluate the chemical composition and amino acid (AA) digestibility of sunflower seed meal (SFSM), and to use this data to develop prediction equations for estimating AA digestibility for growing pigs.

Ten SFSM samples were collected from five provinces in China. Twelve barrows (38.8 ± 4.6 kg) fitted with ileal T-cannula were allotted into two 6x6 Latin square designs. Each of six experimental periods comprised a five day adaption period followed by a two day collection of ileal digesta.

The ten test diets contained 50% SFSM as the sole source of AA. Another nitrogen-free diet was used to measure the basal endogenous losses of crude protein (CP) and AA. Chromic oxide (0.3%) was used as an inert marker in each diet.

There was considerable variation (CV >10%) among the ten SFSM in chemical composition (dry matter [DM]).

Test results

The concentration of CP and ether extract (EE) ranged from 29.33% to 39.09% and 0.88% to 11.33%, respectively. Crude fibre (CF), neutral detergent fibre (NDF) and acid detergent fibre (ADF) ranged from 21.46% to 36.42%, 38.15% to 55.40%, and 24.59% to 37.34%, respectively.

There was variation among the ten SFSM in apparent ileal digestibility (AID) and standardised ileal digestibility (SID) for lysine (Lys) and threonine, which ranged from 63.16% to 79.21% and 55.19% to 72.04% for AID and 67.03% to 82.07% and 61.97% to 77.01% for SID, respectively.

The variation in CP and methionine (Met) ranged from 60.13% to 74.72% and 74.79% to 88.60% for AID and 66.70% to 79.31% and 77.16% to 90.27% for SID, respectively.

Met was a good indicator to predict AA digestibility. These results indicate that conventional chemical composition of SFSM was variable (CV >10%) among the ten SFSM (DM). The results of AID, SID and prediction equations could be used to evaluate the digestibility of SFSM in growing pigs.

Sunflower (*Helianthus annuus*, Asteraceae) is one of the most widely

cultivated oil crops in the world (Flagella *et al.*, 2002). The worldwide production of sunflower seed reached 37.08 million tons and subsequently produced 15.22 million tons of oil (FAO, 2012).

Together with soya beans, cottonseed and canola (rapeseed), sunflower seeds are one of the major oilseeds produced in the world (Salunkhe *et al.*, 1992).

Oilseed byproducts play an important role in supplying plant protein (Church and Kellems, 1998). Soya bean meal (SBM) is often referred to as the gold standard compared to other protein sources (Cromwell, 2000; Zhang *et al.*, 2013). The demand for soya bean is increasing due to its inclusion in livestock feed and its use for human consumption (Sasipriya and Siddhuraju, 2013).

In order to satisfy the need for protein resources, other materials such as rapeseed meal (Baidoo *et al.*, 1987; Brand *et al.*, 2001; Opalkal *et al.*, 2001; Zhang *et al.*, 2012), cottonseed meal (Noland *et al.*, 1968; Tanksley *et al.*, 1981) and peanut meal (Batal *et al.*, 2005; Sulabo *et al.*, 2013) are used to replace SBM in the feed industry.

Potential protein source

SFSM is a byproduct of the oil extraction of sunflowers and could be an important protein resource for use in animal diets. Solvent extracted sunflower seed meal has an average CP concentration of 30.7% and a higher concentration of Met than solvent extracted SBM, but has less Lys than SBM (NRC, 2012). Another characteristic of SFSM is that it is not known to have antinutritional factors such as those found in soya



Table 1: Analysed chemical composition of sunflower seed meal (% DM).

Item	Sunflower seed meal number ¹													
	1	2	3	4	5	6	7	8	9	10	Min	Max	Mean	CV
DM	90,91	91,37	92,51	90,76	92,15	92,91	91,27	91,85	90,79	90,31	90,31	92,91	91,48	0,92
Composition														
CP	34,91	38,00	29,33	32,02	31,68	29,47	35,19	34,63	39,09	30,87	29,33	39,09	33,52	10,13
Ether extract	2,19	2,08	5,23	0,93	1,23	3,47	2,02	0,88	1,73	11,33	0,88	11,33	3,11	101,99
NDF	41,65	38,15	55,40	45,93	47,32	43,97	40,96	42,67	40,72	51,90	38,15	55,40	44,87	12,01
ADF	25,85	24,59	37,34	31,31	31,42	28,04	25,89	27,99	26,07	30,52	24,59	37,34	28,90	13,28
Crude fibre	21,83	23,11	36,42	30,54	29,87	27,25	21,46	25,66	22,47	33,69	21,46	36,42	27,23	19,31
Ash	6,86	7,15	5,45	6,32	6,82	7,75	8,30	6,40	6,76	6,71	5,45	8,30	6,85	11,37
Calcium	0,27	0,32	0,17	0,34	0,33	0,45	0,44	0,30	0,30	0,31	0,17	0,45	0,32	25,07
Phosphorous	1,04	1,15	0,63	0,81	0,94	0,84	1,02	0,98	1,06	0,92	0,63	1,15	0,94	15,89
DM, dry matter; Min, minimum; Max, maximum; CV, coefficient of variation; CP, crude protein; NDF, neutral detergent fibre; ADF, acid detergent fibre.														
¹ Sources of sunflower seed meal: 1, 4, and 8 were from Xinjiang; 2, 7, and 9 were from Hebei; 3 was from Liaoning; 5 was from Shanxi; 6 and 10 were from Inner Mongolia.														

bean, cottonseed and rapeseed meals.

Although sunflower seed contains 1,56% chlorogenic acid (Milic *et al.*, 1968), its concentration in SFSM does not lead to toxicity effects (Senkoğlu and Dale, 1999). Sunflower seed meal diets supplemented with Lys can be used as a replacement for SBM in growing pigs (Seerley *et al.*, 1974). However, the digestibility of these nutrients may vary considerably, resulting in rather inaccurate measures for the nutritional value of actual batches of feed (Just *et al.*, 1983).

Therefore, the objective of this study was to compare the chemical composition of different SFSM and determine the AID and SID of CP and AA of SFSM fed to growing pigs. In addition, the results of the chemical analysis were used to establish prediction equations for AID and SID that could be applied in future commercial practice.

Materials and methods

This experiment was conducted at the China Agricultural University (Beijing, China). The institutional animal care and use committee at the university approved the protocol for the experiment. All the pigs had been used in another experiment before being placed in this experiment.

The experiment was conducted in the metabolism laboratory of the Ministry of Agriculture Feed Industry Centre, Beijing. The temperature and humidity of the room were automatically controlled and kept at 18°C to 21°C and 50% to 65%.

Twelve barrows (Duroc x Landrace x Yorkshire) with an initial body weight

(BW) of 38,8±4,6kg were fitted with a simple T-cannula in the distal ileum (Stein *et al.*, 1998). The barrows were individually placed in stainless steel metabolism crates (1,4 x 0,45 x 0,6m³). Each crate was installed with a one-hole feeder and a nipple drinker.

Ten sunflower seed meals were collected from five provinces in China, which are representative of more than 80% of the country's output. The chemical composition of the ten SFSM differed from each other (Table 1 and 2).

The diets used in this experiment were prepared based on the chemical composition of the feed ingredients. All diets were fed in mash form.

Composition of ingredient

According to the reports, SFSM is a valuable ingredient for swine because of its high energy concentration and ease of handling in feed mills (Thacker, 1998). It is also a good ingredient because it is free of most antinutritional factors (Wahlstrom, 1990).

The results of the chemical analysis of SFSM conducted in this experiment varied greatly. The CV of CP, NDF, ADF, CF, Ash, Ca, and P were higher (CV >10%) due to the selection of samples before the official experiment.

Preparations for collecting samples from the major provinces that cultivate SFSM in China involved contacting the representative plants, acquiring basic information on the chemical concentration of SFSM in each plant and collecting typical samples in person.

In addition, the variation of SFSM might

result from different growth conditions, such as climate and soil conditions (Alpaslan and Gündüz, 2000). Although, most SFSM underwent a similar production process of a pre-pressing extraction method (Fick and Miller, 1997). The differences, such as temperature, pressure and time during the production process, might lead to the changes in chemical concentration in SFSM (Clandinin and Robblee, 1950; Parrado *et al.*, 1991). The large variation of EE (0,88% to 11,33%) was mainly related to the different extraction processes.

The average concentration of CP (sources 1, 2, 7, 8 and 9) was higher than other sources and NRC (2012), probably because of genetic improvement (Robertson, 1972). The concentrations of EE among the ten SFSM sources varied from 0,88% to 11,33%, depending on the extraction process and the amount of residual oil left after extraction (Dinussou, 1990).

The EE in source 4 and 8 SFSM were lower than the others, which means the oil had been extracted according to the Association of American Feed Control Officials (AAFCO, 2011). The ten SFSM sources had a higher average value of NDF but lower ADF than González-Vega *et al.* (2012), which was similar to the value reported in NRC (2012).

Digestibility of CP and AA

Waldroup *et al.* (1970) reported that SFSM can be effectively used to replace up to 50% of SBM in broiler diets. The AID and SID values for CP in this experiment were lower than NRC (2012), because of the lower concentration of CP in the ten SFSM.



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Table 2: Analysed AA composition of sunflower seed meal (% DM).

Item	Sunflower seed meal number ¹													
	1	2	3	4	5	6	7	8	9	10	Min ²	Max ³	Mean	CV ⁴
Indispensable AA														
Arginine	2,70	3,03	2,22	2,52	2,48	2,35	2,91	2,60	3,06	2,34	2,22	3,06	2,62	11,36
Histidine	0,89	1,11	0,87	0,86	0,85	0,80	0,97	0,88	1,18	0,83	0,80	1,18	0,93	13,67
Isoleucine	1,36	1,55	1,20	1,29	1,25	1,15	1,45	1,34	1,62	1,23	1,15	1,62	1,34	11,45
Leucine	2,18	2,38	1,78	2,04	1,99	1,92	2,29	2,07	2,46	1,81	1,78	2,46	2,09	11,06
Lysine	1,56	1,63	1,22	1,52	1,45	1,31	1,56	1,51	1,67	1,36	1,22	1,67	1,48	9,61
Methionine	0,80	0,86	0,61	0,74	0,76	0,65	0,80	0,77	0,89	0,66	0,61	0,89	0,75	12,00
Phenylalanine	1,45	1,67	1,22	1,23	1,30	1,17	1,45	1,42	1,71	1,28	1,17	1,71	1,39	13,39
Threonine	1,33	1,42	1,09	1,15	1,14	1,08	1,35	1,29	1,45	1,17	1,08	1,45	1,25	11,04
Tryptophan	0,37	0,43	0,33	0,34	0,35	0,32	0,40	0,34	0,44	0,35	0,32	0,44	0,37	11,64
Valine	1,85	2,02	1,57	1,60	1,62	1,52	1,83	1,76	2,05	1,80	1,52	2,05	1,76	10,47
Dispensable AA														
Alanine	1,70	1,76	1,41	1,55	1,54	1,49	1,74	1,66	1,79	1,52	1,41	1,79	1,62	8,10
Aspartate	3,08	3,50	2,66	2,88	2,68	2,71	3,23	3,03	3,56	2,77	2,66	3,56	3,01	11,04
Cystine	0,64	0,62	0,39	0,52	0,53	0,47	0,60	0,60	0,71	0,48	0,39	0,71	0,56	17,15
Glutamine	7,02	7,62	5,97	6,56	6,28	6,20	7,51	6,89	7,86	6,12	5,97	7,86	6,80	10,05
Glycine	2,05	2,32	1,70	1,93	1,91	1,69	2,12	2,01	2,35	1,92	1,69	2,35	2,00	11,22
Proline	1,19	1,30	1,12	1,16	1,17	1,11	1,28	1,17	1,33	1,16	1,11	1,33	1,20	6,58
Serine	1,45	1,64	1,14	1,38	1,37	1,29	1,53	1,41	1,66	1,36	1,14	1,66	1,42	11,00
Tyrosine	0,78	0,93	0,66	0,68	0,63	0,70	0,88	0,75	0,97	0,59	0,59	0,97	0,76	17,58
DM, dry matter; Min, minimum; Max, maximum; CV, coefficient of variation; AA, amino acid.														
1 Sources of sunflower seed meal: 1, 4, and 8 were from Xinjiang; 2, 7, and 9 were from Hebei; 3 was from Liaoning; 5 was from Shanxi; 6 and 10 were from Inner Mongolia.														

The results of AID and SID of CP and AA in source 3 SFSM resulted from the highest concentration of NDF, ADF and CF, which had a depressive effect on AA digestibility (Sauer *et al.*, 1980; Lenis *et al.*, 1996).

The SFSM with a relatively higher concentration of EE, associated with lower NDF and ADF (source 2), had higher AID and SID values ($p < 0,05$). The different content of EE in the diets also affected the digestibility of source 10 SFSM (Noblet and Perez, 1993). The relatively higher concentration of NDF and CF may contribute to a decreased AA digestibility (Sauer *et al.*, 1980; Lenis *et al.*, 1996).

Jørgensen *et al.* (1984) reported that the digestibility of sunflower seed products is lower than SBM. Sunflower seed meal has a lower content of Lys than SBM (Smith, 1968; Sosulski and Sarwar, 1973). Sources 2 and 9 SFSM had a higher concentration of Lys. However, the average AID and SID values of Lys among all SFSM were lower than NRC (2012).

Differences in the heating temperature could also have caused the variation in the AID and SID values of CP, resulting

in a Maillard reaction that decreased the concentration and digestibility of Lys in corn distillers dried grains with solubles (Pahm *et al.*, 2008). In addition, the concentration of Met was relatively higher in SFSM than SBM (Olvera-Novoa *et al.*, 2002).

For most indispensable AA, the AID was lower than the value shown in NRC (2012). However, the SID of those AA had less variation. This means that endogenous loss of AA cannot be ignored for evaluation of AA. In addition, the SID value had greater accuracy than AID (González-Vega *et al.*, 2012).

Correlations and prediction equation

The results of the study indicated that the variability of chemical composition in SFSM could contribute to the difference of AID and SID values. The AID and SID of CP could be accurately predicted by Met, which means that Met was highly correlated with CP. The concentration of reactive Lys was a good predictor for the concentration of Lys in distillers dried grains with solubles and canola meal, respectively (Almeida *et al.*, 2014).

The Lys concentration per unit CP could be an acceptable predictor of Lys SID in

wheat distillers dried grains with solubles (Cozannet *et al.*, 2010). Other factors such as CP, Trp and Ca were also essential for estimating the digestibility of AA.

In conclusion, the digestibility of SFSM has great variation resulting from differences in chemical composition. The concentration of Met was the factor most affected in the equations established in this experiment. In order to improve SFSM as an alternative to SBM for use in swine diets, more SFSM samples should be collected and further research should be conducted to increase the accuracy of the equations. 🟡

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Peanuts that keep aflatoxins at bay: A threshold that matters

By Kiran K Sharma, Arunima Pothana, Kalyani Prasad, Dilip Shah, Jagdeep Kaur, Deepak Bhatnagar, Zhi-Yuan Chen, Yenjit Raruang, Jeffrey W Cary, Kanniah Rajasekaran, Hari Kishan Sudini and Pooja Bhatnagar-Mathur

Aflatoxin contamination in peanuts poses major challenges for vulnerable populations in sub-Saharan Africa and South Asia.

Developing peanut varieties to combat preharvest *Aspergillus flavus* infection and resulting aflatoxin contamination has thus far remained a major challenge, confounded by a highly complex peanut-*Aspergilli* pathosystem.

Our study reports achieving a high level of resistance in peanuts by overexpressing (OE) antifungal plant defensins MsDef1 and MtDef4,2, and through host-induced gene silencing (HIGS) of aflM and aflP genes from the aflatoxin biosynthetic pathway.

While the former improves genetic resistance to *A. flavus* infection, the latter inhibits aflatoxin production in the event of infection, providing durable resistance against different *Aspergillus flavus* morphotypes and negligible aflatoxin content in several peanut events/lines as well.

A strong positive correlation was observed between aflatoxin accumulation and decline in transcription of the aflatoxin biosynthetic pathway genes in both OE-Def and HIGS lines. Transcriptomic signatures in the resistant lines revealed key mechanisms such as regulation of aflatoxin synthesis, its packaging and export control,

besides the role of reactive oxygen species-scavenging enzymes that render enhanced protection in the OE and HIGS lines.

This is the first study to demonstrate highly effective biotechnological strategies for successfully generating peanuts that are near-immune to aflatoxin contamination, offering a panacea for serious food safety, health and trade issues in semi-arid regions.

Contamination by aflatoxins

Aflatoxins, secondary metabolites produced by *Aspergillus flavus* and *A. parasiticus*, are extremely toxic, immunosuppressive and carcinogenic compounds. Over five billion people in developing countries of sub-Saharan

Africa (SSA) and South Asia (SA) are exposed to uncontrolled levels of these toxins, while nearly two billion unsuspectingly consume aflatoxins at levels far above the European standards of 4ppb, especially in low-income countries where food rarely undergoes formal safety inspection.

Alarming levels of aflatoxin contamination in an array of crops, including peanuts, have been reported around the world. Very high levels of aflatoxins B1, B2, G1 and G2 in peanuts, peanut butter and other processed commodities sold in formal and informal markets in low-income countries of SSA and SA are of great concern.

Being a subterranean legume, peanuts are susceptible to contamination from the soil that serves as a reservoir for *Aspergilli*. The developing peanut pods are in direct contact with soil populations of these two aflatoxigenic species that inhabit soils as conidia or sclerotia.

While frequent droughts and high temperatures can cause the pods to shatter – damaging tissues and thereby increasing the chances of preharvest infection – drought adaptation in peanuts is not necessarily linked to the level of resistance to *A. flavus* invasion and aflatoxin accumulation.

Postharvest management

Although postharvest management

practices such as appropriate drying, curing and storage can minimise aflatoxin contamination during storage, they can only be effective when peanuts are free from preharvest infection. Biocontrol strategies such as ‘competitive atoxigenic’ fungal technology (CAFT) and deploying of promiscuous atoxigenic *Aspergillus* strains have been shown to reduce levels of aflatoxin contamination in the field.

Nevertheless, CAFT poses potential challenges in peanuts, as it does not offer protection from exponential mould growth, further compromising peanut quality and hygiene. However, development of varieties with desirable genetic resistance to preharvest infection by *A. flavus* and aflatoxin contamination has remained a challenge for peanut breeding programmes.

Here, we describe a host-plant resistance strategy to create peanut germplasm with improved genetic resistance to *A. flavus* infection and aflatoxin contamination. This is performed using a three-tier approach involving the following:

- Prevention of fungal infection by boosting the innate plant immunity.
- Arrest of subsequent fungal growth in the event of infection.
- Inhibition of aflatoxin production in

scenarios where fungal infection is difficult to eradicate.

This approach involved altering interactions of the *Aspergillus*-peanut pathosystem for activation of defence pathways by differentially regulating plant antimicrobial polypeptides (AMPs; defensins) that confer enhanced protection against pathogenic stresses and mechanical wounding and expressing double-stranded RNA molecules of *Aspergillus* in the peanut-host system to inactivate and suppress key aflatoxin biosynthetic pathway genes.

Summary of findings

In summary, our study demonstrated that defensins boost resistance of peanuts against the invading *A. flavus*, providing agronomically useful levels of control, and functional inhibition of the ver-1 (aflM) and omtA (aflP) genes through HIGS results in remarkable resistance to aflatoxin contamination.

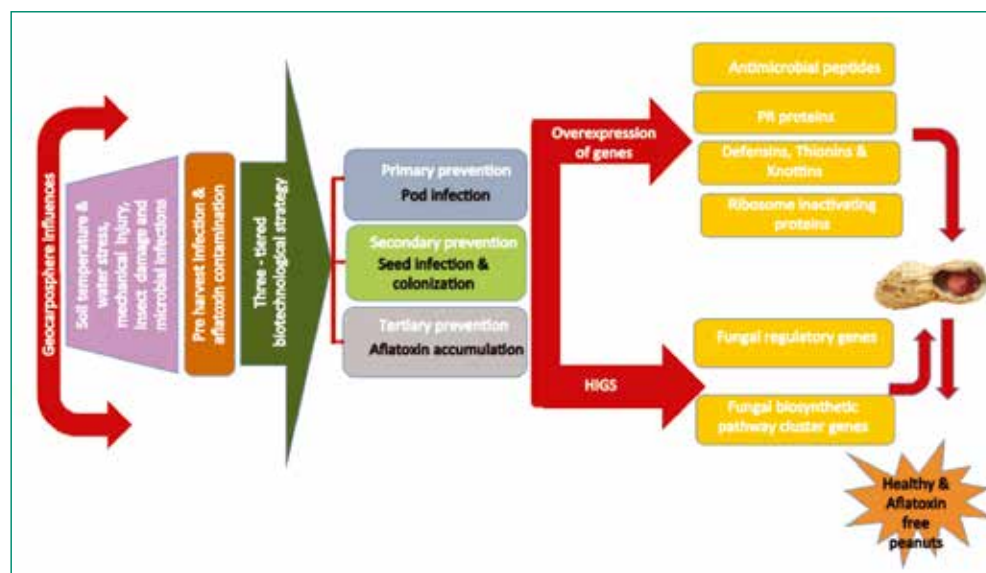
Our data shows that by using two different interventions, we achieved aflatoxin levels in peanuts that are nondetectable or as low as 1-2ppb (within the safety limits). This finding is of high significance, as there are no resistant peanut lines/varieties available that demonstrate resistance levels even remotely close to the United States or European Union

legislative limitation of <20ppb and <4ppb aflatoxin, respectively.

Data presented here suggests that co-expression of antifungal defensins and hpRNAs targeting mycotoxin genes in transgenic peanuts could boost immunity, potentially resulting in absolute aflatoxin control. As a future follow-up, we propose a strategy for addressing the complex host-*A. flavus* interactions using biotechnological approaches for effective control of preharvest infection and aflatoxin management in peanuts (Figure 1).

For references and the full article, visit www.onlinelibrary.wiley.com

Figure 1: Biotechnological approaches are necessary for effective control of preharvest infection and aflatoxin management in peanuts.



PRF awards outstanding industry contributions

By Ursula Human

The Protein Research Foundation (PRF) recognised several achievements in the industry for the 2016/17 season. Awards for publications in the protein research industry were presented on 22 November 2017 at Kronenburg Estate in Paarl.

Annika Pieterse from Stellenbosch University, was awarded for the best thesis of the year. Her master's thesis focuses on investigating the potential of indigenous nematode isolates to control invasive molluscs in canola.

Dr Sandra Lamprecht from the Agricultural Research Council's Plant Protection Research Institute (ARC-PPRI) in Stellenbosch, received an award for the best article in a scientific journal for

her article *Soybean SDS in South Africa is caused by Fusarium brasiliense and a Novel Undescribed Fusarium sp.*

On a separate occasion, Dr Jan Dreyer received the award for outstanding contributions by an individual who promotes the PRF's objectives. Dr Dreyer, a PRF contractor, was presented with the award at the Soybean Working Group and the Sunflower, Soybean and Soybean Food Forum held at the PRF offices on 11 October 2017. 🌱



Annika Pieterse receiving her award from Andries Theron, chairman of the PRF.



Dr Sandra Lamprecht receiving her award from Andries Theron, chairman of the PRF.



Dr Jan Dreyer, PRF contractor, left, with Gerhard Scholtemeijer of the PRF.

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