

Issue 31 • November/December 2017

Harvest

Securing South Africa's Food Resources

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Smallholder farmers can kickstart the economy

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From gene-editing to drones, it's happening

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Gold Award winner at the international Tabbie Awards in the Best Single Edition Category



Wheat Breeding Platform responds to wheat farming crisis

Drones, satellites and high-tech lasers are some of the innovations used in the Department of Science and Technology's newly launched Wheat Breeding Platform at Stellenbosch University



The platform is a response to the growing crisis in the wheat industry. Since 2000, the area of land dedicated to wheat farming has declined from 1.4-million hectares to the current 500 000.

South Africa's consumption of wheat is outstripping planting, forcing the country to rely on imports. Dr Marinda Visser, Grain South Africa's Manager of Grain Research and Policy, says that the wheat industry is in trouble and that reversing the crisis will be difficult. While South Africa produces wheat of a world-class quality, it must now try to produce the quantities needed to reduce the country and continent's reliance on imports.

The Minister of Science and Technology, Naledi Pandor, toured the facility at Stellenbosch University's Welgevallen Experimental Farm to see first-hand how technological innovations can be used to increase crop yields.

Addressing the launch event on 31 October 2017, Minister Pandor said the extent of the drought in maize-producing areas was affecting the demand for wheat.

"Maize is our staple food. It's difficult to import white maize to make up for what we don't grow. People switch to rice and wheat, making our dependence on imports even greater," she said.

The current farming crisis and the need to import food is a challenge South Africa has not experienced before at such levels and research and development are critical if the situation is to be remedied.

"The Wheat Breeding Platform is an important sign that we are responding to this crisis," said the Minister.

The Wheat Breeding Platform, implemented under the Department of Science and Technology's Bioeconomy Strategy, is a successful partnership between the private and public sectors. Partners include the Agricultural Research Council, Grain South Africa, the Winter Cereal Trust, Sensako, Pannar, the Department of Science and Technology and Stellenbosch University.

The platform is assisting the country's wheat producers to increase their production through the development of germplasm with greater drought/heat tolerance or other yield-improvement factors.

If higher yielding cultivars, benefiting from the germplasm developed in this platform, can be developed by local wheat breeding companies, this will increase local production and lessen South Africa's dependence on wheat imports.

Preline Swart, a women farmer from the Western Cape's Stormsvlei area, said that work being done by the Wheat Breeding Platform was of particular importance to her and other farmers because of the ongoing drought.

"We need the research platform to ensure the long-term sustainability of production. Advancement in seed technology and climate resilience are some of the critical aspects required to achieve additional yield per hectare," said Swart.

Improvements in production resulting from the platform are expected to support poverty alleviation, job creation and equality while ensuring food security and enhanced nutrition.



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Drones and data at the service of the farmer



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EDS NOTE



GREG PENFOLD
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// These are the days of miracle and wonder,” said Paul Simon back in 1986, in a song that name-checked a number of the technological advances that made the 1980s seem like such a futuristic place to be. Those words, it seems, are even more relevant in 2017, as the pace of change attains a velocity so staggering that it’s difficult to understand what’s happening before your very eyes. Take the weather. At the time of writing, news has filtered through that snow is blanketing Beaufort West. In November. Two days after the announcement that the Beaufort West had run dry. Incredible, isn’t it?

There is one group of farmers for whom such miracles are to be expected. In its constitution, TAU SA, which is celebrating its 120th year of existence, “clearly affirms the dependence of its members to the Holy Trinity as reflected in Gods’ Word as recorded in the Bible.” It’s a faith that is vindicated by the numerous milestones achieved by TAU SA throughout the years, including the establishment of the Department of Agriculture, Land Bank, a stock improvement scheme, experimental

farms, veterinary services well as the establishment of the South African Agricultural Union (currently Agri SA). We congratulate TAU SA on its 120th anniversary and applaud the statement that “Our natural resources are in fact a God given gift which is borrowed from the next generations and therefore conservation practices are regarded as high priorities”.

In addition to faith, farmers set great store by innovation. Here, the younger generation especially are developing the most incredible solutions to age-old problems such as drought and water management. The importance of technology is recognised not only by global giants such as Monsanto, but also vibrant start-ups such as Aerobotics (featured in this issue), who combine data analytics with drone and satellite technology to enable farmers to monitor their production on a tree-by-tree basis.

The most exciting aspect of this, for me, is that the app-driven approach to agriculture is drawing in the younger generation. Instead of being an old-fashioned, back-breaking means of learning a living, farming is becoming, dare I say it, sexy. Who wouldn’t want to have a high-tech 4x4 adventure lifestyle that doubles as a career?

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*Inspired by a William Blake poem

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Farms shed jobs

Smallholder farmers could reverse shock trend

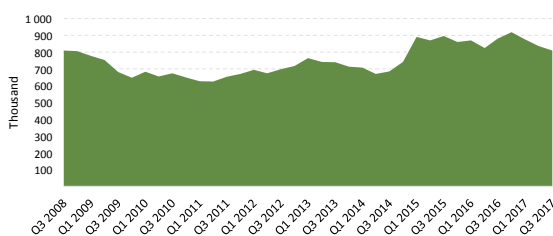
The creation of sustainable employment opportunities is critical to eliminating poverty and reducing inequality in South Africa. Year after year, millions of jobs need to be created to provide employment and income for a growing population. The South African government has identified employment creation as one of its key priorities, with key sectors such as agriculture expected to play a central role in realising equitable and inclusive growth.

As the primary economic activity in rural areas, the National Development Plan (NDP) recognises the agricultural sector as having the potential to create close to one million new jobs by 2030, placing it front and centre as the leading contributor to the overall employment target.

Agricultural jobs decline in Q3 2017— understanding the context

Unlike the last three years during which the employment figures for the third quarter showed an increase in agricultural employment, the agricultural sector continued to shed jobs in the third quarter of 2017. This was on the back of reduced activity in field crops and the horticultural sector. After shedding 44 000 and 40 000 jobs in the first and second quarters of 2017 respectively, the sector saw a further 25 000 jobs lost in the third quarter. In total, the sector registered a decline of 109 000 jobs over the first three quarters of the year. The latest decline in agricultural jobs puts the sector's total labour force at 810 000 jobs, which is equivalent to 5% of the total South African labour force, compared to 5.2% in the third quarter. This is still higher than other sectors such as the mining, but slightly below the transport industry.

Figure 1: Employment in South Africa's primary agricultural sector

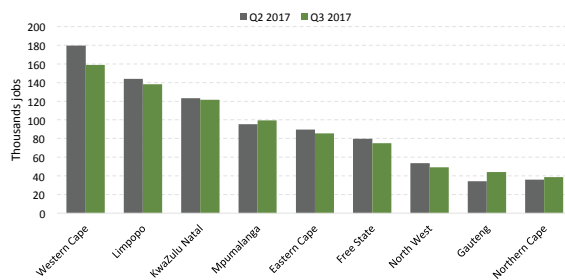


Source: Stats SA Quarterly Labour Force Survey, 2017

Agricultural job losses were recorded in all provinces, with the exception of the Northern Cape, Gauteng and Mpumalanga. Although it remains the largest agricultural employer with a share of 19.6%, the Western Cape was the most affected province in terms of agricultural job losses in the third quarter of 2017. This was due to lower production activity as a result of the continued drought, which has seen fewer seasonal workers being employed. About 21 000 jobs losses, equivalent to 82% of the third quarter agricultural job losses, were in the Western Cape.

This reflects the significant impact of the continued drought on agricultural activity in the province. Furthermore, the Eastern Cape, Free State, KwaZulu-Natal, North West and Limpopo provinces also saw a notable reduction in employment in the third quarter of 2017. This can be attributed to reduced activity in the fields during the winter season.

Figure 2: Agricultural jobs by provinces



Source: Stats SA Quarterly Labour Force Survey, 2017

A closer look at agricultural commodity levels reveals that the field crops and horticulture sub-sector is the major contributor to the decline in agricultural employment during the third quarter of 2017. This sub-sector, a leading contributor the country's total gross agricultural production, showed a massive decline of 12 000 jobs during this period. Most of these job losses were recorded in the Western Cape's fruit producing areas as a result of persistent drought.

Notable employment reductions were also recorded in other sub-sectors including livestock, mixed farming, and organic fertilizer production, while other sectors such as forestry and aquaculture recorded job gains. The increase in jobs in the forestry sub-sector most likely reflected those workers who were employed as wattle



bark strippers on a seasonal basis as a vast majority of forestry jobs are low-skilled.

Following the trend in the second quarter, the number of women employed in the agricultural sector further decreased by a further 12 000 in the third quarter of 2017, compared to a decline of 14 000 jobs during the second quarter. Similarly, the number of men employed further decreased by 13 000 during the same period, which is half the number of jobs shed in the second quarter. As a result, women's share of employment in the agricultural labour force continues to decline, albeit at a slightly lower rate of 31.1% during the third quarter of 2017, compared to 31.6% in the second quarter of the year. This clearly indicates that men still largely dominate employment in the agricultural sector. The declining women's share of agricultural jobs is of serious concern, especially given Government's imperative to build an inclusive sector.

Subdued agricultural employment prospects

It is widely expected that jobs across the entire sector will remain sluggish into the fourth quarter of this year. The persistent drought in the Western Cape Province remains a key risk that could potentially undermine the performance of the entire agricultural labour market. Although the summer crop-producing provinces could experience

an increase in activity in the fourth quarter of this year, there is limited prospects of notable improvement in employment as most summer crops are not labour intensive, particularly grains and oilseeds.

Despite the quarterly decline in employment, agriculture is still one of the most labour-intensive sectors with substantial employment linkages. Government, including the Development Finance Institutions (DFIs) such as Land Bank and the Industrial Development Corporation (IDC) are prioritising support to farmers severely affected by the drought in the Western Cape. This will hopefully help to arrest the decline in employment in the sector.

Emerging and semi-subsistence farming, with the support of government, could create additional employment opportunities in the sector. By empowering these farmers to become profitable, there is potential to create significant employment in the agricultural sector.

Today, most of these farmers produce a fraction of what their lands can yield, mainly because they are not using improved seeds or fertilizers among others. With new, improved seeds and the right support, these smallholder farmers may be developed into profitable businesses making an economic contribution and creating jobs. ■

Tebogo Mashabela, Agricultural Economist, Land Bank

INCONVENIENT TRUTH INCONVENIENT SEQUEL INDETERMINATE FUTURE

South Africa must wake up to climate change now



Former US vice president Al Gore's film on the environment, "An Inconvenient Truth," has been followed up by "An Inconvenient Sequel", now showing at South African cinemas. There may be some who believe that the current global warming is simply another "stage" of the earth's long history of weather changes but this is hardly consolation to those

of us who may not live longer than the Bible's "three score years and ten" attributed to a man's average life span. Today we are witnessing dramatic climate change which is affecting all of us: farmers, businesses, property developers and population numbers.

Gore showed unambiguously in his first film the hard evidence of global warning,

especially at the poles. He visited mountain tops which had been glaciers thirty years ago, and he predicted that the World Trade Center (WTC) would be flooded in the event of a storm surge on Manhattan Island. He was virtually laughed out of town! But his "Sequel" pictures of that same WTC under water a year or so ago as authorities hustled to pump water out of central Manhattan were chastening. Manhattan's subways were also

flooded causing consternation as millions of commuters stood stranded.

Gore's info titbits were alarming: 14 of the Earth's 15 hottest years in recorded history have been since 2001. Miami Beach's streets are routinely flooded, and the ferocity of a Phillipine hurricane was terrifying to watch. Islands in the Pacific are disappearing as residents leave their homelands and move to safer climes, and droughts, fires and floods ravage the planet at an increasing rate.

Gore's role at the United Nations 2015 Climate Change Conference was significant—even India and China signed up and it appeared that it was all systems go for the Conference's signatory countries to make every effort to halt the ever-increasing rise in air and sea temperatures.

What are the facts?

"The 12 000 liter plastic tank full of water rests on the tip-up section of the construction truck which arrives to fill our rain water tank. It costs \$450 for this water load. We have no piped water from the municipality and water we pipe from the river is only for the toilet, shower and the garden. September temperatures regularly hit 40 degrees and it's not even full summer yet! We have officially been in drought for most of 2017, with only sporadic rain in April. Our rainwater tank is down to its last rung. This has never happened in our lifetimes. The ground is brown and cracked and dry. Our garden has dried up from the mercilessly hot winds. Clean drinking water is more expensive than milk."

Is this India? Afghanistan? Egypt? No, it's an Australian resident living in northern New South Wales near the Queensland border. In addition, bushfires are a clear and present danger, life threatening in their ferocity. In the north west of the state, the 2014 drought turned the ground into bare veld, while the Salvation Army distributed hay and food to the local farmers for their animals and for the farmers' families themselves. Australian rainfall is more variable than rainfall in the rest of the world, so for the same level of reliability, dams in Australia need to be six times as large as those in Europe and twice as large as the world average to ensure water supply does not run out during dry seasons.

The International Monetary Fund (IMF) reported that In California, farmers have had to leave more than one million acres

of farmland uncultivated because of water shortages. In the recent fires, the Napa Valley vineyards and surrounding areas were burning at temperatures of 1500 degrees. Cars and metal cellphone poles have melted. Two hundred thousand people have lost their homes and two thousand houses and buildings have been destroyed. Twenty-five people lost their lives, while others are still missing.

In January 2015, the most devastating floods in living memory ravaged Malawi, while South Africa's 2015 drought was the worst in a hundred years. In Amman, Jordan, piped water is only provided to the city for two days of the week – the other five days see trucks bringing water to rooftop tanks for a population of more than four million.

Though water covers approximately 70% of the Earth's surface, only a small fraction of it is available for human use. Additionally, the global stock of fresh water is unevenly distributed. Over 60% of usable fresh water supply is found in just ten countries (IMF).

By 2014, Iran was using 70% of its total fresh water, far above the upper limit of 40% recommended by scientists. The country's rivers, wetlands and lakes are drying up. Fifteen per cent of pistachio trees have dried up in Sirjan province due to an inefficient agricultural sector and mismanagement. (Pistachio nuts are an important foreign exchange earner for Iran.) The country is spending \$5 billion to restore the dried-up Lake Urmia in the north west of the country. Iran's per capita water consumption is "nearly twice the global average, while 37 million people are at risk of dehydration." In less than 50 years, the country has used all but 30% of its ground water supply, which took a million years to gather (Washington Post 4.3.2016).

Egypt's capital Cairo has always had a serious problem with broken water pipes and structures. The United Nations warned in 2016 that by 2025 the country could run out of water. It already faces an annual water deficit of 7 billion cubic meters, while the country receives less than 80 mm of rainfall a year. Only 6% of the country is arable and its historical grip on the Nile river is loosening to Ethiopia and Burundi.

In June 2016 the Egyptian government's National Research Center reported that 40% of Cairo's residents do not get water

for more than three hours a day. In Mexico, with a population of 130 million, of the 82 existing irrigation districts, 42 are in a state of slow degeneration. This dry country is heavily dependent on underground aquifers from where it draws water for 70% of its needs. Presently the rate of extraction exceeds replenishment.

And so the story continues for country after country. No one, it seems, can escape climate change.

The 2015 Paris Agreement

South Africa, together with 173 other countries, signed the 2015 Paris Agreement on Climate Change. In a press release, the SA government said Minister of Environmental Affairs Edna Molewa signed up to an agreement that was a "comprehensive framework to guide international efforts to limit greenhouse gas emissions and to meet all the associated challenges posed by climate change". The press release said further that "South Africa is already acting on climate change. The country has significant investment in renewable energy, public transport, energy efficiency, waste management and restoration initiatives".

Clearly the Conference heads recognized that not every country has equal dedication to eradicating the factors that are destroying the planet; a runaway population explosion, corruption, backward social norms, maladministration, human greed and what appears to be in some instances a blithe indifference to adjusting to higher standards in order to add to the efforts of those countries that take quality living seriously.

This recalcitrance is in the main the Achilles Heel of attaining the goals set out at the Conference: while one half of the world will try its best to conserve the planet, the other half apparently couldn't care less: urban slums where rotting garbage and open sewage cause disease and pollution are common; beaches are piled high with ocean detritus and human effluent, while soil erosion, deforestation, poor municipal management, water wastage and water pollution result in urban and rural chaos and appear to have become a norm.

Who will call these miscreants to book? Who will police them? And in which category is South Africa?

It is an empirical fact that South Africa is in many sectors descending into third-world status.

Economically we are considered as such by those who bestowed junk status upon the country. But socially, structurally and administratively, where do we stand?

The facts speak for themselves. Much of the afore-mentioned desecration is unfortunately in Africa: it has the fastest growing urban population globally and such growth places stress on water utilities, to name but one resource. It is "widely accepted that many water supply systems on the continent are in a state of disrepair after years of under-investment and limited maintenance". (Business Day 12.9.17)

This statement could well apply to South Africa. The following observations make for grim reading:

- Committee members of the Parliamentary Portfolio Committee sitting on Water and Sanitation were informed there was no comprehensive plan covering the protection of water sources in South Africa, despite the country experiencing one of the worst droughts on record. (Beeld 21.6.17). Minister Nomvula Makonyane was supposed to lay a plan in this regard before the Committee on 20 June this year, but she wasn't at the sitting and no plan was proffered. One committee member asked if there was at least a concept plan, but that wasn't available. The minister's staff member said a comprehensive plan would only be available in March 2018. Earlier in the month the same parliamentary committee demanded that the Minister give an urgent account of her "bankrupt" department where "irregular and wasteful spending amounting to R2,5 billion" occurred in the 2016/7 book year. The Minister's head of department could not tell the committee where the money went. Legal steps are being considered against at least 500 employees of the department to account for this missing money. It was pointed out by an opposition member that in 2014 an amount of R680 million was budgeted to repair ageing water infrastructure. This has now grown to R800 million because little has been done. The member declared this matter disastrous as 4 200 million/5000 million liters of

sewage-laden water is pumped daily into SA's rivers because 84% of the country's 600 sewage plants do not work. This state of affairs is acknowledged as the single worst polluter of the country's water. (M & G 21.4.17)

- Only two areas in urban Pretoria (one of which is where most of the ambassadorial corps resides) tested positive for safe drinking water. (Beeld 21.6.17). Nine other areas did not meet the required standard. Pollution in these areas ranged from 8 000 units of e.coli bacteria per 100 ml water to 15 000 units. There should be no sign of e.coli whatsoever in drinking water. (Afriforum test).
- Mining permits have been granted to an Indian company by the SA government to mine for coal in the Wakkerstroom district of Mpumalanga, a national heritage site where hundreds of millions of litres of water sit in wetlands visited by tourists from all over the world to view the area's more than 400 bird species. In addition, this mining will inevitably pollute the underground water system which will in turn destroy farming and human settlements in the area. Citizens are using their own money to fight this government action in the courts but if they lose, this could be one of South Africa's most serious ecological disasters. This wetland is the convergence of four important rivers, including the Vaal which supplies water to Gauteng, South Africa's most densely populated area.
- The World Wildlife Fund (WWF) reported in March 2017 that if South Africa continues with its water policies, there will be a 17% shortage of available water before 2030, just twelve years away. WWF says that by 2025, there will be such a physical shortage of water that it will cause thousands of lost jobs and concomitant serious social unrest. "South Africa's water crisis is not just a problem for the future, it is a problem for the here and now" said the report.
- Polluted water in the Vaal dam was recently "spilled out" of the dam by authorities to "make it cleaner!" This was done to "thin out" pollution in the Barrage, said an official. But all this did was to send the sewage-polluted water down the river to Parys in the Free State. According to a recent government report, there are 435 000

units of e.coli bacteria per 100 ml of water in the Rietspruit River which empties into the Vaal. Local residents along the Vaal have threatened the government with legal steps for this dangerous negligence.

- Many of South Africa's 274 municipalities are "under administration". (This means those in charge cannot run them efficiently.). The stories of chaotic municipal service delivery in South Africa are legendary. In October of this year SA's professional association of civil engineers issued a damning report on state-run infrastructure, saying it is not coping with demand and it is likely that the public will be subjected to, inter alia, serious danger unless prompt action is now taken. The association places much of the blame on inefficient and corrupt municipalities.
- The engineers said further that, with a few exceptions, every segment of the work of the state is bedeviled by poor planning, a lack of skills and capacity, corruption, neglect and poor maintenance. The institute's greatest concern was the lack of maintenance of vital installations.
- Hundreds of productive commercial farms were handed over to beneficiaries of the government's land reform program resulting in the farms being used as either weekend retreats or degenerating into squatter camps. The number of farms still being successfully managed and making a profit without outside help is virtually nil.
- Millions of illegal immigrants from Africa and even the Indian subcontinent and South East Asia have entered South Africa without permission and have settled in scores of squatter camps surrounding the country's cities. In many camps there is no sanitation or clean drinking water, no toilets or piped water for household use. Electricity is stolen from paying citizens. Health and living standards have deteriorated drastically. The environment has been desecrated.
- Government's signing of international environment agreements is no compensation for the destruction of a country through government neglect, corruption and indifference to the needs of the citizenry. ■

Benny van Zyl, General Manager, TAU SA



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Putting more youth into agriculture



Mr Vusi Shongwe, MEC

None can deny that the transformation of South African society in a manner that benefits the previously disadvantaged is a noble goal, but the march of progress cannot be sustained unless the people are able to feed themselves. Fortunately, government has the challenge of food security firmly within its sights. Foremost among provinces in this regard is Mpumalanga, where MEC for Agriculture and Rural Development, Land and Environmental Affairs, Mr Vusi Shongwe, has the honour to preside over two important schemes for not only putting food on the table, but also empowering people to create their own livelihoods. We find out more about the Fortune 40 Young Farmer Incubation Programme and the Phezukomkhono Mlimi initiative.

Make no bones about it: radical economic transformation is inescapable, as Shongwe explains: "As defined by the President of the Republic of South Africa, the Hon. JG Zuma during his 2017 State of the Nation Address, radical economic transformation is the 'fundamental change in the structure, systems, institutions and patterns of ownership, management and control of the economy in favour of all South Africans, especially the poor'. There can be no denying that the economy needs to be radically transformed, which requires all of us to think afresh on the roles of institutions in economic governance and resource allocation. So the economy definitely does need a major overhaul."

To achieve such a bold vision, audacious initiatives are required. One such is

the Fortune-40 Young Farmers Incubator programme announced by the Premier of Mpumalanga, Mr David Mabuza, during his State of the Province Address in February 2015. A total of R80 million was set aside and 20 youth-owned SMMEs and 20 youth-owned cooperatives were recruited into an incubator programme operated under a strategic partnership with the private sector to mentor future commercial farmers.

"The main objective," says Shongwe, "is to address the socio-economic challenges of poverty, inequality and unemployment. But most importantly, our aim is to develop an army of new, young and black agricultural entrepreneurs."

The incubation programme works to provide accredited agricultural technical training to empower the beneficiaries of the programme in order to develop their talent, skills and knowledge for farming. As Shongwe elaborates, "Beneficiaries are put under the stewardship of a competent incubator who takes them through an intensive on-the-farm training programme. The programme has two legs whereby 70% focuses on practical, while the remaining 30% is theoretical. The stewardship entails mentoring and coaching in entrepreneurship, skill development and experiential training."

Since it was announced, the campaign has spread throughout Mpumalanga, improving the fortunes of an ever-increasing number of farmer-entrepreneurs.

Shongwe confirms: "So far we have 17 farms, spread in all four Districts in the province. There is also a Cabinet decision that the Department increase the number of Fortune 40 projects by 15 more farms, meaning the number of beneficiaries or incubates will increase, thereby creating opportunities for more young people. The Department is, among others, currently working with the Department of Rural Development and Land Reform to look at issues of securing land and farms that we can utilize for this purpose."

The programme has already racked up considerable achievements. "Seven farms



MEC Vusi Shongwe with some members of the Siyaquba eMalahleni Coop and their Mentor

are already in full production, namely Muhlomube and Zoeknog near Acornhoek and Alandale, all in the Bushbuckridge area, Barberton Environmental Centre in uMjindi, Kwaggafontein in Thembeisile Hani Municipality, Elandspruit in Steve Tshwete Municipality, and Delmas in Victor Khanye Municipality.

"No doubt a lot of job opportunities have been created for the beneficiaries. Temporary jobs are also created during planting and production period. These farms are already supplying their produce to schools and hospitals through the Government Nutrition Programme, a guaranteed market for them. Temporary job opportunities were also created during the development of infrastructure such as fencing, irrigation infrastructure, greenhouses, chicken houses and farm buildings. Note that there was no infrastructure in all the farms, and everything had to start from scratch, hence few other

projects are still lagging behind, but getting there."

Those who take part in the programme may rest assured that they are receiving qualifications that are of the highest quality and commercial relevance. "The trainings offered are AgriSeta accredited, and they are mainly on plant and animal production," Shongwe explains. "Let us note that many of the beneficiaries are young people, previously unemployed, who could not further their studies beyond matric due to circumstances, including not qualifying for tertiary university entrance. But there is also an aquaculture partnership with the University of Stellenbosch, of which the group whose project focus on aquaculture visited the University on a fact-finding mission earlier this year, to gain exposure to aquaculture and bench marking."

Fortune 40 farms began by supplying the government integrated School Nutrition



MEC Vusi Shongwe with HOD Ms Sindi Xulu at the launch of the 2017 provincial Ploughing Season

Programme with vegetables such as butter-nuts, spinach, cabbages, carrots, tomatoes and onions. Now they are set to spread their wings.

"It should be noted that the Fortune 40 programme turned two years old in September 2017," Shongwe attests. "The Government Nutrition Programme is merely a launching pad for Fortune 40 to test their strength and ability to meet the demand. Other possible markets are being explored, including export."

A further aim of the Fortune 40 programme is to give impetus to cooperative development and small business development support.

"The government has placed more impetus on cooperative development and SMMEs," Shongwe explains. "The Fortune 40 beneficiaries participate through cooperatives rather than individual farmers. The

Department promotes cooperative development as the cooperative system has been proven to be working in other countries such as Argentina, Venezuela and in most G7 countries. The successful business in these countries are cooperatives listed in the Stocks Exchange. There is no better motivation than this."

Of course, none of this could take place without government support. "Government assists the cooperatives through provisioning of production inputs such as chemicals, fertilizers, seeds, and animal feed in case of livestock farming, including mechanisation," says Shongwe.

"In terms of infrastructure, government has invested mechanisation, production inputs, and farm infrastructure such as packhouses, fencing, drip and centre pivot irrigation, greenhouses, park-home villages for beneficiaries, pump-houses, animal handling

facilities and cattle, electricity and water reservoir," he continues.

All of this investment has yielded good returns. "Of course, the return on investment is good; there is value for money for the investment that went into the development of the farms and the training programme. The beneficiaries can practice independently from the Incubators/Mentors. We are currently exploring social contracts with the private sector, including Afgri and other strategic partners."

In a time marked by increasing concerns about food security, government is resolutely committed to getting people fed, and the rural areas are no exception. While the Fortune 40 entrepreneurs are honing their skills, the rest of the community is not being neglected. On the contrary, thanks to the Department, old and young alike are able to invest in their own future wellbeing by tilling the soil of their native land.

"Food security is a concern in rural areas in particular, and in the country in general," Shongwe avers. "We still have areas where infant mortalities are as a result of malnutrition. Otherwise South Africa is far much better than some of its counterparts in the continent.

It is however comforting to note that SADC is trying all it can to curb, or decrease the rate of infant mortality through various interventions by their governments.

"Fortunately the Department launched a revived extension and advisory support programme called Phezukomkhono Mlimi, which, unlike the previous programme that aimed at small-scale farmers, now also targets ordinary households, schools, creches, Home-Based Care centres, Drop-In centres and Churches, to support them with production inputs, to encourage them to use whatever small piece of land in their yards, to establish food gardens.

The programme has received much appreciation from traditional leadership, and ordinary citizens throughout the province. Through Phezukomkhono Mlimi, we encourage households to establish backyard gardens to fight hunger.

We call upon the elderly to let their children work on these backyard gardens, so that they begin at an early age to love agriculture", concluded MEC Shongwe. ■

Oil change

Don't let used oil pollute water and soil

With farms covering extensive areas of South Africa, this sector has the largest impact on our natural habitat. It is estimated that South Africa generates an average of 120 million litres of used lubricant oil in a year with about 10 million litres of this being generated by the Agricultural sector.

Commercial farming relies heavily on technology and mechanisation. On average, a tractor can hold anywhere between 40 and 100 litres of oil and the average medium commercial farm can have anywhere between three and ten tractors. Considering that one litre of used oil has the capacity to contaminate one million litres of water, this is a potentially devastating amount of used oil that, if not collected and recycled responsibly, could make its way into our environment.

Used motor oil contains numerous toxic substances, including polycyclic aromatic hydrocarbons, which are known to cause cancer. In addition, tiny pieces of metal from engine wear and tear, such as lead, zinc and arsenic, make their way into lubricants, further contributing to the polluting potential of used motor oil. Motor oil is exposed to heat and oxygen during engine combustion, which changes its chemical make-up. Because spent motor oil is heavy and sticky, and contains an extensive concentrated cocktail of toxic compounds, it can build up and persist in the environment for years.

Once motor oil escapes the engine it has the potential to travel long distances, and most used motor oil eventually makes its way into waterways in the form of run-off. Once it reaches waterways used motor oil is toxic to the plants and animals living in the water, and the oily film created on the surface of the water can impair natural processes, such as



oxygen replenishment and photosynthesis. Used motor oil can also pollute soil and drinking water.

Preserving biodiversity

With the frequent droughts that we are experiencing, caring for our water resources has become a massive national priority. The protection of visible water sources is as important as protecting underground water, especially because farmers regularly use boreholes to tap into underground water.

The farming community is known for its creativity and survival skills, hence the saying 'n boer maak n plan. Unfortunately, in many farming communities in South Africa, cost cutting methods and traditional practises that have been carried out on farms for generations are often not environmentally friendly and sustainable. Practices include spraying used lubricant oil on the ground in order to limit dust damage to crops and also using the old oil on fence posts as a preservative, as well as rubbing it onto livestock as a parasite deterrent. Conversion to more sustainable agricultural practice is necessary both to

preserve South Africa's biodiversity and to ensure a future resource base.

Many farmers do their own oil changes and minor services when their vehicles are out of the maintenance plan and manufacturer's warranty. The ROSE Foundation encourage these farmers to gather and store their oil in containers which can easily be transported to the nearest town and dropped off at a vehicle service workshop.

Alternatively, there are some ROSE Foundation registered collectors who operate in the rural areas and will come and remove this oil for the farmers in an environmentally compliant and safe manner.

We are comforted by the knowledge that farmers would never knowingly damage the environment. That is why it is important for us to reach out and create awareness about the potential harmful effects of used oil on the environment. ■

Bubele Nyiba, CEO, ROSE (Recycling Oil Saves The Environment) Foundation

The ROSE Foundation is an organisation that has been championing the responsible management of used oil in South Africa for many years.



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Western Cape relief

Largest haul of fodder ever delivered by road

The largest single haul of fodder was recently transported to the drought stricken Beaufort West in the Western Cape in a convoy of 31 interlink trucks. The transportation was generously donated by Hendrik van Wyk Transport, a transport company from Randfontein who have been involved for a number of years in drought relief projects associated with Agri NW.

When 1500 large bales of fodder was offered to Agri NW by Jannie Neuhooff from Neuhooff Farms at Sundra, the opportunity arose to launch a high-impact drought relief project to raise awareness amongst the citizens of South Africa for the plight of the drought-stricken farmers in the country.

The project was organised by Agri SA assisted by Agri NW who took responsibility for the logistics required. Apart from the assistance of Jannie Neuhooff and neighbours to provide tractors and forklifts to load the trucks, two private companies availed their services and forklifts to allow us to load all the bales in record time.

Six tractors and forklifts worked continuously for fourteen hours to complete the mammoth task of loading the 1500 bales on 31 trucks to be ready to depart on Tuesday 8 November 2017. As is customary with Hendrik van Wyk Transport everybody present including the truck drivers gathered for scripture and prayer before departing on the journey.

Agri NW would like to express its gratitude to everybody for their donations and tangible support in making this attempt possible. You have demonstrated extraordinary care and sympathy for the suffering of our farmers in a tangible manner.

Diesel fuel donated to the amount of R1,5 million will be utilized for this project and other similar efforts in the near future. ■

The particulars of the Agri SA Drought Fund is available on the Agri SA website at www.agrisa.co.za.

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MEGA ATTRACTION

Uniting role-players across the value chain

Agri Mega Week has developed into one of the biggest and most important events on the agricultural calendar. We spoke to Media & Marketing Manager, Alex Kleinsmith to find out more.

Please tell us about the background to the show.

Agri Mega Week started 15 years ago when Overberg farmers recognised the need for an agricultural information and open day. The typical agricultural show transformed into an agricultural trade expo that attracts local, national and international producers, commodity organisations, government, marketers, consumers and farm labourers. It is an opportunity to partner, share information, accelerate sector development and create business opportunities within the agricultural sector. In 2014 the event hosted 60 global countries collectively, with the 2015 expo theme announced as "Africa for International Food Security". Collectively the 2014/2015 event hosted more than 25 000

visitors. Agriculture and its functions being a primary economic sector contributor to South-Africa's GDP, the purpose of Agri Mega Week is to unite agricultural role-players across the broader value chain.

What is your personal involvement?

I am responsible for the marketing of the event and ensuring that the event is well covered on all of our marketing platforms.

How many exhibitors were there this year?

There are approximately 350 exhibitors across seven sectors.

This includes agro-processing.

How many people are involved in making the show a success?

Including volunteers, the team consists of at least 40-50 people.

What are you excited about this year?

This year Agri Mega Week hosted the Cape Floral Kingdom Expo, the BeSAFE

Rural Safety Expo and Mega PetEx that gave visitors and attendees the additional benefit of visiting four expos at one premise.

We had about 17 000 visits through our gates this year.

How do shows like this help the farming community?

Firstly, it unites agricultural roleplayers across the broader value chain and so doing accelerates sector development.

It also creates synergy regarding land reform and agricultural transformation and raises awareness about the rights and roles of commercial farmers, smallholder farmers and farm workers.

Very importantly, too, it also reintroduces youth to agriculture. ■

Greg Penfold

The date for the 2018 Agri Mega Week Expo is 12 to 15 September 2018. For more information please see our website www.mega-events.co.za



GIVE THIRIPS THE SLIP

Pest control management guidelines in orchards and greenhouses on most indoor/outdoor plants

A common pest found in greenhouses and indoor/ outdoor plants, thrips damage plants by puncturing the epidermal layer of fruits, flowers and leaves, and sucking out the cell contents. Here's how to prevent these tiny menaces from ruining your harvest.

Fast facts

1. Monitor blocks throughout the season for the presence of thrips – commence monitoring 2-3 weeks before flowering
2. Ensure timely applications of Delegate™ 250WG as indicated on the label
3. Ensure that the product is mixed into the spraying solution—make a premix to ensure that granules dissolve
4. Do not mix into muddy water
5. Ensure that the spraying solution's pH is between 5 and 8
6. Remove/treat external sources of infestation eg. flowering weeds and flowering lucerne fields—do not disturb flowering weeds during grapevine flowering-period
7. Ensure adequate coverage – high volume application

Timing of application

Continuous monitoring results will indicate when the product should be applied. Thrips numbers are known to peak at the onset of flowering and continue to be high until fruit set and product application is therefore

recommend to be at the onset of flowering (80% cap fall), ensuring fruit protection.

Depending on the duration of the flowering period or presence of thrips and population-pressure, a follow-up application within 5-7 days of the previous application may be necessary to obtain adequate protection. In some areas under certain conditions thrips are also known to occur later in the season and a later application of the product as described on the product-label may also be necessary to ensure berry protection.

How do we control thrips?

Monitoring-results will indicate when control measures should commence.

Thrips are known to peak at the onset of flowering and sprays should therefore be timed accordingly, starting at or just before 80% cap fall will ensure that fruit are protected till fruitset. Control measures should be based on sound Integrated Pest Management principles, including cultural practices (such as not disturbing cover crops at the onset of flowering till two weeks post-flowering to prevent an external source of infestation) and it should be combined with the use of registered insecticides, as described below.

There is no set economic threshold for thrips. The general recommendation is that control should commence as soon as monitoring methods indicate the presence of

thrips, considering label recommendations and withholding periods.

What is Delegate?

Delegate™ 250WG (spinetoram) is a product developed by Dow AgroSciences. The product is effective against certain insects and registered for the control of thrips in commercial vineyards.

Mode of action

Delegate™ 250WG is a water dispersible granule with contact and stomach action, of which ingestion has proven to be the most effective.

Optimal plant tissue coverage is therefore of utmost importance (high volume application). The product is not systemic but will be absorbed by the cuticle of plants and has translaminar action, thus penetrating the leaves, which is proven advantage for thrips-management as they are known to feed in this area.

Do not apply Delegate™ 250WG in more than two consecutive applications or more than three applications/season/block.

ALWAYS USE ACCORDING TO LABEL RECOMMENDATIONS: <http://www.dowagro.com/en-za/southafrica/products> ■

For more information please contact the registration holder: Dow AgroSciences Southern Africa (Pty) Ltd. on Paarl (021) 860 3620 • Pretoria (012) 361 8112 • Emergency No. 082 887 8079

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Do value chains really matter... and if so, where is the value?

by Potatoes South Africa



The potato industry in South Africa is a prime example of how a free market system operates, i.e. price is determined through the interaction of supply and demand. More specifically our national fresh produce markets act as the institutions where supply and demand interact to determine prices that are used by the rest of the industry as price barometer. Thus, it is useful to look at the industry from a supply and demand point of view, but within a value chain context (the combination of the supply and demand chains).

The question at hand is, if we consider current trends, whether the potato value chain is on a sustainable pathway for the next ten to 15 years (and even longer). So, what are some of the current trends that are emerging?

From a supply perspective

- Since 2002 production increased by 2.9% Compounded Annual Growth Rate.
- Expansion in production until 2011/12 was mainly due to new cultivars, increased number of hectares under irrigation (80%), better cultivation and

chemical control practices. But, since then the total potato crop has moved more or less sideways with variation in production volumes (i.e. up and downs) mainly as a result of climate conditions.

- Real input costs show an increasing trend, putting significant financial stress on producers (in the early 1990's there were over 2000 potato producers, now around 540 potato producers left in the industry).
- Supply via national fresh produce markets (NFPMS) has declined from over 60% of the total potato crop



during the 1990's to around 46% currently. Cognisance must be taken that over 60% of NFPMS sales goes into the informal market. Direct marketing to retailers, retailer packers and to the processing sector has grown, while exports have been moving sideways.

- The South African supply chain is still predominantly fresh produce orientated, and more concerning is that the product offering has seen very little change over time.

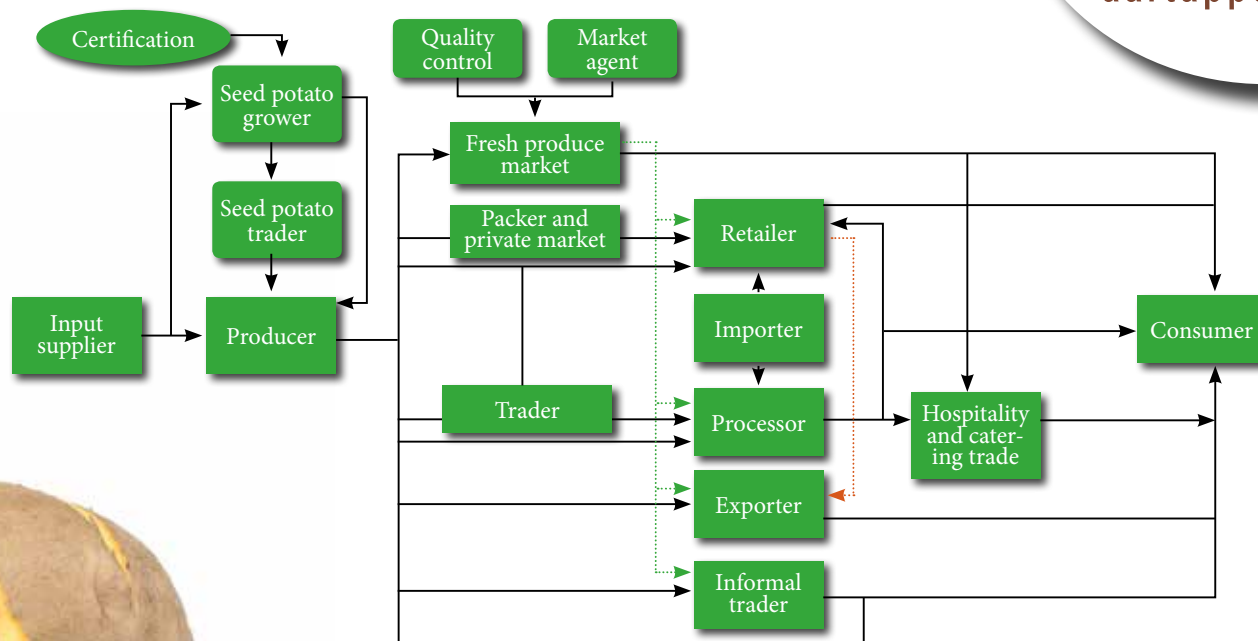
From a demand perspective

- Demand has expanded in tandem with supply. Demand growth is higher than population growth, but marginally lagging per capita income growth. In real terms, expenditure on potatoes is R1.3 billion more than ten years ago annually. But, a sideways trend emerging in line with local availability (note imports of fresh potatoes not allowed).
- Although real prices reacted as



potatoes
aartappels SA

South Africa Potato value chain



expected according to supply and demand forces, it shows a sideways trend in recent years after an upward trend throughout the late 1990s. This is concerning, since over the same timeframe real input costs have increased. In short, the price cost-squeeze is becoming more pronounced over time (one can postulate that this situation is one of the main reasons forcing producers out of the industry and resulting in existing farming businesses growing to take advantage of economies of scale).

- Competition for space on the “consumer’s plate” is becoming more intense as the demand for convenience, out of home consumption and increased food diversity accelerates. This is over and above stiff competition from other starch/staple foods.

In short, the above can be summarised as follows: (i) a trend is emerging where production/consumption is moving

sideways, (ii) the cost-price squeeze is threatening the sustainability of potato production, (iii) the industry has seen very little product innovation, (iv) marketing channels are changing, whilst others are growing to slow and (v) consumers’ tastes and preferences are changing.

The future sustainability of the potato value chain (inclusive of all role players) will be dependent on how the value chain will unlock value to consumers.

We will have to explore different value propositions the potato value chain can offer and what it will require to unlock such value. Examples include:

- The development of export markets for seed and table potatoes, and in particular processed potatoes.
- Product innovation – this can be at the primary level (new cultivars) throughout the chain to new potato products.
- Information systems to facilitate arbitrage in the value chain to reduce

transaction costs for stakeholders.

- Revitalisation of fresh produce markets.
- Fostering trust relationships in the value chain – partnerships vs us-and-them.

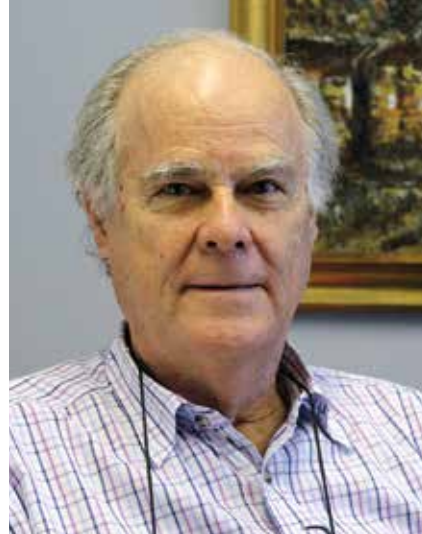
Other issues that should also receive attention are:

- Innovative public-private sector partnerships.
- Corporate Social Responsibility.
- The level of integration down the value chain must be explored to determine whether producers can unlock further value.
- Addressing problems and challenges of the informal traders.

Read more in Chips magazine at <http://www.potatoes.co.za/chips-online/chips-september/october-2017.aspx>

A question of viability

Expertise and sound advice are key to leveraging automation, writes Trevor Reardon



Packhouse automation, in the eyes of many farmers is associated with images of large capex, which may not be recouped for a number of years. This in turn makes them hesitant to invest. However, it's important to note that with computerized weighing and automatic bagging systems from Goldpack, this does not need to be the case!

Using Goldpack's Newtec computerized linear weighers, it is possible to reduce average "portion overweights/give-away" substantially from the order of 10 to 15% to less than 4%.

In addition to the other efficiencies gained from installing Goldpack's automatic optical grading, weighing and bagging systems, this feature alone contributes from "day one" towards paying for this investment. Let's take a recent packhouse installation Goldpack

implemented for a customer who had abandoned farming potatoes for some years.

Hand grading, weighing and packing, by traditional methods could not effectively and profitably process a large-scale potato crop.

He believed that the systems available would not make it possible for him to process his crop cost-efficiently. On the contrary, he wanted an acceptable profit, in return for the time, effort and investment involved. Hence he stopped planting.

However, after some on-site visits to local Goldpack automated installations, he reevaluated his position. In fact, he concluded, these packhouse systems could make large-scale production of potatoes a viable and profitable business. A recent installation of Newtec weighers with sack clamp bagging systems by Newtec now processes up to 200 tonnes of potatoes per day.

Newtec computerized linear weighers are available for other crops such as carrots,

onions, tomatoes, citrus and deciduous fruits and will consistently effect an average saving in portion overweight/give-away of 7-10% !

Over a six- or twelve-month production period, this alone results in a considerable financial saving to the farmer.

Alternatively, over this production period, this saving in overweight will enable the farmer, with no additional product input, to increase the value of his sales by 7-10%

The Newtec computerized linear weigher forms the heart of Goldpack's packhouse systems, ensuring that crops are processed consistently, steadily, and efficiently without the need for tea breaks or lunch breaks or sick leave.

These packhouse systems can be scaled to and tailored for the farmer's needs and pocket and can be upgraded as and when required.

The reality is that any method of crop processing in a packhouse, be it manual, semi-automatic or fully automatic, carries costs with it.

What automation offers is process control in terms of predictable efficiency, lowered downtime, faster processing and accurate weighing in return for these costs.

A viable pack-house requires expertise and sound advice to ensure that every rand is spent wisely. Goldpack has the expertise to do just that.

If you would like to assess the viability of automation in your packhouse feel free to contact Goldpack. ■

Trevor Reardon is the pack-house systems director at Goldpack, which is a major supplier to the South African root crop industry.



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Threat assessment

Could bio-control agents and stimulants harm workers' health?

Biological agents are commercially produced through biotechnological processes to harness their abilities of controlling plant diseases and pests (insect, mites, weeds) or stimulating plant growth. These renewable resources are increasingly being used as a more eco-friendly and sustainable method of biocontrol and biostimulation.

Their active ingredients can be plants, algae, extracts, microorganisms (bacteria, fungi and viruses) or active metabolites. The controlling mechanisms of biocontrol agents (BCAs) include predation, parasitism, herbivory and pathogenicity. Biostimulants contain substances or microorganisms that stimulate natural processes to enhance nutrient uptake and efficiency, tolerance to abiotic stress and crop quality. The use of BCAs is an important development as pesticides are known to be harmful to humans and the environment. Although there are several important benefits to the application of BCAs

and biostimulant agents (BSAs), they could have adverse effects on workers exposed to it without a thorough understanding of the possible consequences. Therefore, while these biological agents find ready acceptance in agriculture, horticulture, landscaping and production, the question of safety to workers' health must be ensured.

Agricultural workers are exposed to high levels of biological agents due to the use of and exposure to BCAs and BSAs, which are associated with various occupational diseases. Exposure to high levels of these agents over a short period is also a health risk to certain workers. Diseases include allergies, asthma, chronic obstructive pulmonary disease, hypersensitivity pneumonitis and phototoxicity. The occupational diseases caused by these agents may be dependent on the level of exposure, the concentration of the agent and amount of product used.

Microbial control products can be manufactured as powder, granules and suspensions. These agents become airborne during application of the powder or granular products,

leading to occupational exposure. Individuals applying these products are often exposed to very high levels during their work activities. Exposure can be direct through inhalation of the BCA or indirect by handling treated plants and/or by winds blowing them from or shaking them off surfaces where they are present. Other activities that should be considered when investigating exposure to BCAs and BSAs include production and application of the products and clearing of old plants.

Common biological agents used as BCAs and BSAs include algae (*Ascophyllum*, *Fucus*, *Laminaria*), bacteria (*Bacillus subtilis*, *Ba.Thuringiensis*, *Rhizobacteria*, *Streptomyces griseoviridis*), fungi/mold (*Beauveria bassiana*, *Lagenidium giganteum*, *Paecilomyces lilacinus*, *P.fumosoroseus*, *Trichoderma harzianum*, *T.polysporum*, *T.viride*, *Ulocladium atrum*, *Verticillium lecanii*), trees (*Lithraea molleoides*) and nematodes (*Steinernema feltiae*). Reports of exposure to high levels of certain BCAs (*B.bassiana*, *Ba.thuringiensis* and *Trichoderma* species) compared with other agents in environments such as greenhouses



are known. It is important to note that some BCAs (e.g. *B.basianna* and *Ba.thuringiensis*) have been detected weeks and in some instances several years after application. This could have been from settled fungal spores or new growth of the fungi on the host, thus soil can act as a reservoir and exposure source. *B.bassiana* also poses other challenges as it has numerous antibody proteins, some of which can cross-react with other allergens from other fungi. Allergy testing was positive for the *B.bassiana* agent. *B.bassiana* can also be infectious to individuals with weak immunity; and *B.bassiana* and *Ulocladium atrum* have been reported as causal agents of keratitis. Therefore, sensitised workers may be exposed to the agents long after processes or activities have ended.

The health of a number of workers from different greenhouses workers has been affected from exposure to BCAs (e.g. *Ba.thuringiensis* (*BactimosR* and *VectobacR*)). Apart from the risk of allergenic sensitisation to exposed workers, the use of *Ba.thuringiensis* kurstaki (*ForayR* 48B) also led to increased

complaints of gastrointestinal, upper airway and neuropsychiatric symptoms. Allergic sensitisation to *V.lecanii* was also shown to be high in 35% of farm workers in England and among workers from greenhouses (9 to 21%). Cases of allergy to a nematode product containing *Steinernema feltiae* was reported in flower greenhouse and horticulture workers. *Paecilomyces*, *Trichoderma* and *Ulocladium* have been implicated in onychomycoses (fungal infection of the nail) cases. The use of *Lagenidium giganteum*, a watermold as an anti-mosquito control agent has resulted in the emergence of heat-tolerant *L.giganteum* strains that are pathogenic to lower animals and humans. This poses a public and environmental health concern for countries where diseases caused by mosquitoes are endemic and the BCA is used.

Apart from microbial agents, many essential oils which are natural by-products of plant metabolism show a broad spectrum of insecticidal, anti-feedant, repellent, oviposition deterrent, growth regulatory and anti-vector activities. They thus have great potential for increased use in agriculture. Essential oils which are so promising for use in agriculture are a good example of natural substances which are a well-known cause of skin allergy or irritation (contact dermatitis) in humans. Common essential oils that are known to cause skin problems include tea tree, orange, lemon, mandarin and grapefruit oil. These substances can cause outbreaks of occupational contact dermatitis among the crop sprayers or even in the factories producing them. They may also affect individuals where these products are used as insect repellents, flea dips for animals and indoor pesticides. Another plant, *Lithraea molleoides*, produced for medicinal purposes, also possesses antimicrobial, antiviral, cytotoxic and immunomodulatory activities; however, it can also cause allergic sensitivity, skin disease, fever and visual problems in sensitive individuals.

A highly invasive plant, *Parthenium hysterophus*, causing substantial economic losses in many countries (southern and eastern Africa, Asia, Australia and India), is also known to cause allergic respiratory problems and contact dermatitis, and is mutagenic in humans. Several biocontrol agents have been released in selected areas in South Africa to eradicate

this pest. Care should be taken to ensure that the health of workers involved in the weed management process is not affected by indirect exposure to the BCAs.

While the use of bioproducts as BCAs or BSAs has many advantages such as economic and environmental gains; it also has some limitations as they can affect the health of some workers that are particularly involved in the use of, or are exposed to these agents. It is essential that hierarchy of controls are implemented to control exposure and where relevant appropriate personal protective equipment is provided for workers. The National Institute for Occupational Health (NIOH) has recognised this as an area that requires more awareness and research in order to protect workers from exposure.

E Ratshikhopha, A Fourie, O Matuka, and T Singh, National Institute for Occupational Health, a branch of the National Health Laboratory Service ■

Further information can be obtained by contacting the NIOH on +27 (0)11 712 6400 or info@nioh.ac.za.

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Green light for smallholder farmers

Technology improves productivity, slashes costs

Lack of access to technologies and information, poor infrastructure and lack of access to markets, political instability can also play a role and a lack of access to financing are all factors that plague smallholder farmers. Fortunately, the private sector has been listening and solutions abound. We spoke to Kobus Steenekamp, Country Manager for Monsanto, to find out more.

How can getting modern agricultural technology to smallholder farmers help rid the world of hunger?

The future and wellbeing of millions of people lies in the hands of farmers – large commercial farmers as well as smallholder farmers. As a leading global provider of technology-based tools and agricultural products that improve farm productivity and food quality, we believe that it is important to deliver products and solutions that enable both small-holder and large-scale farmers to produce more from their land to meet the world's growing food needs, but at the same time still conserve natural resources and protect the environment.

Plant biotechnology, genomics and breeding can play a big role in improving productivity and reducing the cost of farming.

We also offer weed-control options that form the basis of integrated solutions with other Monsanto products. We define sustainability very simply: Helping farmers produce more with fewer resources to help improve lives. With the help of our partners and continued investment in research and new technologies, we are making steady progress on our sustainability goals.

What is the best way to develop reliable systems for delivering better seeds and agricultural technology to the world's poorest farmers?

Seed distribution is important so that all farmers can have access to good quality products. It should be available for all inputs, not only seed, as a farmer also needs ferti-

hybrid or GM depending on their choice. But also access to other technologies and products such as good crop protection chemicals, fertilizer and advisory services. Marketing tools are also essential.

Monsanto understands that participating in the development of small-holder and emerging farmers will be the route out of poverty, unemployment and overcoming food scarcities. We are committed to creating solutions to these challenges while helping to take care of our planet, our people and the communities where we live and work. We are also committed to inclusive growth, enabling a successful and sustainable agricultural platform in South Africa and across the world, by first focusing on the basics, such as access to financing, increased investments in programs to train emerging farmers on best practices, providing high-quality seeds and crop protection products to improve harvests while using water and other valuable resources more efficiently. We believe, as private sector, that our responsibility does not end there. It's about ensuring the long-standing success of our farmers, aiding the transition from emerging to commercial status by bringing what modern agriculture has to offer in the latest technology and agricultural innovation.

Monsanto is built on Improving Lives – a foundation of business and inclusive growth principles. Our approach to improving the lives of small-holder and emerging farmers began more than 20 years ago with investments towards inputs, training and development and grants. Partnerships such as the one we have developed with MASDT over the years have been pivotal in reaching these farmers.

We define sustainability very simply: Helping farmers produce more with fewer resources to help improve lives.

lizer and other chemical products for weed and insect and pest control. Infrastructure is of high importance, especially the establishment of road networks, conditions of roads, off-set points for products and off-take points for grains and other harvested products for better access to markets.

Partnerships and making sure that all farmers have equal access to modern technologies such as good quality seed – OPVs,



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MONSANTO was instrumental in establishing the Buhle Academy where farmers receive in-service training and is also involved in school projects, the maintenance of school buses, women's days, sport activities, community training, safety measures and other donations in your community. Furthermore, through collaborative partnerships we facilitate community engagement and build profitable businesses towards creating a sustainable future for all.

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Today, Monsanto has a dedicated Empowerment Programme – “Imbewu” – focusing on enterprise and supplier development, skills development and socio-economic activities. The ultimate goal is to improve lives. We do this in three ways. First, promoting sustainable development - and offering the latest products Monsanto has to offer thereby doubling the farmer’s yields making farming profitable; second, ensuring farmers are not perpetually dependent on donor funding, which we do by offering opportunities on training and best practices, education around sound business practices such as budgeting for the following year’s input expenses; and third, to inspire other emerging farmers to modern agricultural innovations.

How have advances in data science and biology made it easier for more farmers to benefit from new technology?

In the 1940s, the first wave of what is now called the Green Revolution brought significant advancements in plant breeding. This era was quickly followed by additional waves of innovation in advanced breeding and biotechnology, which helped reduce risk and increase food production.

There have been many advancements in agriculture since then. Among the most significant is how smartphones and tablets are putting the power of data science into the hands of farmers to help them optimize their harvests while using resources more

efficiently. These devices have become such a big part of our daily lives that it’s hard to believe they’ve been around for less than a decade. We’re just starting to realize their potential to improve the way food makes it to our dinner tables.

Through The Climate Corporation, a division of Monsanto, we help farmers use data to make more informed decisions about their operations by measuring and delivering information on soil, field and weather conditions. These decisions help farmers to be more productive on each acre of land, using resources more efficiently and getting the most out of every harvest. We believe that through data science and the availability of digital technologies, we’re now on the cusp of another key point in agriculture – the “Green Data Revolution” that will usher in the data-driven farm of the future.

Here are two key things you should know about how smart tech and the Green Data Revolution can help bring us the nutritious foods we need and want, all while using the same or fewer farming acres we use today.

First, data helps farmers plan for better harvests. Data can be used to create predictive models that help farmers optimize farming decisions throughout the season. More informed decisions lead to improved farm productivity and better harvests. That increases farmers’ abilities to grow enough food to feed a world population that is expected to reach more than 9 billion people by 2050.

Second, data enables decisions that are better for the planet. Just like you and I might check the weather on our smartphones, farmers can use web-based technology and apps to help make decisions like when to plant, how much fertilizer to apply and which seeds to use on different parts of a field to get the best level of production. This access to data helps farmers get the most out of every acre, driving better outcomes on the farm and our planet.

The Green Data Revolution represents an important frontier in the advancement of farming and our collective ability to meet the food and nutrition needs of present and future generations.

Are GMOs the solution to drought?

As with all technology, the GM drought trait can be seen as one of the tools in the packet available to farmers. It is one of the solutions that can make a contribution towards higher and more stable yields. Drought tolerant traits, GM and normal hybrid traits developed by breeding for a certain quality and trait, may be some of the solutions in addressing dry conditions and spells. But it is important that practices such as minimum tillage and mulching can also play a very important role. Remember if it does not rain, nothing will grow, even drought-tolerant hybrids. However, during times when rainwater is necessary for a plant, a drought GM trait can help the plant to survive and can assist in giving a yield and crop to a farmer that would have lost the entire crop if he/she had not had access to the technology. GM drought traits can also assist in irrigation crops during times when irrigation should have been applied but water was not available.

Gene editing will provide another, modern tool to use to develop high quality products for farmers to use. It can bring new traits and characteristics to the field and it can also bring benefits to the consumer.

If farmers ask for information and then demand access to technologies, governments may be more inclined to embark on trials and regulatory processes.

Scientific regulatory access can play a role in providing piece of mind to farmers. It should ensure ensure quality and safety of products and should act in the interest of all parties. ■



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WATER BY DESIGN

What can farmers expect from irrigation system designers?

The design of an irrigation system, according to the design norms of South African Irrigation Institute (SABI), the choice of efficient equipment, the installation of the system according to plan, as well as the efficient management and maintenance of such a system by farmers are all important factors, if producers and farmers want to utilise available water resources optimally and conserve water.

It is, therefore, of concern that many farmers make decisions based primarily on the capital costs of the system.

Farmers should consider using designers who have theoretical as well as practical knowledge of design.

The correct questions should be asked by producers and farmers to ensure that the design specifications of the selected system fulfill their needs.

It is advisable that farmers discuss the aspects detailed in this article with their irrigation consultant and supplier before purchasing a new system.

The discussion will be beneficial to both parties and assist in making an informed decision on the intended capital investment. In these preliminary discussions, the duties and responsibilities of both should be made clear.

Designer qualifications

- What qualifications and experience does the designer have? (These would typically include formal training from a university or technical college, SABI courses, SABI Approved Designer membership status, and/or registration with ECSA (Engineering Council of South Africa).)
- Is the designer able to provide contactable references for similar systems and/or supply of materials?

Remuneration of consultant/designer

The SABI Council's opinion is that a design fee should be paid to consultants and designers who render a professional service for, or on behalf of, their client. There is no such thing as a "free design", because eventually someone must be responsible for the cost and time that goes into the design, planning and specifications of each irrigation system. Remember that "buying cheap" can be detrimental in the long run.

Further information that buyers must obtain

- Does the intended irrigation activities comply with the National Water Act?
- Good planning must be done regarding the availability and requirements of water for the planned crop and the irrigated area.
- Equally important is that a quality analysis of the water that is used – this is necessary to ensure a suitable system is designed with no negative effects on the crops or blockages, etc.
- A soil examination and analysis regarding the physical and chemical characteristics of the soil is also required.

The above information must be discussed with the consultant/designer.

What the irrigation designer/consultant should provide

- A signed agreement that the system has indeed been planned according to the SABI norms (motivation should be provided if the designer diverted from the norms)
- A suitable topographic survey
- A detailed technical design and report in which flow rates and pressures are specified.
- A scaled layout plan.
- Detailed installation plans of the system.

- Detailed product specifications (and tender documents, if required) that will be used for purchasing, installing and/or commissioning.
- A suggested management plan of the system – it is important that the designer and the producer, from the preliminary stage, communicate clearly to prevent any misunderstandings and to ensure that the producer understands the management inputs and maintenance requirements of the planned system well and agree with it. Only when concurrence has been reached on the matter should the planning of the system proceed.
- A capital versus running costs comparison as well as the expected maintenance costs over the lifespan of the system: in this way, the producer is informed of the expected benefits and costs.

Design materials/system

- What is the expected lifespan of the material that will be used?
- What are the possibilities of extensions to the system?
- Which components are of critical importance and should get special attention?
- Has adequate provision been made for the requirements of the Occupational Health and Safety Act's influence on the system?

System specific norms

- What is the design Emitter Uniformity / Distribution Uniformity of the system?
- Is the system easily adaptable to variable water requirements such as seasonal changes and what is the impact thereof on the management inputs?
- What about a suggested maintenance program for the system components, especially for electronic or hi-tech equipment?

Water requirements

- What is the peak daily requirement of the crop in mm/day? Has the system capacity been adjusted to make provision for this?
- What is the expected water usage per year in mm/ha?
- If different crops/cultivars/ages/root stock will be used, is the system planned as such to comply with the specific requirements of each block?
- Has the designer provided a pump curve that shows the flow rate versus pressure for the specific pump/motor combination? Has this curve been discussed with the producer?
- Has the pump installation been checked for secondary losses, especially on the suction side, to ensure NPSH requirements are met?
- What are the expected energy costs of a system in Rands per mm and water supplied in Rands per ha?

Filtering

- Is filtering necessary and if so, to what extent, and what type of filter is suggested?
- Will the filters backwash automatically or manually?
- How often and for how long must the filters be backwashed?

Flow measurement

- Is the system fitted with a flow measuring device?
- Can it measure the flow rate as well as a volumetric total?
- Does the installation follow the manufacturer's minimum installation instructions?

Pressure/air release and rinse

- Has sufficient provision been made for air outlet or inlet vales, pressure relief and scouring valves?
- Is water hammer expected and has provision been made to protect the system?
- Do the components and pipes have the correct pressure rating to match the

expected operating conditions of the system?

- Has provision been made for the flushing of micro and dripper lines?

Guarantees

- Who will be responsible for what part of the guarantees – who will install, test and commission which system components?
- Which measurements and tests will be done to determine whether the system complies with the design specifications?
- Has the designer provided all the literature, guarantees and operating rules for the system?

Chemical injection

- Has provision been made in case a pipe burst occurs in one of the supply lines.
- Does the application rate of the equipment adapt to the system's pressure and flow conditions?
- Can the equipment handle both chemicals and applied plant nutrients if necessary?

Control tests and measures

The following should be done after the system starts to operate:

- Read and keep record of specific electric current (Ampère) and pump pressure for each set-up.
- Keep records of pressures at each block or control valve.
- Keep records of the flow rate for each block, if available.
- Keep records of the pressure differences over the clean filter bank, if applicable.
- Check the inlet pressure at each block against the minimum pressure requirements as per the design report.

This information can be used to periodically check the system's performance.

Installation

Much difficulty and upset can be avoided if the parties agree beforehand about responsibilities regarding the following:

- Arrangements regarding site clearing, e.g. bulldozers.

- Pegging out of the system.
- Civil works.
- Electrical installations and applications.
- Provision of water, cement, sand and stone for thrust blocks.
- Supervision of the correct installation of equipment.
- Installation of the equipment inside the pump house.
- Who is responsible for equipment that fails?
- How often will the designer visit the site to ensure that equipment and installation comply with the requirements?

If problems occur during the testing of the system, the producer and the designer need to come to an agreement on how the system must be improved to comply with the design specifications. The system may not function properly because of installation mistakes by the producer or design mistakes by the designer. If the farmer/producer made the mistake, he/she must carry the cost of the alterations and vice versa.

SABI believes that the above suggestions are acceptable to farmers and designers and will lead to less misunderstandings as well as an improvement of the irrigation industry and water use in South Africa. ■

Tony Ewels, SABI President

SABI – Your guarantee for appropriate irrigation technology. SABI's role is to actively promote and share knowledge to ensure the optimal and efficient use of water in South Africa, for the ongoing growth and sustainability of the socio-economy and society in South Africa and on the African continent. SABI activities in agriculture and landscape include: membership, SABI Congress, training and SABI magazine. Tel: 021 – 850 8220 / E-mail: info@sabi.co.za, www.sabi.co.za

Accounting for water

Record and track rainfall measurements

e-Accounts, AFGRI's electronic account management system, has been enhanced to include yet another innovative feature that benefits South African farmers. The feature – the first of its kind in the agricultural industry – enables farmers to record rain fall on their lands, allowing them to keep track of seasonal rain fall measurements, and assisting in having statistics readily available for comparative purposes.

Users will also be able to upload historical data to provide handy comparisons. Moreover, the new feature is simple to use. Clients simply log into e-Accounts, select "My Farm" and then "My Rainfall". On the

menu, navigate to "Grain" and "Capture Rainfall". Here clients can capture or upload their first measurement. This unique functionality also allows users to capture measurements for multiple farms and for multiple rain meters.

Once the information has been captured, the system generates detailed graphs showing the rain fall per farm. Users will also be able to submit feedback by clicking on "Suggestions", allowing AFGRI to keep enhancing functionality.

e-Accounts was originally launched in 2014 by UNIGRO, the financial services arm of AFGRI Agri Services. It has since evolved into a powerful, dynamic digital channel. Not only does e-Accounts allow farmers to manage their entire business, finance and

planning on one secure user-friendly platform, but has been expanded to include further agri-related functions that enable farmers to administer and manage their entire farming operations.

The rain fall measurement feature is just one such feature that has been added to the platform to make life simpler for farmers. Another is the popular grain management tool. Using e-Accounts, farmers can view the amount of grain they have in stock at the silo, as well as the amount they still need to deliver on their contracts.

AFGRI e-Accounts now has approximately 1 200 active users, with more than 30 000 logins since the launch in 2014. The largest single payment so far was more than R60 million. ■

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ABOUT US

The WRC has four key strategic areas called KSAs (Water Resource Management, Aquatic Ecosystems, Water Use and Waste Management, Use of Water in Agriculture) which relate to water-centred knowledge, each providing an integrating framework for addressing a portfolio of key water-related needs. These KSAs allow for multidisciplinary studies and are focused on solving problems related to national needs, supporting society and the water sector. While each of the KSAs is unique and mutually exclusive (minimal overlap), they collectively attempt to cover the complete spectrum of water-related topics of strategic importance.

THE WRC LIGHTHOUSES

Another key pillar of the WRC five-year vision is research concentration for accelerated knowledge and solution development. The construct of the WRC Lighthouse is a strategic tool that is used to direct research in key areas identified by the WRC. These Lighthouses are flagship programmes, and are trans-disciplinary, multi-KSA and inter-institutional mega-projects that examine priority water issues across the innovation value chain. The WRC actively seeks to direct key projects into these programmatic areas.

The five lighthouses include:

1. Water Sensitive Design
2. Climate Change
3. Water–Energy–Food Security
4. The Green Village
5. Freshwater Governance

A recent WRC-funded study revealed that water research in South Africa performs above the average for all scientific disciplines, with the South African water research output ranking

19th in the world while the country's research output for all disciplines as a whole is ranked 33rd. The study also revealed that the water field is performing above expectation in comparison to the country's research size. It can be argued that the focused support by a dedicated national water R&D agency, the WRC, is a key contributor to this success.

Together with its sector partners, the WRC is ensuring that water science works for the improvement of the lives of all South Africans.

PARTNERSHIPS

The WRC recognises that it is just one entity in the water innovation value chain in South Africa. We therefore recognise the importance of partnerships and actively build our partnership profile for informing priorities, leveraging funds, developing research products and services and transferring knowledge. It is through co-ordination, co-operation and communication in water R&D that the WRC has been able to punch above its weight and make inroads to global solutions. Understanding that achieving full implementation of research outputs requires specialist inputs and resources beyond those available to the WRC, we actively pursue mutually-beneficial partnerships that will improve our overall effectiveness. Collaborative partnerships have been established with private and public entities, as well as governmental departments and international institutions. lives of all South Africans. t of the lives of all South Africans.



FOR MORE INFORMATION:

about the WRC or for free downloads of our water research publications, visit www.wrc.org.za or Tel: (012) 761-9300 ; or email: info@wrc.org.za.

Amandla Olwazi Kubantu –
The Power of Knowledge to the People

ECONOMIC TRADE-OFFS IN IRRIGATION DESIGN

Water and electricity are precious commodities on farms, given their impact on profitability and food production. Jorisna Bonthuys looks at Water Research Commission (WRC) research that aims to optimise these key assets for those producers who are dependent on irrigation for their livelihoods.

The recent drought and growing conflict amongst users given water scarcity have put the need for efficient water-use in the agriculture sector firmly in the spotlight again.

To optimise water-use and remain economically sustainable producers are increasingly looking at ways to do more with less water. In future, farmers will need to produce higher yields through beneficial water use, especially given rising input costs and more erratic weather patterns emerging. Water use issues are compounded by the fact that demand outstrips supply in many parts of the country. Besides the growing demand for water for socio-economic growth, other factors, such as ageing water-supply infrastructure and variable rainfall, are adding to emerging water pressures in South Africa.

Between 1991 and 2005 the WRC invested in several research and technology exchange projects to develop models for calculating irrigation costs and testing application in practice, reports Dr Gerhard Backeberg, WRC Executive Manager: Water Utilisation in Agriculture. "With increasing electricity tariffs and changing rate structures, requests were received from representatives of the irrigation industry that norms and standards for irrigation design should be revised. This led



Signing the MoU between the WRC and Namibian National Commission on Research, Science and Technology (NCRST) from left to right: CEO of the WRC, Mr Dhesigen Naidoo and CEO of the NCRST, Ms Enid Keramen.

to a new research and development project, which ran between 2013 and 2017."

Many farmers are struggling to absorb operating costs caused by rising energy tariffs, reports Prof Bennie Grové from the University of the Free State's Department of Agricultural Economics. "In future, rising electricity costs will become a significant part of operating costs on farms," he points out. "As a result, producers have to focus on the economic trade-off between investment costs and operating expenses when

deciding on an irrigation system's design and management."

Prof Grové was involved in research funded by the WRC to optimise the use of water and electricity in the agricultural sector. This is part of efforts to improve on-farm water management through better design and planning. Marcill Venter, who completed her MSc Agric (Agricultural Economics) on this subject, as well as Isobel van der Stoep, from the South African Irrigation Institute, contributed to this technical study.

The researchers focused on three areas to manage rising costs, namely technology (design), farm management and electricity tariff choices. Their work was synthesised in a WRC published report titled, *The optimisation of electricity and water use for sustainable management of irrigation farming systems* (WRC Report No. TT 717/17). The main aim of this research was to develop a model that would integrate irrigation system design aspects (including pipe diameter selection), electricity tariff choices and water planning to help support more efficient energy management.

Increasingly, farm profitability is coming under pressure due to the cost of pumping irrigation water, says Grové. This is because higher electricity tariffs create serious problems for many farmers since irrigation depends on electricity to pump water.

The cost of applying irrigation water on farms must be balanced with expected economic benefits, he notes. "The old paradigm of applying irrigation water to sustain maximum production will be replaced with the new paradigm where water use is optimised to increase profitability."

Rising input costs

Previously, Eskom was one of the cheapest electricity suppliers in the world. Many irrigation designers took this situation as a given, Grové points out. This was because they were able to reduce investment costs by decreasing mainline pipe diameters with resulting larger kilowatt requirements.

The average tariff of electricity has, however, increased significantly in the last two decades. From 1998 until 2007 the increase in the average tariff was moving along with the inflation rate. In the year 2008, the tariff increased rapidly to maintain Eskom's sustainability and to cover expenses associated with the expansion of infrastructure. Indications are that further electricity price hikes are inevitable over the coming years as South Africa weans itself off its current fossil fuel intensive energy budget. This could have a significant impact on the cash flow, profitability and sustainability of irrigation farmers.

For some producers, the cost of increased electricity tariffs is even higher than for others because they have invested so heavily in outdated and energy-inefficient irrigation



systems. Luckily, potential energy savings can be achieved by adopting new technologies (including variable speed drives and high-efficiency motors) while taking cognisance of the trade-offs between investment and operating cost, the report shows.

Says Grové, "The question is not whether irrigation farmers should adopt practices to improve energy and water management. Rather, the problem is how to evaluate the linkages between irrigation management, system design and the choice of electricity tariffs to improve energy and water management. Together these factors will determine the extent of water and energy savings in irrigated agriculture."

Consider lifecycle costs

Currently, the South African Irrigation Institute (SABI) is responsible for local irrigation design norms. These include details about irrigation requirements, system efficiency and even irrigation hours per week. But higher electricity tariffs have now made it necessary to rethink some of these norms given that they are not applicable anymore, the researchers say.

Rethinking these design norms can have a huge impact on local irrigation practices, Grové points out. About 80% of registered irrigation systems in South Africa are pressurised types of irrigation systems (centre pivots, sprinkler, drip and micro sprinkler systems). The majority of these are powered

by centrifugal pumps driven by electrical motors. Any practices that will reduce the power demand of such systems will, therefore, have widespread application in the irrigation sector.

A trade-off exists between reducing investment costs and increasing operation costs through higher electricity costs, the researchers say. Following a comprehensive literature review, a conceptual framework was developed of factors influencing the lifecycle costs of alternative electricity management interventions. Emphasis was placed on using lifecycle costing as it incorporates not only the cost of acquiring new technology but also operational costs, maintenance costs and the cost of disposing the product.

The conceptual framework takes cognisance of the irrigation system design process and the three focus areas that should be targeted to manage electricity costs. The design process includes the design of the power supply, water distribution network and the determination of the irrigation water demand and design of the infield irrigation system. Capital investments that influence the kilowatt requirement, management (operation and maintenance) of the irrigation system and choice of electricity tariff was identified as focus areas that should be investigated in order to reduce electricity costs.

The framework emphasises the linkages between irrigation system design and irrigation water and electricity cost management.

Specifically, a trade-off exists between reducing investment costs and increasing operating costs through higher electricity costs.

The next step was to develop a mathematical model to calculate the lifecycle costs of this kind of investment over a period of twenty years. This so-called Soil Water Irrigation Planning and Energy Management (SWIP-E) programming model considers alternative management interventions. Decisions that influence electricity costs included the type of electricity tariff structure used, when irrigation happens throughout the day, the design capacity of the system and other factors like main pipeline size and operation and maintenance.

The model has the unique characteristic that it determines irrigation pumping hours through a daily soil water budget while considering the time-of-use electricity tariff structure. It also considers changes in kilowatt requirements resulting from mainline design changes.

The costing framework was tested on in the Douglas region and in Limpopo, using Eskom's Landrate and Ruraflex tariff structures (both aimed at rural agricultural users). The researchers considered the electricity use of centre pivot sizes of 30 ha and 47,7 ha, as well as static systems like micro irrigation and sprinkler irrigation systems.

Smaller irrigation system delivery capacities proved to be the most profitable for all the systems and electricity tariff structures investigated, as higher flow rates increased the energy demand.

The implication of using the current 1,5% norm is that thinner pipe diameters would be used which decrease investment cost but at the same time increase operating cost (electricity costs). Says Grové, "This means that increasing electricity costs will have a significant effect on the profitability of irrigation systems if thinner pipes are used."

Large pipe diameters reduce friction loss and therefore total pressure with lower kilowatt requirements while increases in flow rate will cause an increase in kilowatt requirements. This increase in kW demand had a greater impact on the energy cost than the decrease in irrigation hours resulting from high system capacities. "Also, electricity tariffs have a significant impact on break-even

percentage friction, Grové points out. "Furthermore, the break-even point is much lower than the norm of 1.5%."

The results show that variable electricity costs increase as flow rate increases if the optimal pipe diameter stays the same. "Failure to consider electricity tariffs when designing irrigation mainlines may result in suboptimal designs which will increase electricity costs," he says.

The researchers recommend that the SABI design norm for the maximum allowable friction losses in main pipelines must be reduced from the current 1.5% to 0.7%. This would ensure that there is a better balance between investment and operating costs, Grové indicates. Lowering the norm will also decrease operating costs while increasing the investment costs.

The model provides a basis to evaluate the profitability of new technology such as variable speed drives, energy efficient pumps and motors as well as modification of existing irrigation system designs.

The choice of tariff-structure also has a direct impact on electricity use and profitability, the research shows. The timing of irrigation is of utmost importance since it has a direct effect on electricity costs and crop yield. Time-of-use electricity tariff-structures enable producers to schedule irrigation outside of peak periods to reduce electricity costs.

According to the researchers it is more profitable to use Ruraflex than Landrate, irrespective of the irrigation system size used. Says Grové, "The total annual fixed cost charge for Landrate is consistently higher than the annual fixed cost charge of Ruraflex, and savings can be achieved through careful planning of electricity supply points' sizes and locations."

Making irrigation system investment decisions on investment cost alone is flawed, he believes. "This is because the variable electricity costs may outweigh the capital costs when considering the life cycle of the investment. Investors in irrigation systems should ask their suppliers to provide an estimate of variable electricity costs together with the investment costs."

Management of irrigation systems also remains key to reduce costs while improving efficiency. These systems should,

for instance, operate at the correct pressure. Pressures higher than the minimum requirements increase the power demand and thereby increase electricity costs, while those below the design requirements will mean more irrigation.

Furthermore, irrigation systems need to be maintained properly to make sure that water is applied at an acceptable uniformity. Lower uniformities necessitates more irrigation to ensure that the whole field receives enough water to maintain high crop yields. More irrigation hours increase electricity costs that again affects farm profitability.

Irrigation designers should also apply economic principles when designing mainline designs, the researchers point out. This will increase the overall profitability of the investment compared to applying the friction percentage design norm. Using economic principles will also differentiate between electricity tariff structures when designing an irrigation system.

The report shows significant opportunities exist for farmers to reduce electricity cost through irrigation system design, renewable energy resources and adopting new technology, Grové points out. "Careful consideration of the economics is necessary since smaller delivery capacities need much more intensive management because longer irrigation hours are needed to avoid a decrease in crop yield. Designers should include both the investment costs and an estimate of the operating costs of the irrigation system design to allow farmers to make informed decisions. However, cognisance also needs to be taken of the trade-off between investment and operating costs if new technology is adopted."

The SWIP-E model now informs other ongoing research efforts, including a SABI project to rethink the norms applied in irrigation system management across the country. ■



To access the report, *The optimisation of electricity and water use for sustainable management of irrigation farming systems* (WRC Report No. TT 717/17), contact Publications at Tel: (012) 761-9300; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy of the report.



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Wild, wild life

Perseverance pays off for Wildlife Pharmaceuticals

A small South African-based manufacturing company specialising in niche, small batch, and regulated medicines, Wildlife Pharmaceuticals punches well above its weight. We spoke to CEO JP Raath to find out more.

How did the company originate?

Wildlife Pharmaceuticals South Africa (Pty) Ltd was founded in 1997 by myself, after heading up the veterinary division in Kruger National Park for over 11 years. Through my hands-on wildlife veterinary work, I identified numerous short-falls in pharmaceutical requirements for wildlife, and subsequently decided to address this through the establishment of a pharmaceutical company that focussed on, but would not be limited to, wildlife requirements in Africa and worldwide. Our product range includes anaesthetics, analgesics, anaesthetic antidotes, tranquilisers and sedatives, and sedative antidotes.

Our passion is to research, develop, manufacture and register products specifically for

use by wildlife veterinarians. We are slowly spreading our attention to other fields where niche, small-batch regulated medicines are required.

Wildlife Pharmaceuticals (Pty) Ltd, alongside Wildlife Pharmaceuticals Incorporated, were the proud partners in the first registration of a new wildlife anaesthetic in South Africa in 40 years.

Prior to this, the previous registration of a wildlife anaesthetic was in 1963. Before Wildlife Pharmaceuticals, there was not a single company in the world who solely dedicated itself to the wildlife industry from a pharmaceutical point of view. Therefore we established ourselves to serve this market worldwide, and have subsequently grown to provide a number of different products to the industry.

We serve the rest of the world, excluding the Americas, and since our establishment, our sales and exports have grown to over 23 countries. Both American continents are served by our sister companies, Wildlife Pharmaceuticals Inc., situated in Colorado USA, and Wildlife Pharmaceuticals Mexico, situated in Mexico City.

What would you consider your competitive advantage to be within the industry?

Having worked extensively in the industry, we have a sound knowledge of the shortfalls and challenges that the wildlife veterinarian and the patients have to live with every day. As this is a small market, Wildlife Pharmaceuticals decided to specialize in niche, small batch and regulated medicine manufacturing and development. We provide veterinarians with fully registered products that have undergone rigorous quality control and because we are not restricted by batch sizes, we can provide a consistent supply parallel to the demand for these high quality products. Many of our API's are also manufactured in-house so that our final product output is not dependent on API supplies from outside sources. Much of our focus is on industry demand and as such we are able to identify and meet the specific needs of the industry through currently registered product manufacture as well as new product identification, research and development. Because we are a relatively small company in comparison to most other pharmaceutical companies, we



are able to quickly adapt to even the slightest changes in development and industry needs.

What does Corporate Social Responsibility (CSR) mean to you?

Corporate Social Responsibility is something that we take seriously and is a main principle of our company and our employees. We realize that the community is impacted by the services we provide and the products that we develop, which is why we aim to make a difference globally.

Conservation is the core of our company, so we commit ourselves to fund projects which protect wildlife worldwide and to change conservation as we know it. We consider all of our products and the services we provide as "conservation medicine" with our goal being to produce an overall positive impact on animal conservation.

We value education and training and aim to ensure that all individuals are provided with the opportunity to grow both personally and professionally. CSR is a core component of our service offerings, which is why we make an effort to implement services which are in the best interest of the community, not only at present but also in the long-run. We believe that if we empower individuals and equip them with the right tools, we are able to contribute to world growth.

What CSR projects and initiatives have you undertaken?

Being situated close to South Africa's flagship national park, The Kruger National Park, and being active propagators of the one health concept at the interface of conservation areas, we have embarked on a project to support our local communities in the areas adjacent to the Kruger Park, with special reference to assistance in the veterinary field. Called the Siyatutuka Farmers Project, we are proud to say that the project is gaining momentum every year, and expanding to incorporate youth education, rabies prevention and eradication assistance and working with the community to improve their livelihood.

We have also partnered with the SATIB Conservation Trust, contributing to conservation efforts in Southern Africa. We believe that the beauty of Africa, its people, and its spectacular wildlife, is a huge competitive

advantage that Africa has over the rest of the world, and we should protect this asset at all costs for long term prosperity.

What are some of your company's greatest achievements?

The most notable of our achievements has been our exceptional growth over the past few years where our staff quadrupled in three years. Our company now comprises a number of different, well-qualified teams, all geared to meet the industry's needs.



JP Raath, CEO

At Wildlife Pharmaceuticals, we are also constantly pursuing innovative technology and are proud to be the first in Africa to be using a fully robotic filling system which set a new standard in small batch pharmaceutical manufacturing. We are continuously working with highly scheduled and regulated medicines, and therefore introduced a unique Individual Vial Identification System. This enables us to keep track of each vial from production to the end user. The data is kept online and is available to regulatory authorities, contributing to our policy of transparency.

Our research teams have not been holding back either. Our molecular team obtained the license to patented slow release technology, enabling us to administer medicines only once to wildlife with a longer duration of effect. They completed training in the USA and are busy fulltime with exciting new products. In the clinical department, our researchers, as part of a PhD degree

fulfilment, developed a template for the evaluation of tranquilisers and sedatives in wildlife, masterfully overlapping physiological data with behaviour. This brought new light on perceived effectiveness of certain compounds.

What are some of the biggest challenges your company has overcome?

As could be expected with setting up a company that services such a niche market and manufactures highly regulated medicines under strict international guidelines, we have been faced with a wide variety of challenges. Furthermore, being a company that focuses on such a relatively new speciality brings about new challenges every single day. However, our strongest asset has always been our perseverance in overcoming these challenges – the one attribute that also sets us apart from many of our competitors.

What do you hope to achieve within the next few years?

In our fine chemical division, we would like to expand our services to those clients that also require small batch, niche manufacturing of both API and non-API products. We are also continuously aiming at expanding our global footprint and providing products in countries where our products are not readily available to veterinarians because of legislative restrictions that make importing difficult. We are also aiming to expand into the companion and laboratory animal market with a specific focus on pain control in these species.

What does your current role entail?

Apart from my normal CEO responsibilities, I am still very much involved in all our company's departments from the ground work up. I like to be involved in all aspects of the company from molecular to clinical, sales and marketing and of course dealing with our clients. I have a passion for teaching and research and for identifying industry needs that we can meet. Having had the privilege to work with wild animals all my life, I am driven to ensure that we do this at the highest ethical level through pharmaceutical enhancement. ■

Greg Penfold

GROUND COVER

Protecting the assets under your feet

When Price Forbes (Pty) Ltd was established in South Africa in 2012, it was considered a significant step towards achieving the goal of being a global insurance specialist. However, even with the well-established brand name, they were still very much the new kids on the block in Africa. Since then, Price Forbes have proven their capabilities to the new market.

Greg Dillon, Executive: Business Development for Price Forbes, elaborates: "The company was established following two large mergers in the South African corporate insurance broking market in order to provide clients with a viable and compelling corporate retail broking alternative. We have re-established a respected and well-known brand in South Africa that is synonymous with service excellence and innovation in insurance solutions. Having first started as a broker back in the 1930s in the South African market, Price Forbes in London dates back to 1893. It is this proud heritage and wealth of history that we have recreated in the South African and African insurance intermediary space."

Dillon continues: "As a niche and focused service provider, we want to be the best, not necessarily the biggest. As the custodians of this great brand, we have a remarkable responsibility to the market, but we also have a wonderful opportunity. As a brand, we have been back trading in the SA market for the past five years now, and we have done exceptionally well to re-establish our place among the leading corporate service providers. It is upon these great foundations and building blocks that Price Forbes intends to go from strength to strength in the coming years. Our commitment to all our farming and agri clients is that we will help them build their businesses, and in so doing, help them manage their risk, and protect their future."

Focus on agriculture

Price Forbes specialises in corporate and commercial insurance solutions and has a large agricultural industry focus, broadly defined as agri-mining. Also on offer are speciality solutions in the political risks, trade and credit insurance world; the company is comfortable working on large scale project work, including infrastructure, mining, energy and water.



Ebbe Rabie

As Divisional Executive Ebbe Rabie explains, "Our competitive advantage is that we focus on what we call agribusiness insurance. Our years of experience and relationships within the farming and agricultural industries have enabled us to bring the very best service and advice to our clients. Our focused areas include the following aspects of insurance: crop insurance for horticulture and viticulture, broad-acre crops including: feed, seed and grains; livestock and wildlife; loss of revenue for agri processing and pack houses; commodity stock throughputs; warehouseman's liability; structured trade credit and political risks (including civil unrest and strikes); whole turnover credit and transit and marine cargo."

Rabie continues: "We also provide solutions for food and agri processing/ manufacturing. This covers all aspects of assets, plants, warehouses, other physical structures, stock, machinery and loss of

revenue. It includes interruptions to supplies and utilities; cover for pandemics and terrorism acts, riot wrap, public and product liability; product contamination and recall costs, while we obviously specialise in transit and marine cargo insurance and cover."

Moving forward together

Corporate social responsibility is an aspect of business that Price Forbes takes very seriously. "Our commitment to the community that we operate in is vital to our long term vision of re-establishing the Price Forbes brand," says Dillon. "For a number of years now, by way of example, Price Forbes has supported The Village Safe Haven, a group foster care facility also acting as a place of safety to orphaned, abandoned and abused children. However, being a smaller niche business, we can't be all things to all people and have also chosen to focus our support on an organization that resonates with our own purpose and talks to 'our reason for waking up in the morning!'"

This organization is Qhubeka, a non-profit organization that, through the support of its various donors, uses bicycles to connect people to schools, clinics and jobs.

"Communities with limited transport have restricted options, but bicycles are tools of change," says Dillon. "We believe that by associating with, and supporting Qhubeka, that we too can help them change lives. The name Qhubeka means 'to progress' or 'to move forward'. A bicycle is a tool that helps people move forward, and this purpose aligns our own team with our own purpose, 'to help businesses move forward', and to help people run their businesses more efficiently and more expediently."

Riding the storm

Since re-entering the South African market, Price Forbes has had to pull out all the stops to stay ahead. As Dillon expresses it: "Our greatest successes have also been our greatest challenges. Price Forbes has re-entered the corporate insurance broking space at a very interesting and challenging time in our country's and the continent's evolving macro economic climates. Insurance markets have been 'soft' and in decline, while the demand for high-end customer service and corporate service solutions is at an all-time high. We are weathering the storms of competitive challenge from the



Greg Dillon

large global brokers, while establishing a national footprint against the plethora of independent insurance brokers of varying size, skills sets and capacity."

Dillon adds: "The changing economics of South Africa and the uncertainty that is facing corporate South Africa, particularly across agri businesses and farming are some of our biggest challenges. Importantly, our independence remains one of our great strengths."

If anything, however, these challenges only add to the enjoyment of doing business as Price Forbes. As Rabie puts it: "We are passionate about our ability to provide a value added service to clients and with the experience we have, being able to provide advice and offer solutions that address risks, ultimately helping our clients grow their farms or agri-business, but also providing a cost effective mechanism to guarantee risk mitigation. It isn't always about the lowest premiums, it is also very much about making your business financially safe." ■

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For more information please contact **Ebbe Rabie**
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Closing the loop

Data analysis

Necessity is the mother of invention, as South Africa is constantly proving. Nowhere is this more true than in the agriculture space, as brilliant start-ups like Aerobotics deploy drone technology, machine-learning algorithms and Big Data to help farmers break the drought and work smarter than ever before. We spoke to Aerobotics' Andrew Burdock to find out more.

Aerobotics is best understood as a data analytics business, interpreting drone and satellite data to help farmers improve their practice by zeroing in on those parts of the farm most in need of attention.

"We started the business by interpreting drone data so that farmers could find the early-stage problems on the farm and really zero in on those problem areas, instead of the old blanket approach to applying water and fertilizer. Recently, we've incorporated satellite data into that as well; now you can get satellite images of your farm every week that shows where you need to intervene. We also have moisture maps that show you the moisture levels of your plant. In the Western Cape, for instance, farmers can already see where they're over-irrigating or under-irrigating and really target irrigation properly. We're finding that you can really cut down water usage in the drought. If you've got a thousand trees in an orchard, you can find the ten or twenty that aren't performing that well and apply appropriate treatment to get the best possible yield from your orchard. Then we've got the satellite moisture maps, which have been helping farmers a lot in terms of targeting the

places that need to be irrigated, rather than just uniformly irrigating.

There are two ways of operating the system, Burdock explains: "A farmer can buy his own drone and use our flight-planning app, where a farmer just can choose his different orchards and the app automatically plans a route; the drone flies, comes back and

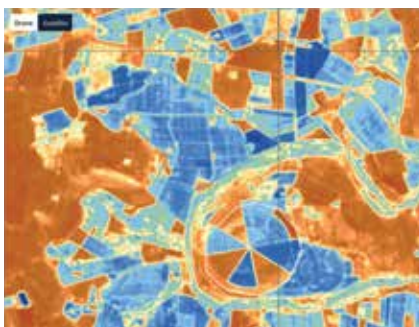
lands itself. Alternatively, we've got a network of service providers around the country with commercial drone licenses who can go out to any farm in the country and actually collect the data for them for an extra fee."

Cheaper than drones is the use of satellite imagery. Aerobotics interprets data from a company called Sentinel, whose satellites pass over the whole world, including the farms, once a week. However, unlike drone data, satellite imagery is dependent on cloud cover. "With the drone," says Burdock, "you can get the data when you need it, and, with the special multi-spectral camera, you can get a lot more high level information, a lot more detail. Take the tree space: we actually specialise in the tree space by being able to pick up individual trees and helping you manage your crop on a tree-by-tree basis. Satellite resolution is a bit too low for that. However, at R500 a month, it's still an affordable, effective entry-level solution."

Global scalability

The company has been in business for just over three years. The first two years were spent building the product – "a lot of analytics had to be developed upfront" – and the year has been spent on commercialising the product, rolling it out to farmers across sub-Saharan Africa as well as in Australia, New Zealand, the UK, and India.

Response has been reassuringly positive, Burdock confirms: "We're starting to get some nice traction across the world, and we're now selling it to corporates as well, because we believe the banks, insurance companies and big fertilizer companies, for example, can use the same data to help them improve their





processes internally in the agriculture space. For instance, with crop insurance, we can help them assess losses and assess farmers during the season."

Thanks to its inherent scalability, the product is set to expand world-wide. "It's a cloud-based platform, very scalable," enthuses Burdock. "From South Africa to Brazil, you can easily sign up, log in, choose your farm, immediately get your satellite data, get our apps and either upload your own drone data anywhere in the world or do so with the help of our partners. We're currently raising another million dollars in funding for sales and marketing and then obviously further R & D on the product, to get more in-depth analytics and provide more insight to the farmers."

Closing the loop

The most exciting aspect of Aerobotics is that it's constantly innovating and developing. "In October this year," says Burdock, "we launched an app for Android and IOS where you, the farmer, fly the drone over the farm, collect the imagery and data and analyse it; then we pick up problem areas in the field, allowing you to take your smart phone into the field and with your GPS actually go to the problem trees or areas, take notes and pictures, and feed it all back into the system. That really allows you to close the loop of what's happening above to what's happening on the ground, track those changes over time, and make sure what you've done to rectify the problems has worked."

"At the same time, our machine-learning algorithms are using that same data from the ground to better understand what we're seeing from above. We want to start getting to the point where we can start collecting data on yields as well as certain diseases. It's one thing to find problem areas, but if we can start seeing what that problem actually is, what type of pest, what type of disease, we can start picking up trends in the data based on what we're seeing from above. Then we'll be able to start interpreting what those problems actually are, and we'll be able to provide farmers with further actionable data."

Aerobotics

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