

Issue Sept/Oct 2016

Harvest SA

Securing South Africa's Food Resources



Overcoming the odds

The challenges small farmers face
and what needs to be done

Wheat research is vital for farmers and food security

The allocation of resources for agricultural research and development depends on an assessment of priorities based on individual countries' food security needs—wheat and wheat breeding are clear priorities in the South African context



While wheat-producing countries generally focus on yield improvements in their breeding programmes, in South Africa, the current wheat breeding programme focusses on quality (for milling and baking) rather than yield. With wheat, improved quality usually comes with a lower yield, and the quality of cultivars that the millers and bakers prescribe to producers in South Africa has a significant effect on productivity, and therefore on the competitiveness of the South African wheat farmer.

While investors in wheat breeding programmes question the profitability of research into self-pollinating crops, as farmers are able to save their seeds for the next year's crop, wheat breeding is of vital importance if South Africa is to produce enough food to feed its growing population. The country needs to develop high-yielding wheat cultivars that can withstand common wheat diseases and changing climate conditions.

Worldwide, wheat breeding, together with advances in agriculture, has made significant progress in increasing yields. In order to breed better adapted cultivars, breeders need to respond constantly to changing environmental conditions, agricultural practices, and consumer preferences.

South African wheat farmers operate in a global market, which means that they have to be competitive in both quality and quantity in order to ensure that their businesses are sustainable.

In the past 10 years, South Africa has become increasingly dependent on imports to meet its domestic needs. This has been widely acknowledged by stakeholders in the wheat value chain and has led to accelerated interest in research and development in this area. South African breeders are involved in the development of wheat varieties adapted specifically to the local environment, with the aim of producing higher yields to supply the ever-growing domestic demand, while still maintaining quality.



Grain SA estimates show that South Africa will import approximately 56% of its domestic wheat consumption for the current marketing year—the equivalent of 1,89 million tons, valued at roughly R5,5 billion. Importing such a volume not only means large capital outflows but has a negative effect on employment and leads to dependency on other countries for basic food supplies.

Considering the context, there is an urgent need for South Africa to increase the rate of genetic gains for yield, drought tolerance, and resistance to pathogens and pests while retaining the current quality, and ensuring safe and nutritious wheat for the value chain. At the same time, it is necessary to find more efficient ways of using inputs such as fertilisers and pesticides.

The industry is collaborating with the government to expand industry-funded research and development activities to complement current research efforts. A multi-stakeholder partnership on wheat between private-sector stakeholders (Grain SA and Winter Cereal Trust) and government departments (Science and Technology, Trade and Industry, and Agriculture, Forestry and Fisheries) has been established with the objective of achieving a transformational impact through a sustainable increase in wheat productivity.

It is important to note that wheat production is a challenge not only to South Africa, but to the whole of Southern African Development Community (SADC). In 2014, the SADC imported 9,8 million tons of wheat at a cost of R15,1 billion, with the leading importers being Mozambique, South Africa, Tanzania, the DRC, Zimbabwe, Malawi, Mauritius and Seychelles.

This leaves the region exposed to any global event that might influence the wheat markets. Anything from geopolitical unrest to a natural disaster could pose a risk to regional wheat production and food security.

Investment in wheat seed-breeding is, therefore, essential for regional growth and self-sufficiency. It would also lead to job creation and the improvement of SADC research capacity and facilities.

South Africa's public-private, multi-stakeholder partnership on wheat breeding provides a unique opportunity for policymakers, public research organisations and private seed companies to work together towards enhanced food security, economic growth and poverty alleviation.

Marinda Visser, Grain SA

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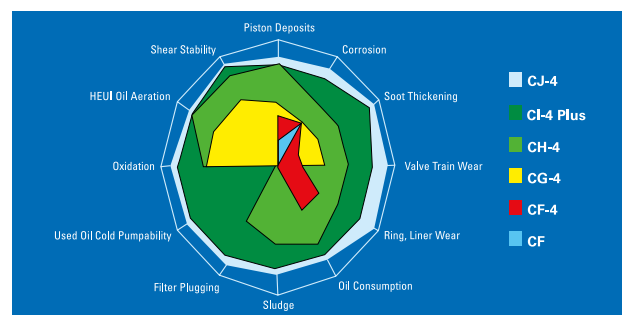
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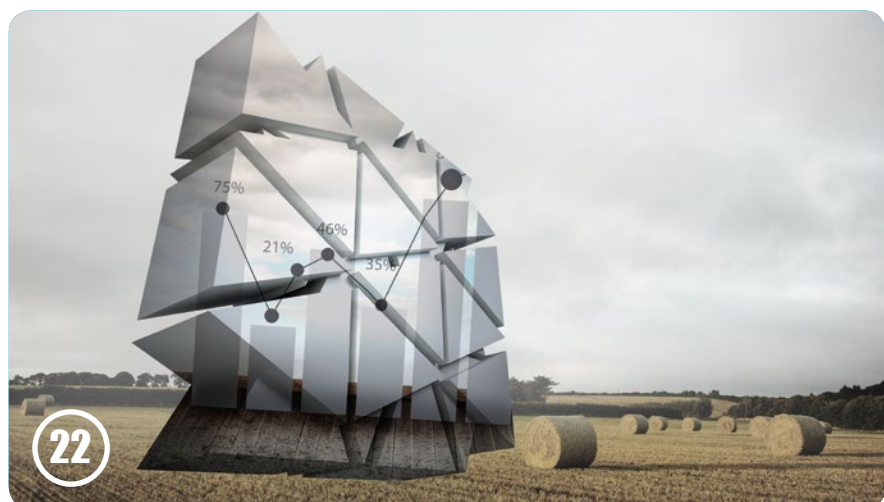
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EDS NOTE



GREG PENFOLD
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Welcome to another issue of **Harvest SA**. This month the focus is on small farmers. We lead with an insightful report by the Agricultural Research Council (ARC) into the difficulties that small farmers are faced with in the current agriculture business climate. Understanding these challenges is essential if any progress is to be made, and the ARC is to be commended for its dedication to carrying out research that has real meaning in the lived experience of farmers doing their best under difficult circumstances.

Fortunately, South Africa has many innovative role-players in the agriculture sphere, including many world-renowned universities that retain close links to the soil. One of these is the University of Pretoria, whose Institute for Food Nutrition and Wellbeing (IFNuW)

has developed an approach to food security that promises to benefit not only small farmers but also the poorest of the poor. Such initiatives are a beacon of hope amidst the seas of insecurity.

More often than not, small farmers happen to be women. One such woman farmer is Dineo Mokhabuki, whose inspirational journey from waitress to successful farmer is featured in this issue. You will be amazed by what vision and tenacity achieved in her case.

Equally inspirational is the story of how a co-operative of women rooibos farmers in the Western Cape achieved Fair Trade certification. The rural communities of the Western Cape are among the most historically disadvantaged in South Africa, so when a group of women such as these take their collective destiny in their own hands, it represents a triumph of the human spirit and a victory for agriculture as a whole.

We hope that you will find inspiration in these stories.



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Facing the facts

Challenges and constraints facing small-scale agricultural productivity in South Africa



Smallholder farming continues to play a key role in South African agriculture. However, climate variability, lack of appropriate agricultural infrastructure, shortage of farming skills, high levels of soil degradation and tough economic conditions are amongst the constraints facing small-scale agricultural productivity in South Africa. Droughts or long dry spells will worsen the situation, often resulting in complete crop failure and thereby perpetuating poverty in rural communities. The reality for many smallholder farmers is that their soils have become severely depleted through generations of unsustainable farming methods such as continuous deep tillage, monocropping, little or no replenishment of nutrients and burning of residues. Such practices result, ultimately, in decreased yields and lower farm income. The challenge of agricultural sustainability has become more intense in recent years with climate change, water scarcity, degradation of ecosystem services and biodiversity, the sharp rise in the cost of food, agricultural inputs and energy, as well as the financial crisis hitting hard on poor communities. The expected increase in population and the associated demands for food, water and other agricultural products will bring additional pressures. This article presents the challenges limiting small-scale agricultural productivity in South Africa today.



Unsustainable farming practices

The degradation of agricultural soils in South Africa and the consequent decrease in their health and productive capacity is the result of intensive tillage-based farming practices that pay little or no attention to managing the soils and the landscapes as part of a living biological and ecosystem resource base. In most rural farming communities, livestock is allowed to feed on crop residues in winter without proper control or management. Thus, most agricultural soils under these cropping systems have low organic matter contents with poor structure and fertility (Dube et al., 2012). This situation will be exacerbated if little effort is made by farmers to reverse it, such as the immediate cessation of soil surface disturbance (tillage), the retention of an organic (crop residue) soil cover or mulch and the inclusion of a diversity of crops. These practices will feed the soil

microorganisms, maximize rainfall infiltration and protect the soil from water and wind erosion (Kassam et al., 2010).

Climate change

Climate change, resulting mostly from global warming, is a major environmental challenge facing humanity today. It has been rated among the major causes of reduced agricultural productivity in many parts of rural South Africa. There is sufficient proof that agricultural production in sub-Saharan Africa has already been affected by climate change in the second half of the 20th century (Barrios et al., 2008). In South Africa, most crop farming is rain-fed and therefore susceptible to weather fluctuations and variations (Kurukulasuriya & Rosenthal, 2003). Furthermore, with increasing land degradation, land resilience has been reduced, exacerbating the effects of drought on already susceptible farming

communities. It has been reported that South Africa may need to import as much as 7 million tons of maize in 2016, roughly half of its total requirements. The drought has also resulted in high food prices and severe food shortages, felt mainly by rural households in poor communities.

Poor infrastructure and logistics

Poor infrastructure continues to impede agricultural activities in South Africa. The key challenges are lack of agricultural infrastructure such as fencing and equipment, as well as inadequate and poor condition of market facilities and transportation systems, including road and rail. The road transport system, which is the most important for market development in terms of distribution of inputs and outputs to and from farms, is the most serious infrastructural bottleneck facing agricultural development. As a result

of the poor rural road network, smallholder farmers depend on inefficient forms of transportation including the use of animals. Underdeveloped roads and other key physical infrastructure often lead to high transport costs for agricultural products to the market as well as of farm inputs, reducing farmers' competitiveness. In addition, electricity in rural areas is expensive and often not available, which has reduced investment in cold storage facilities, irrigation systems and equipment for processing farm produce. Lack of storage and processing facilities constrains marketability of perishable goods such as dairy products and vegetables. These infrastructural and logistic constraints are also impediments to trading.

Education

Agriculture is viewed as a vital means through which poverty and unemployment can be addressed (Department of

Agriculture, Forestry and Fisheries (DAFF, 2011). However, the agricultural sector in South Africa is not only dualistic with a developed commercial farming sector which co-exists with a large number of subsistence (communally owned) farms, but in terms of actual size of production, education and technological know-how, it is still primarily in the hands of white commercial farmers (DAFF, 2011). Consequently, the challenge for the country is to bring the previously excluded black farming community into the mainstream agricultural economy through access to education and information. Capacitating black farmers with agricultural skills to manage the natural resource base in a sustainable manner is one important avenue to redress past inequalities. Higher economic growth in South Africa will not be possible without addressing problems such as illiteracy and low education levels which are most prevalent in rural areas, and where

agriculture is most likely to play an important role in resolving both economic and human development challenges (Organization for Economic Co-operation and Development (OECD), 2006).

Apart from problems associated with natural resources, there are huge challenges with human (i.e. skills, knowledge and health) capital in South Africa. Skills shortage is cited as a major obstacle to economic growth, social development and sustainable employment growth. Therefore, improving human capital in agriculture is especially important where the shortage of trained human resources is a major limiting factor to development. Education and training on sustainable use of agricultural natural resources can assist farmers to make productive contributions to the agricultural economy in South Africa. However, one of the critical issues in the 21st century is the introduction of appropriate technologies that will effectively contribute



to improved food security, sustainable agricultural production and rural development (Olubode-Awosola & Van Schalkwyk, 2006).

Limited access to production inputs and equipment

Most small-scale farmers experience challenges when it comes to accessing agricultural inputs. Farmers do not have access to good quality and vigorous seeds (hybrids vs. open pollinated varieties), fertilizers, implements (tractors and planters) and

other equipment (e.g. knapsack and boom sprayers). Lack of access to such inputs and equipment often results in poor selection in terms of seed cultivar, type and quantity of fertilizer to be applied, and delayed planting of crops. This will consequently have a negative impact on crop yields.

Access to markets and credit

Improved access to input and output markets is a key precondition for the transformation of the agricultural sector from subsistence to

commercial production. Smallholder farmers must be able to benefit from efficient markets and local-level value-adding, and be more exposed to competition.

However, markets are often constrained by inadequate property rights and high transaction costs (Hall & Aliber, 2010). Despite these problems, some small-scale farmers have managed to produce food for their own consumption as well as for the market (Ortmann & King, 2006). However, in most cases emerging farmers are unable



(without significant assistance) to meet the requirements stipulated by the retailers. Requirements such as pack houses, cold rooms, full traceability, and product, soil and water analysis come at a great expense that could scarcely be afforded by some commercial farmers let alone emerging farmers. Poor education and high levels of illiteracy is also a contributing factor that would prevent these farmers from meeting the retailers' requirements in terms of record keeping and documentation.

Credit is one of the most significant bases of capital accumulation and may be viewed as a device for providing the basis for increased production efficiency and income.

Unfortunately, small-scale farmers in communal areas of South Africa have limited access to affordable credit. The poor access to agrarian and support services experienced by these farmers is attributed to socio-economic factors as well as the constraints that they encounter with financial and other institutions due to the high risk and transaction costs (Okurut et al., 2004).

Acknowledging all the challenges and constraints facing small-scale agricultural productivity in South Africa it is important to know that the Agricultural Research Council (ARC) is the custodian of natural resources data and can make this available to farmers on request. In addition, the ARC-Soil, Climate and Water presents accredited and non-accredited training courses on a variety of subjects.

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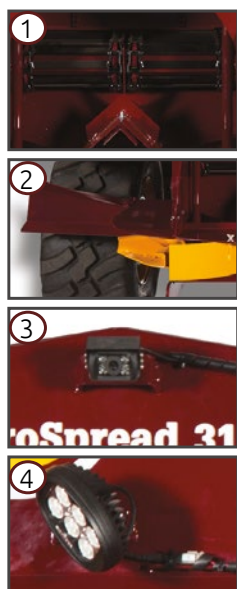
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Softening the blow



**Integrated Pest Management among the
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When German consumer pressure groups first lobbied supermarkets at the turn of the 21 century to reduce the use of chemicals used in managing the pests in the crops they sold, that pressure distilled all the way to the apple and pear growing regions in South Africa.

Today the growers for Tru-Cape Fruit Marketing, the largest South African apple and pear marketing company, responsible for the livelihoods of 15200 people, have some of the lowest Minimum Residue Levels (MRL) in the land and exceed the European Union standard in this regard.

"Our Integrated Pest Management (IPM) programme was developed as a response to the need to find ways to successfully manage pests and diseases that impact apple and pear crops in a way that has the least impact on the environment says De Kock Hamman, Technical Advisor at Ceres Fruit Growers, one of Tru-Cape's grower owned packhouses.

"In 2011 we detected between 27 and 30 active chemicals to manage pests and now just four or five which are also softer chemicals that have less impact on the environment. We also change the way we apply chemicals by using ultra-low volume sprayers, we spray at night to avoid bees and birds and monitor temperature carefully for triggers for codling moth outbreak, for example.

"We use a ladybird in the Tru-Cape logo to link to our IMP efforts. Natural predators

play a significant role in managing pests like aphids, for examples. We also use biological tools that are highly focussed and not harmful to the operator or the environment like mating disruptors which very effectively control the Codling Moth population by confusing the male about the location of the female by spreading moth pheromone

"We also use biological tools that are highly focussed and not harmful to the operator or the environment"

over a wide area so the male dies before mating. Releasing sterile insects is similarly successful. We also apply sticky physical barriers to tree stems to prevent bugs reaching the fruit. These techniques, combined with a change in how we manage past-prime trees - chipping and mulching organic matter rather than burning it - has seen a great improvement in the management of orchards with as few chemicals as possible and requiring less water than before," he says.

According to Ceres Fruit Growers Managing Director, Francois Malan, 90% of their crops

comply with the German standard which is a third more rigorous than the EU standard. "Ceres growers can hold our heads up high when we meet our international colleagues as being among the global leaders in positive environmental practices," he says.

According to Malan, the drought conditions of summer of 2015 had only a limited impact on the harvest as growers quickly responded with water-saving programmes and more targeted watering that used technology like FruitLook GIS which highlighted areas that most urgently needed water. "This technology solution was developed by the SA Department of Agriculture, Forestry and Fishing and it measures evapotranspiration which is the water loss from the soil and from the plant itself and directly linked to growth. Growers are also using technology to schedule irrigation during off-peak times," he ends.

Hamman says that Ceres Fruit Growers are active in the Orchards of the Future programme which is an industry-wide peer group to share best practice among the technical experts. As our factory has no roof we must do all we can do to better understand and care for our environment," he ends.

Tru-Cape Fruit Marketing Managing Director Roelf Pienaar says that Tru-Cape's ability to sell more South African apples and pears than any other is supported by growers and packers, like Ceres Fruit Growers, that meet and often exceed the high global standards of excellence.

Brian Berkman



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Ups & downs

Study links job losses with wage increase



The 2013 increase in the minimum wage for farm workers did cause a drop in employment, new research by the Southern Africa Labour and Development Research Unit at the University of Cape Town suggests.

However, the researchers were unable to determine exactly how many jobs the wage

increase cost. The study also found that the average wage for rural farm workers increased, meaning that the legislation was being followed.

On 1 March 2013, legislation came into effect requiring a higher daily minimum wage of R105 per day for any agricultural worker who worked nine hours or more; at the time, this was a 52% increase (from R69 a day) over the previous minimum wage. The

legislation also tied future increases in the minimum wage to inflation.

Previous research across various sectors in South Africa had found that minimum wage increases had either insignificant or negative effects on employment rates. A similar study done on the previous agricultural minimum wage increase in 2003, found that it slightly decreased the employment rate.

The researchers studied data in the Quarterly Labour Force surveys by Statistics SA across the country. Initially, said Ihsaan Bassier presenting the research today, they were able to establish that the minimum wage increase occurred at the same time as a decrease in rural agricultural employment. After the wage increase in March 2013, the rural agricultural employment rate fell by 14% in the remaining quarters of the year. However, they needed to determine if that job loss was caused by the minimum wage increase, or by some other factor, such as drought, plant disease, or late rains.

In order to solve that problem, researchers compared the employment trends in areas where the original agricultural wages had already been close to R105 a day, with areas where the wage had been much lower. The higher income areas would have been much less affected by the wage increase, than lower wage areas. Additionally, they checked the overall agricultural output, to see if bad crop conditions were the reason for lower employment.

Overall, the researchers say the data shows that minimum wage increase did cause substantial job loss among rural farm workers. However, they do caution their results, saying that possible measurement errors and small sample sizes may complicate the findings.

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COMPETING FOR MARKET SHARE

The tricky business of “coated seeds”

The drought may be impacting local agriculture, but innovative processes are ensuring that local and international obligations are met South Africa may be in the grip of a drought, but the business of supplying farmers with “coated seeds” through Africa’s only fully-computerised coating facility is continuing unabated.

While the seed plant hums along in Chamdor, Krugersdorp, AGT Foods Africa (formerly Advance Seed), the owner of the coating technology, is also attending to the serious business of making bread more appealing. Meanwhile, another production line in the facility completes 25 000 tonnes of packaged and bulk popcorn for local “snackers” and international markets.

Brian Lever, Managing Director of AGT Foods Africa, is quick to point out that the multi-faceted business also includes a Grain Division which supplies peas, beans, lentils and other legumes to various markets, while the Retail Packing Division is fully employed ensuring that microwave ready popcorn, already packed in patented packets, rolls into stores across the country.

A wide variety of seeds - many according to closely-guarded recipes—are supplied to customers as additives to a variety of bread products.

Research projects for the mining industry also form part of the company’s diversified portfolio. Presently, says Lever, AGT Foods is active in the gold, coal, uranium and platinum arenas with producers. Research on

pastures and lucerne also form part of the mix, something you may not expect from a company operating squarely within one of Gauteng’s busiest industrial areas.

“The research is focused on land rehabilitation projects from a mining perspective, while the other key activity is on the production of forage pastures for consumption by livestock,” says Lever.

“The seed-coating business concentrates on delivering seeds that are coated with the nutrients and fertilizers required to stimulate their growth. For the farmer, this technology enables seeds to be sown without the necessity of returning to the same fields to fertilise, spray with weed killer or any other activities.

“Individual seeds are coated with all the trace elements required to propagate and establish a crop. We work with the Universities of Pretoria and the North West who run trials on our variants,” added Lever.

With agri-business and farmers constantly being called upon to participate in as many activities along the agricultural value chain as possible, the production of seeds are incorporated into the AGT Foods programme literally from field to table.

“We contract farmers to grow between 7 000 and 8 000 hectares of seed crops for us during the average year. A farmer’s entire crop is contracted for and we have agronomists who undertake inspections and ensure



that documentation required for export is completed.

"The farms are situated across South Africa. If, like this year, there is a drought, we contract outside South Africa to countries like Argentina, Brazil, Botswana or Zambia for product - basically anywhere we can be sure that conditions are favourable," says Lever.

Yields differ according to crop and region, but popcorn fields will typically produce upwards of eight tonnes per hectare. Peas usually return three to five tonnes per hectare. All crops, however, are subject to the vagaries of the weather.

"The primary damage caused to crops is through the heat that is produced by a very dry season. If pollination is taking place and the temperature exceeds 30°C, the pollen dies. The damage caused by the drought we are currently experiencing is so significant because it began when the plants were pollinating."

The prime concern for AGT Foods, however, is not meeting contractual needs within the country, but with export markets around the world. When it comes to popcorn, a single international client's consignment may equal that of the entire South African market. Delivery at a designated place, at a designated time, spells success or failure for a business.

AGT Foods Africa is continually competing for a share of the market with major agricultural companies. In 2012, the former Advance Seed reinforced its position when it became part of AGT Food and Ingredients, a Canadian-based company that is one of the largest seed companies in the world which sources its products from more than 40 facilities around the globe.

"In this complex business, being part of an international giant is vital when it comes to servicing existing contracts and winning new ones. Often it is being plugged into the well-developed international seed intelligence markets that can make the difference when it comes to sustaining market share," says Lever. "Our goal is to continue to grow from here."

For more information on AGT Foods Africa, visit www.agtfoods.com/africa or www.advanceseed.com.



NOT PULP FICTION

Farmers need to account for “work in progress” on their tax returns

A wine farmer recently discovered that “produce held and not disposed of” includes the pulp of grapes which were harvested and delivered to a wine co-operative where it was mixed with the pulp of other members. The farmer had retained an undivided share in the pooled pulp held by the co-operative which was to be sold as wine on behalf of its members.

The farmer under discussion was the appellant in *Avenant vs SARS*, in which the Supreme Court of Appeal (SCA) handed down judgement on 1 June 2016 in favour of SARS.

When submitting their annual income tax returns, farmers are required to include in their income the value of all livestock or produce held and not disposed of at the beginning and end of each year of assessment. Where traders are allowed to deduct the cost of purchasing trading stock, they are also required to include the value of closing stock held and not disposed of at the end of the year of assessment in calculating their taxable income. It is now settled law that trading stock also includes partly manufactured goods or so-called “work-in-progress” which need not be in a saleable form.

In the case of *Avenant vs SARS*, the SCA held that the meaning attributed to “livestock and produce held and not disposed of” should accord with the meaning attributed to “trading stock held and not disposed of” in terms of the ordinary rules of the Income Tax Act relating to trading stock. Farmers should therefore also be mindful of including work-in-progress (which does not need to be in a saleable form) as part of their produce held and not disposed of at the beginning and end of each year of assessment.

Avenant had delivered all of his harvested grapes to a wine co-operative as at the end of his 2009 year of assessment. At year-end the harvested grapes had already been pressed into pulp and were mixed with the pulp of other members of the co-operative. The co-operative was responsible for making, packaging, marketing and selling the wine. Each farmer who contributed to the pool would share in the net proceeds of the sale of the wine, pro rata to that farmer’s contribution and after the co-operative

had deducted its expenditure. The co-operative did not hold the pulp on its own behalf but rather on behalf of its members who retained joint ownership, each in an undivided share of the pooled pulp and later of the pooled wine, pro-rata to their contributions of grapes.

The SCA held that the processing of the grapes by being pressed into a pulp and starting the natural fermentation process (even if chemicals had been added) did not transform the grapes into something essentially different from the produce of the harvest.

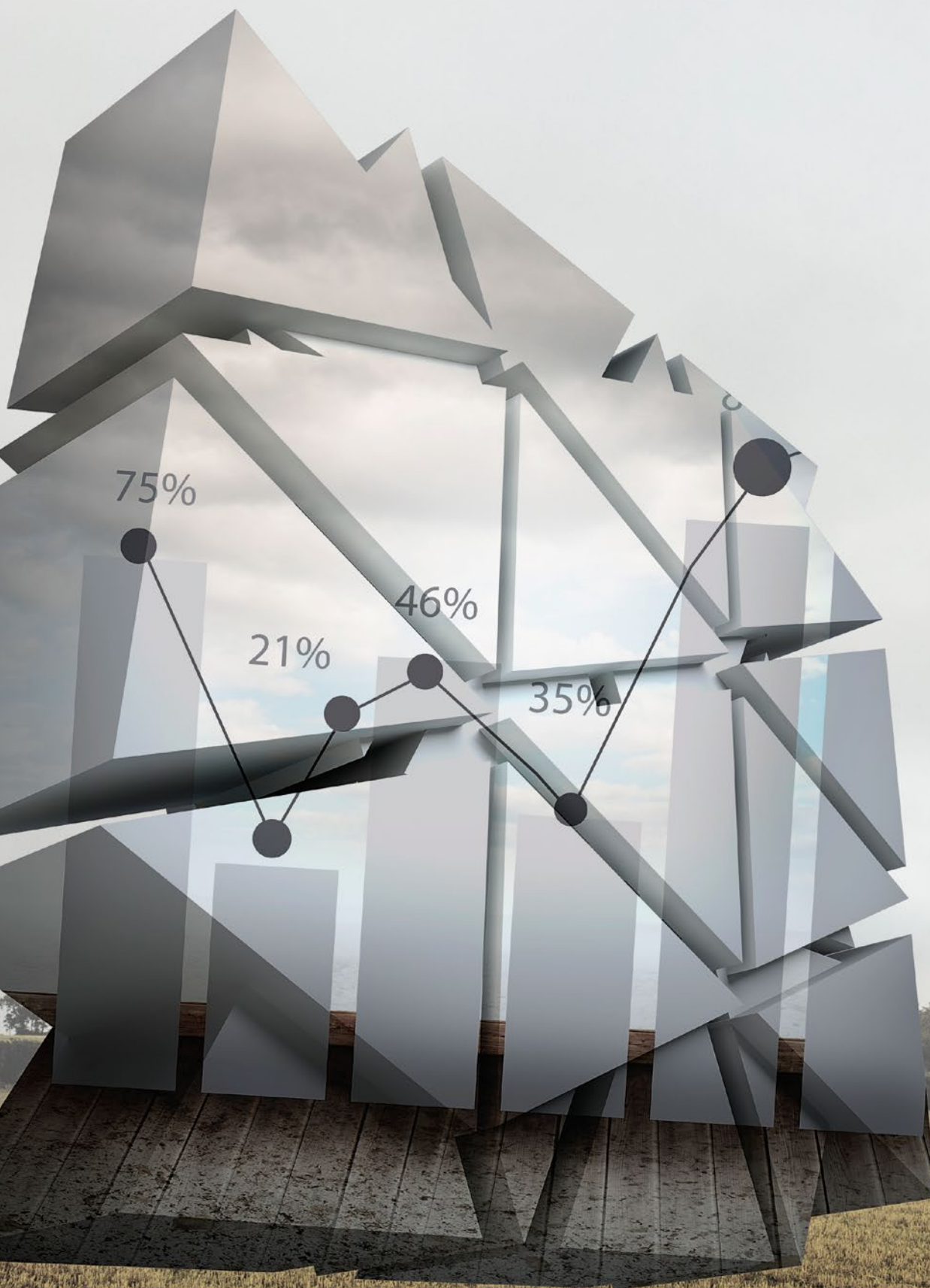
Avenant’s main argument before the SCA was that the pulp which he had delivered to the co-operative did not constitute ‘produce held and not disposed of’ by him at the end of the year of assessment. The SCA however agreed with SARS that where a trader retains ownership of produce without necessarily retaining possession, that produce is considered to be held and not disposed of for purposes of calculating the farmer’s taxable income.

Although the pulp did not have a market value, SARS is allowed to fix any fair and reasonable value on produce to be included in a farmer’s return.

The SCA reiterated that the difficulty (whether perceived or real) in determining a value for work-in-progress does not permit a court to deviate from the plain language of the Income Tax Act. The SCA was satisfied that the distilling wine price would place a fair and reasonable value on Avenant’s closing stock because the distilling wine price had an ascertainable value and favoured the taxpayer as most wines would fetch a higher price than distilling wine.

There are a few important points to take from this judgement. Farmers should be mindful to include in their taxable income their work-in-progress as ‘produce held and not disposed of’ at the end of each tax year - work-in-progress need not be in a saleable form. SARS may fix any fair and reasonable value for ‘produce held and not disposed of’ (which need not be market value). Even though a farmer may have given up possession and mixed his produce with other produce not owned by him, he will still be required to account for his pro-rata share of the produce as closing stock if he retains ownership of the produce.

Esther van Schalkwyk, Senior Tax Consultant at BDO SA



The numbers crunch

How big data is disrupting agriculture

Sometimes we only know there was a revolution by looking in the rear view mirror. That is not the case with the disruption in agriculture today. We can see the innovation and disruption that's occurring in real time all around us.

With the need to produce more food using fewer inputs, agriculture is seeking new products, practices and technologies. As a planet we must use fewer chemicals and less water. Subsistence farmers need to close the yield gap. Production farmers want yield boosts and cost savings. Consumers are demanding healthier, clean food and ingredients.

Big data is causing the disruption to meet these needs.

Start with the vastly increased supply of information everywhere from the plant genome to water management, fertilization, climate, soil, machinery, and crop protection systems. Add the expanding ways to get and use data both in both farming practices and advances in crop genetics. On the production side, this is changing the value chain in big ag as access to big data is transferring power to the farmer and smaller companies, while the big companies consolidate and struggle to innovate.

Disruption will take big ideas, new business models and bold people. A new generation of independent companies are harnessing big data to generate new insights, practices and products. Traditional ag companies and supply chains will have to adapt if they want to keep up.

There are four main areas where I see big data being used in the food chain:

- **Development of new seed traits:** Discoveries and access to the plant genome with new ways to measure, map, and drive information into better products, faster.
- **Precision Farming:** Although sometimes confused, big data and precision agriculture are not synonymous. Big data takes advantage of information derived through precision farming in aggregate over many farms. The resulting analytics, insights, and better decisions can then be deployed through precision farming techniques.
- **Food Tracking:** Use of sensors and analytics to prevent spoilage and food borne illnesses.
- **Effect on Supply Chains:** Seismic shifts in the supply chains of seed, crop inputs, and food driven by the democratization of technology and information.

Big data speeds plant breeding

The traditional process used to create successful crop varieties is costly, labor intensive, and can take 10 years or more. Big data speed things up. An explosion in biological information has occurred from advances in genomics: first, the onset of sequencing the genomes of model organisms and, second, the rapid application of high throughput, or automated, experimental techniques.

This deluge of genomic information can be created and analyzed in the cloud. Biological research that used to start in greenhouses and fields now starts at the computational level (in-silico) where data can be analyzed, experiments planned, and hypotheses developed. From here, a much smaller number of plants needs to be validated in the field

for performance across a wide range of environments, when a breeder can then determine which exact hybrid is best for a particular area. I've seen this amazing shift over my career. I no longer wear boots to visit breeding stations—the work is done mostly

Disruption will take big ideas, new business models and bold people

in labs. The new developments are not only cheaper and faster; we are able to do things we just couldn't do before.

Traditional genetic engineering tools brought drought, herbicide, and pesticide resistance traits to the market. Continued development will produce crops with improved quality and reduced economic and environmental costs. Many crops in development will be beneficial for farmers and consumers alike. Some examples are: high-calcium carrots, antioxidant tomatoes, nonallergenic nuts, bacteria-resistant oranges, water-conserving wheat, and cassava with extra nutrients.

Through better tools, the time to field will be faster and cheaper. It will also be performed by smaller labs with less infrastructure. More data will be made available and analyzed through shared databases. Plant genomics

innovation and cloud biology is empowering new and diverse start-up companies.

Here are some examples of startups using big data for crop genomics:

- Caribou Biosciences : CRISPR-Cas technology for gene editing (raised \$44.6m).
- Benson Hill Biosystems: Advancing agriculture through plant biology, Big data analytics and cloud computing (raised \$8.05m).
- Intrexon Developing new crop traits through developed and acquired technologies (public company).
- Cibus,: Deploying gene-editing tools to produce new traits including herbicide-resistant crops.
- Arcadia Biosciences: Using advanced screening, breeding and biotechnology techniques to produce new traits and crops (public company).
- Precision Biosciences: Genome editing technology company in the life sciences. Building an ag group (raised \$25.65m).
- DuPont / Dow, Syngenta, Monsanto, Bayer, BASF are all active through organic growth and acquisition.
- Data-driven Farming Practices, Better Results

Production agriculture is complex; where biology, weather, and human actions interact. Growers have quickly adopted new precision ag technologies in recent years. With the availability of GPS and other technologies, producers can track yields, steer and control equipment, monitor field conditions, and manage inputs at very precise levels across fields, substantially increasing productivity and profitability. At the same time data is rapidly accumulating in sets too large and complex to be studied without software. Data alone does not create insights; analysis and advisory services are required to help farmers sift through all of this new data. Software applications with machine learning at their core get smarter and more customized in their interactions with data, devices and people. As they learn, they provide a previously untapped opportunity for better decision-making on the farm.

Big data firms can test varieties of genetics, crop inputs, and conditions across hundreds of fields, soils, and climates. They can conduct field-plot trials in real-life conditions

over thousands of acres. This gives farmers information to optimize planting down to the individual seed in specific fields with specific soil and climate conditions. For crop protection suppliers, this means that products can be applied at different dose rates and tank mixes within a single field.

Information is power

This transparency has the ability to disrupt value chains and will likely be unpopular with some retailers, distributor dealers, and large seed and chemical producers. Information pushes power to the grower level by creating visibility of pricing and performance of brand-name inputs. Growers will be able to use fewer chemicals applied in very precise ways. Using generic inputs with precision

New companies have made collecting, aggregating, and analyzing data from multiple farms their primary business

may well give better results than using top brands across the field. More precise planting will likely lead to the reduction in the use of inputs by about 30 – 40% which, along with squeezing margins for the big ag inputs companies, could cause further consolidation in the supply chain.

The rate of adoption of new ag technologies is increasing, despite low commodity prices and sustained low farm incomes. A recent market study done by Robert Hill of Caledonia reported that between 2013 – 2019, growers said they will double the number of technologies they deploy. Fifty-one percent said one of the features they are most interested in is hybrid recommendations matched to their field and soil type.

New companies have made collecting, aggregating, and analyzing data from multiple farms their primary business. Their goal is to provide farmers with individualized plans to farm each field down to the individual plant: using data collected on climate and soil conditions, the use of crop, and yields. Information received from the farmers allows the data companies to improve their models and make better recommendations. Data allows for adapting products that meet specific customer needs on an on-going basis with more sophisticated pricing strategies that better match price and value at the segment level. Below are some of the active companies in this space with a variety of offerings and business models:

Farmers Business Network: Agronomic information network using data analysis to aid farmers in making the best operating and procurement decisions (raised \$24m).

Climate Corp / Monsanto: Climate-based platform aiding farmers in operating decisions (raised \$100M in venture funding to be acquired by Monsanto in 2013 for \$1bn).

Granular: Software and analytics platform that helps farmers manage and have visibility of data to operate more efficiently (raised \$50M).

Conservis: Cloud-based platform offers farmers a service-centric platform to track activity, integrate with outside data, and manage resources (raised \$12.65m).

Trimble: Develops positioning technology solutions for surveying, construction, agriculture, public safety and mapping purposes (public company).

Farmers Edge: Hardware and software. FarmCommand system, automates collection, reporting of costs, and equipment data (raised \$44.2m).

Iteris : ClearAg division gives weather, water, soil and crop health advisory services through API's or App (public company).

John Deere, Bayer, BASF, DuPont are all building their own digital platforms both organically, and through acquisitions.

Tracking food

Following food from farm to consumer prevents illness, reduces waste and increases profits. As the global supply chain gets longer, the importance of tracking and monitoring agricultural products continues to grow. Big

data is being used to improve operations from stock levels at the warehouse and the retail outlet, to food temperatures that can be carried as a pedigree with food products across the supply chain. Food producers and transporters are using sensor-based technologies, scanners, and analytics to monitor and collect data about their supply chains. Temperature and humidity are monitored by GPS-enabled sensors, causing alerts in the distribution route where corrective action may be needed. Point-of-sale scanning at the retailer allows prompt, efficient action if a problem or recall occurs, even after the product has been sold. Genomic tools and big data analytics are also being used to understand food-borne pathogens and to predict outbreaks and the spread of pathogens and diseases. These technologies will help prevent food-borne illnesses that effect an estimated 76 million people in the US every year — leading to 5,000 deaths — and reduce waste in the supply chain — 40% of all food in developed markets is thrown away, including 10% to 15% of all produce.

Effect on supply chains

The Big 6-5-4 ag companies are being challenged as new technologies give farmers the power to know what to plant, when and how to plant, and what crop inputs to use to maximize harvests and profitability. In the past, innovation was concentrated in companies with the largest R&D budget, products to bundle, or the most market share. New technology, particularly in complex arenas like crop genetics, required a scale and infrastructure that was cost-prohibitive for small companies.

The traditional, large ag companies may not be able to make the shift to supply farmers with both the best crop traits and the best information for farm inputs. Innovation favors the creation of new companies for a number of reasons. One is trust. Farmers must be convinced their data will be anonymized and they are less likely to want their information in the hands of large companies angling to push the products they make. The same is true with plant genetics. If independent seed companies are willing to contribute information in a database for better understanding of a wide variety of plant genomes, they don't want that database controlled by

one of the giants in the industry. The second reason is the desire for unbiased advice and a two-way flow of information. Even if the big companies were able to develop the best digital platforms, they will struggle to be seen as providers of impartial advice.

There are many examples where incumbent companies have not been able to make the changes necessary to utilize new technologies. It requires different corporate cultures, different styles, and different operations. The Big Ag companies have large R&D engines to develop genetically modified seeds based on cumbersome technology. Now with gene editing and cloud biology, trait development can be done in a much smaller lab with less people and equipment. An additional hurdle to incumbents is the evolution of complex pricing strategies with layers of distributors, dealers, bundled offerings and rebates creating a lack of pricing transparency that resides in the current supply chain. There are plenty of opportunities for disruption here, similar to how Google transformed multiple industries, or Uber and Lyft are changing the personal transportation industry.

Big Ag is already being reshaped by a series of large transactions. China National Chemical Corp. is acquiring Syngenta for \$43 billion. Regulators are examining the proposed \$130 billion merger between Dow Chemical and DuPont, which will carve out a new crop-science unit. And as I write, the dance between Bayer and Monsanto is continuing, which would be the third megadeal

to change the industry that supplies the world's farmers with pesticides and genetically modified seeds.

Summary

According to the AgFunder Investing Report, over 500 food & agriculture technology startups raised \$4.6 billion in 2015. Start-ups are taking on a vast array of challenges to improve and disrupt the production of food, energy and fiber. The big data revolution is in its early days, and most of the potential for value creation is still unclaimed. But it has set the industry on a path of rapid change and new discoveries; stakeholders that are committed to innovation will likely be the first to reap rewards. I'm hoping the big winners in this revolution are the producers, the environment, subsistence and small farmers, and consumers. This is the best time for disruptive acceleration in agriculture innovation, one that can empower new players in the supply chain to participate, benefit and significantly enhance crop performance.

Vonnie Estes is an agtech consultant with a particular focus on building biotech-focused startups. She has worked in business development roles at three of the big 6 – Monsanto, Syngenta, and DuPont—and is a known face in the industry as a frequent speaker and writer. Here she drills down into the disruption taking place in the industry due to innovations in big data. This column originally appeared in AgFunderNews.



grow smart



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HOMEGROWN SOLUTION

Food security for rural South Africa

The Institute for Food Nutrition and Wellbeing (IFNuW), at the University of Pretoria, has created a world-first solution to improve food security for the poorest communities in South Africa.

The problem

54% of South Africans live below the poverty line, living on R779 or less a month many can barely afford enough maize to feed their family three meals a day. "A diet consisting largely of maize and bread cannot meet a person's nutritional needs," comment's research lead, Professor Sheryl Hendriks. "Many communities turn to subsistence agriculture to bridge this nutritional gap, but in the marginal farming areas that make up large parts of rural South Africa, they struggle to grow enough food to meet their daily food requirements.

"Malnutrition has a dramatic knock-on effect not only on individuals in terms of stunted growth, limited cognitive development and a compromised immune system. But it has an impact on our economy."

Over the past four years, researchers have been surveying what communities in four of South Africa's poorest rural communities grow and eat. Digitally recorded, for immediate use by researchers, at each community, enumerators used tablets to record survey data on diet, health indicators and farming in the community. "We wanted a fuller picture of how communities feed themselves, and how reliant they are on rain-fed and irrigated agriculture to do this, their income

and access to diverse food groups," advises Prof. Hendriks.

The solution

IFNuW has digitally collected data relating to foods which are grown in the four sites that the research was conducted at and combined it with data from food composition tables to understand the nutritional value of different crops. From this insight, the team has developed recommendations for communities in specific regions on what to grow and how to grow food that addresses their nutritional needs.

"The findings of the study and the recommendations can empower communities in taking responsibility for their nutrition by providing them with locally-relevant information while helping government and NGOs design more appropriate agriculture-based interventions," advises Prof. Hendriks.

With input from communities, these recommendations have been converted into series of visually informative brochures and posters. Researchers have made these guides available to community members and agricultural extension officers in a bid to help residents improve their nutritional status through better farming choices. University of Pretoria MSc student Corne van der Merwe has developed Smart Grow, a smartphone app to make the data available electronically. This app can be downloaded here, along with installation instructions. "The app was an afterthought," admits Prof. Hendriks. "When working in the field collecting data, we were surprised how tech savvy the young people



employed as survey enumerators in these communities were. We realized there was an opportunity to make the recommendations available through this technology, putting the recommendations into the hands of farmers and young people."

Impacting policy

The findings of this project have also provided valuable input for the SA National Food Security Information System, currently being



Research Matters portal showcases some of the University of Pretoria's research and innovation output highlighting the impact of its work on socio-economic development in South Africa, Africa and globally.

The University of Pretoria (UP) recognises that traditional academic approaches are inadequate to deal with the complexity of current problems. As part of the UP 2025 Strategy, the University established Institutional Research Themes (IRT) in identified strategic areas that address complex societal issues and are capable of significant growth and improving the University's research output and international positioning.

The formation of the Institute for Food, Nutrition and Well-being (IFNuW) forms part of its strategy and focusses on five key themes:

- Feeding the world in a resource-constrained environment
- Ensuring safer food through effective control and regulation
- Promoting health, nutrition and well-being
- Changing consumption behaviour for improved health
- Strategic planning and policy reform to manage food security risks

developed by the Department of Agriculture, Forestry and Fisheries (DAFF). "Researchers and policy makers need access to relevant and up-to-date information to make informed decisions," adds Prof. Hendriks.

According to the SA Constitution, South Africa citizens have a right to food, proper

nutrition and water,. And, according to a national survey conducted in 2013, 17% of households in South Africa struggle to access food and in that year, 11% of households experienced hunger, of those, 6% of South African households experienced severely inadequate access to food. "More people

need more access to food, proper nutrition and water, our research can positively impact policy creation moving forward," adds Prof. Hendriks.

Discover the story in full at Research Matters, the University of Pretoria research portal:

<http://www.researchmatters.up.ac.za/researcher-projects/view/29>

Kimberley Ogden

A woman wearing a blue headwrap, a light blue t-shirt, and blue jeans is sitting on a blue tractor. She is holding a silver metal cup in her right hand and has her left hand on the steering wheel. The tractor has a large, rounded, metallic water tank mounted on the back. The background is a lush green field with trees. The title 'Breaking new ground for female farmers' is overlaid in large white text at the bottom of the image.

Breaking new ground for female farmers

Dineo Mokhabuki is the proud product of mentorship

She stands tall as a living testament of how far a person can go when their potential is seen and nurtured. In 2002, while working as a waitress and bar lady, she drew the attention of Andre Loubser, who managed a nearby farm in the vicinity of the Sudwala Caves just outside Mbombela in Mpumalanga.

He often popped in to the lodge where she worked and was impressed by her attitude. One day while they were chatting, Mokhabuki mentioned that she wanted a better job to allow her to continue with her studies, which had been interrupted because of a lack of finance.

It so happened that Loubser was looking for someone to help the farm do the onerous



paperwork needed to obtain and maintain various certification standards. He thought Mokhabuki was the ideal candidate for this junior post – well spoken and bright with the attitude and enthusiasm that would make her highly trainable.

A week later, after Loubser had spoken to the farm owners, he called Mokhabuki in for an interview. A few days of heart-stopping

waiting followed, before Mokhabuki got the call that was to change the course of her life.

Her job at MK Twycross Farm as an administration clerk might have seemed like the pot of gold at the end of the rainbow to many youngsters, but to Mokhabuki it was her big chance to find out just how far she could go.

She progressed rapidly, becoming an assistant farm manager in 2007. She then managed Toe Hill Farm from 2009 until 2011, when she moved back to MK Twycross Farm as the manager, a considerable promotion given that the latter is the bigger of the two farms. Today, she has been expertly doing the job for over four years and the farm owners believe she is the only black, female farm manager in the sub-tropical fruit sector in South Africa.

Toe Hill Properties is a family farm that includes a few divisions across the sub-tropical fruit and timber sectors, all of which fall under the Geoff Twycross Trust umbrella. Simon Dunshea, the grandson of the farm's founder, is responsible for overall management of the farming operations, which include macadamia nuts, avocado pears, limes, kiwis and oranges.

"I often leave everything in Dineo's hands, knowing that when I return, things will still be running smoothly. She is an asset and inspiration to others," says Simon.

Mokhabuki is registering with UNISA to study farm management. Once she has her Diploma in Agriculture she intends pursuing a degree. "Education and upskilling myself is close to my heart," says Mokhabuki.

She remembers with a smile the uncertainty of her first few weeks in the office at the farm. "Everything was Greek to me."

Mokhabuki's job was pretty much office and computer bound, but in order to give her an holistic understanding of the operations, Loubser took Mokhabuki on an extensive farm tour to show her how they worked the land and introduce her to their various operations. It was also Loubser who taught her to drive – on a tractor at first – and who congratulated her when she obtained her licence.

Bit by bit she fell in love with farming. While Loubser was getting Mokhabuki's

hands dirty out in the field, Mark Baker, now Operations Director of HL Hall & Sons, Fresh Produce business, which is a Toe Hills Property export agent, showed her the ropes with regard the many requirements needed to obtain GlobalGAP, Tesco Nurture and SIZA certification.

"Many years back I managed Sales and Procurement and we exported a large proportion of the Twycross Trusts avocados. Dineo was a clerk at the time and I assisted with the implementation of their required certifications which she was responsible for.

"She was extremely determined and a good learner, always friendly and an absolute pleasure to work with.

"A business cannot export to Europe and Tesco without the required accreditations and thus Dineo's role had an integral role to play. Not only did Twycross comply, but thanks to Dineo's inputs, they achieved gold status, which is way above the industry norm," says Mark.

"We need more Dineos in SA Agriculture to ensure sustainability!"

"Maybe farming was always in me but never given the chance to flourish," says Mokhabuki. "I remember back at school, girls were expected to do sewing and boys would do gardening. Whenever I could, I would run off and garden with the guys. I always told my Dad I wanted a job where I would wear boots and overalls.

"As a young girl, I loved challenges and my Dad would always say, 'Don't limit yourself' so I wanted to learn more than just how to do the job I was employed to do. Mr Loubser gave me the freedom to learn and as I started proving myself, he gave me more and more responsibility."

Soon she was attending study groups, training sessions and symposiums, which allowed her to meet different farmers who would share their stories with her. "My love for farming grew and grew."

One of the hardest challenges Mokhabuki had to overcome was the attitudes of the men working on the farm. "It is a cultural thing; most black men battle to accept direction from a woman so initially it was tough.



I was frustrated. My age made matters even worse. Threats of physical harm were made."

By staying calm, treating everyone with respect, and listening to their inputs, Mokhabuki was able to win over the team and today she says their relationship is based on mutual respect. "At end of the day, we are all here for one reason – to better our lives. I am not here to trample on them and they must not trample on me."

"It did not take long for the workers to embrace Dineo," remembers Loubser, adding that he knew when he first offered her a job

that she would go far. Mokhabuki attributes the mentoring she received from Loubser; Baker; Hans Boyum—General Manager of Westfalia Marketing (Pty) LTD South Africa, a grower-owned marketing structure that specialises in the trading of subtropical fruit, mainly avocados and mangos to both export and domestic markets; and Alan Mohle,† the CEO at Geoff Twycross Trust; for much of her success.

"So many other people helped me along the way and had faith in me. I owe a special debt of gratitude to Mr Mohle who gave me

the chance to explore, grow and become who I am today.

"I met Dineo through our relationship with Geoff Twycross Trust, which is a grower shareholder in Westfalia Marketing," says Boyum, who provided invaluable technical support to Dineo.

"My first impressions were of a conscientious person who was truly interested in her field of work, and wanted to learn more about the field that she was working in. Dineo attended many industry workshops and Westfalia grower days. She was very involved in implementing the requirements of the new versions of the GlobalGAP on the farm," he says.

"GlobalGAP is essentially a farm audit system that covers aspects such as food and worker safety, and the responsible use of chemicals, fertiliser and water. European retailers have also been increasingly focused on the ethical sourcing footprint of fruit. In order to comply, a South African initiative encompassing the ethical requirements of the retailers was established by Fruit South Africa, called SIZA. Dineo played a crucial role in getting Twycross SIZA accredited. These accreditations allow Twycross to access to European supermarket programmes," says Boyum.

Mentorship all-important

Government has recognised just how important mentorship is, and realises that it can positively impact scores of lives, just as it did Mokhabuki.

The National Mentorship Implementation Framework emphasises the importance of people management skills as a cornerstone of growing the South African human resource capital. All mentors appointed have to demonstrate high regard to placing emphasis on people skills prior to embarking on other areas of the project.

The Department of Agriculture, Forestry and Fisheries (DAFF) facilitates the implementation of the mentorship programme through Provincial Departments of Agriculture. The programme is implemented under the capacity-building pillar of the Comprehensive Agricultural Support Programme.

DAFF's EXCO recently approved the National Mentorship Implementation

Doors opened by government

Government agrees with this philosophy of allowing people to reach for the stars and has developed and implemented policies and programmes on gender equity, all of which aim at ensuring that women and youth in particular are programmatically brought into the mainstream economy. They include:

- AgriBEE Fund is a fund that draws from the AgriBEE Empowerment Charter for its scope, thus impacting the entire agricultural value chain, including production, processing, marketing and distribution. It seeks to promote the entry and participation of the previously marginalised groups, including black women and youth, in the agriculture, forestry and fisheries value chains, through provision of funding for equity deals, acquisition of interests in agriculture, forestry and fisheries entities and enterprise development. A total of 3 750 beneficiaries were supported and 2 240 women benefitted through the AgriBEE Fund.
- Micro Agricultural Financial Institutions of South Africa (MAFISA) is a financial scheme that seeks to address the financial services needs of the smallholder farmers and agribusinesses. MAFISA provides capital (loans) of not more than R500 000 per person to enhance agricultural activities through the purchase of production inputs (fertilisers, seeds, pesticides, animal feed and remedies) and small equipment and implements. Considerations are made to ensure parity when implementing this financial scheme. A total of 7 100 women were supported from March 2009 to date, which is 36.6% of the total beneficiaries. The enterprises funded are sugar at 60%, 6.3% livestock, 0.1% grapes and the balance is divided into various crops including grain, vegetables and citrus.
- DAFF Career Awareness Programme is a structured programme which focuses on promotion of agriculture, forestry and fisheries as careers and livelihoods of choice, particularly among school-going youth, to build a skills base in agriculture, forestry and fisheries careers, specifically within the identified scarce and critical skills. DAFF enters into formal agreements with schools from disadvantaged rural communities which are identified and adopted based on their academic performance. The programme ensures that mathematics and physical science learners from these schools are given information on careers in agriculture, forestry and fisheries. DAFF high school bursaries are awarded to nominated learners from the schools and an

undergraduate bursary is guaranteed for the beneficiaries upon completion of Grade 12 on condition that they enrol to further their studies in one of the identified scarce and critical skills. Since 2004 a total of 277 learners were supported and 144 female learners benefitted from the high school bursaries of DAFF.

- DAFF also has an external bursary scheme that is used as a vehicle to bridge the skills gap, promote rural development and to eliminate skewed participation in the sector. The scheme recruits young people from previously disadvantaged and poverty stricken rural communities with good symbols in mathematics and physical science to be recipients of DAFF bursaries to further their studies in one of the identified scarce and critical skills in agriculture, forestry and fisheries. This External Bursary Scheme has, since 2004, funded a total of 1 002 students and 574 young deserving female students benefitted.
- The Internship and Young Professional Development Programme combats unemployment by placing young graduates with requisite skills in functional units and place others with commodity organisations for practical exposure. Since inception, 1 165 young women have benefitted from the programme. Of these, 347 are employed by DAFF.
- The Comprehensive Agricultural Support Programme (CASP) is aimed at providing post settlement support to the targeted beneficiaries of land reform and to other producers who have acquired land through private means and are, for example, engaged in value-adding enterprises domestically or involved in export. The CASP framework pronounces that 70 per cent of the CASP infrastructure grants should be allocated to food production initiatives (crop and livestock production). The programme has supported 473 542 beneficiaries and women accounted for 42 per cent.
- The LandCare Programme, under the Expanded Public Works Programme, participates within the land-based livelihoods category of the Environment and Culture sector. The programme deploys labour-intensive mechanisms within its project implementation under the SoilCare, VeldCare and WaterCare themes.

For more information on any of the above projects, contact your closest DAFF office.

Framework which seeks to guide and provide standards and criteria to be used in the implementation of the programme to smallholder producers in the agriculture, forestry and fisheries sectors.

During the 2015/16 financial year, 318 beneficiaries were targeted of which 119 are women and 92 are youth.

Helping to feed the nation

"Farming has its challenges," says Mokhabuki. "We can't fight nature with its drought, floods, hail and climate change. We have to adapt to the escalating prices of fertilisers and chemicals but the fact that I am providing food for people gives me immense personal satisfaction."

Mokhabuki dreams one day of having the finances to start her own farm. "I would love to create jobs, help families put food on the table and do my bit to tackle food security. I get heartsore when I see productive land with nothing on it but invasive lantana and grass."

She grew up in Bushbuckridge and was raised by her grandmother. Mokhabuki's Dad was a forester and her Mom a domestic worker. Even before she started school, Mokhabuki enjoyed reading and writing, thanks to her Uncle Andries Mametja. "Tragically, he died shortly after returning from exile in Tanzania."

Today, the single mother of Tshegofatso (16) and Thandolwethu (9) is building her

own home in Nelspruit. Of farmers she says, "We are heroes in our own right. Even people with millions in their pockets would starve without farmers."

She would love to see more young people –and especially women–pursuing a career in agriculture. "There is a misconception that farming is only for uneducated people, or people who don't mind getting dirty, but the truth is that farming is a highly-specialised field that incorporates research and development, and requires highly skilled people. To women who love the land, remember, there is no such thing as a man's job or a woman's job anymore. You can be anything you want to be."

Cathy Grosvenor



The advantage of listening

New agribusiness models going beyond rural industrialisation to socio-economic sustainability

Through sustainability-focused innovation in remote Northern Cape, GWK Farm Foods exemplifies agriculture's transformative power. Agriculture's role in creating and maintaining socio-economic prosperity is becoming progressively more critical as nations focus on issues such as food security.

In addition, in emerging economies like South Africa, agriculture is the only sector capable of transforming remote rural communities by locating agribusinesses in those areas and, in the process, supporting the local farmers and developing local suppliers.

In the past, agriculture played part of that role by default simply because it was usually a country's largest employer and also because it provided essential products in the form of food. But farmers and agribusinesses rarely saw it as their direct responsibility to pro-actively put strategies in place to benefit the community or, indeed, the economy.

Today, agriculture stakeholders are deliberately using business skills to convert the industry into a decisive vehicle for social transformation. In that context, GWK, a public farmer-owned company based in the Northern Cape, is an important example of the basic principles that best embed sustainability in agriculture and, therefore, the community.

GWK, an agribusiness involved in grain products, specialist crops, and meat and auction services among others, opened its GWK Farm Foods factory in Modder River in April 2016. The R400 million wheat mill, pasta plant, and biscuit factory uses wheat sourced locally to create bread and cake flours and other products marketed under the new Nature's Farms brand. The wheat is recognised internationally as being of unusually high quality, having 9% more protein than the imported products from which South African wheat-based foods are typically manufactured. South Africa imports some 70% of its wheat.

Obviously, the factory represents a major commitment to local farmers. More than that, it represents a vote of confidence in the rural community from which the factory draws its 100 employees and its services suppliers. The collaboration of the local authority in making an empowering facility such as the GWK Farm Foods factory possible in a location so far from major commercial centres is also a crucial factor.

The factory therefore epitomises the inclusive approach to agriculture that we always advocate and support.

Sustainability built-in

The GWK Farm Foods facility was planned from the ground up with sustainability and environmental custodianship in mind. "Energy efficiency was a planning priority," says Eddie Ueckermann, GWK Farm Foods

executive manager. "For example, we used white roofs for temperature management and skylights for natural light. The flow of products in the wheat mill is gravitational, all our electrical motors are the most energy efficient available, and all electrical lights are LED and connected to motion sensors. Collectively, these technologies and approaches reduce the factory's energy consumption by up to 25%.

The water used in the plant is cleaner when released back into the environment than it was when it entered the factory. A quarry on the site was modified into a dam for the irrigation of the gardens. Grey effluent and rain water, as well as treated sewerage water, are collected in the dam.

The factory boasts the most advanced Buhler mill from Switzerland, while the Pavan pasta and Lazer biscuit plant imported from Italy are two of the best in Africa.

Outside of the factory walls, GWK supports the farmers who supply it by advising on sustainable agriculture practices, including soil management and irrigation scheduling, that are focused on optimising the use of natural resources. This collaboration ensures that GWK gets the best possible raw materials and that farmers have an assured off-take for their product.

By innovating and exploiting intelligent technologies that reduce operating costs, minimise the factory's impact on the environment, and make it highly efficient, GWK



Farm Foods demonstrates that the business case for sustainability is very strong. By collaborating with its supplier farmers, GWK is assured of supply and quality and enables sustainability for its suppliers. The ripple effect of a sustainability focused approach is almost limitless.

Listening is a competitive advantage

GWK's approach has also proved the benefit of responding rather than dictating to the end customer.

"We ensured that we thoroughly understood the size of the category for pasta and what needed to be done from a product development point of view," says GWK managing director, Pieter Spies. "For biscuits, we made absolutely sure that we have the right flavours, cutting-edge innovation, and the best taste profiles. For our wheat flour, understanding the results required for the baker was pivotal in all our planning."

GWK's in-depth research into consumer preferences had a direct impact on its choice of technology for the factory. It also assured the company of a ready and growing market for its output and, as a consequence, of an early return on its investment in best of breed technology. In addition, GWK's market research has reduced its cost of marketing because consumers are actively seeking out

products that are socially and environmentally responsible.

In other words, GWK is taking full advantage of the recent shifts in agriculture that have made it a demand-pulled service industry.

One of the primary consumer requirements GWK Farm Foods fulfils is knowledge of the origin of the product. Its products are named for the farms from which their raw materials are sourced, clearly demonstrating their local origin.

GWK is also partnering with other South African FMCG players in the development of agricultural products tailored to their individual needs. GWK works closely with its farmer-shareholders and maintains these important relationships which contribute to the food production value chains of multinational FMCG partners. Examples include ground nuts and durum wheat. This is another way in which GWK's origin on the farm comes to life.

Diversifying the skills base

GWK's approach also illustrates the commercial advantages of another sustainability principle advocated by the bank: that of exploiting skills outside of the traditional scope of the industry. Agribusinesses used to be run by agricultural specialists. But, as GWK has done in employing a managing director

who has a track record in the international fast moving consumer goods (FMCG) sector, agribusinesses are tapping into many different sector disciplines in order to extract optimal value from agricultural activity. They are also using innovation at all levels as a competitive advantage.

Integration along the entire supply chain is another strategy vital to success in modern agriculture. The more farmers participate financially up and down stream, the bigger their share of the consumer's wallet. "By the same token, their participation propagates synergies throughout the value chain, reducing costs and boosting efficiencies. This amplifies profitability in the chain while reducing shelf prices for consumers.

As GWK has shown, a value chain that offers a comprehensive basket of products can obtain a much larger share of the market, adding the profound benefits of economies of scale to the sustainability scenario.

Controlling your destiny

Mr Spies says that alignment with the correct partners up to and onto the shelf is absolutely crucial. "Because we offer premium products with authentic origin, top-end retail is key. Our strategy of using the best technology and honouring the farmer's produce has allowed us to take ownership of the value chain – including retail relationships - while keeping cost as low as possible."

Inherently, as agricultural sustainability as exemplified by companies like GWK deepens, so it becomes attractive as an investment destination. Agriculture is becoming a distinct asset class, capable of delivering significant returns to external investors and, thereby, increasing its ability to transform local and national economies.

In the end, sustainability comes down to strong, agile, innovative, socially conscious, economically astute leadership of the agribusinesses that form the links in the value chain. Organisations like GWK are showing the profound transformative power of a value chain in which collaboration and integration drive success for all the individual players that have a stake in it. It really is a case of "all for one and one for all".

Standard Bank Senior Manager: Secondary Agriculture, Bertie Hamman

A fair deal

Women farmers flourish in Cape tea empowerment venture

"MEN seem to think we women can't do anything without them, but I reckon they are a little surprised when they see what we girls can do these days," says Maria Kotze, vice-chair of the world's first organic rooibos co-operative to be certified by Fairtrade, a global organisation that advocates gender equity and sustainability in the farming sector.

"Ons gaan lê nie plat nie [we don't lie down]," says Kotze, 43, a tough go-getter from a historically disadvantaged community of emerging tea farmers near Nieuwoudtville, Northern Cape.

Kotze's "Heiveld" co-operative represents one of the province's most successful examples of women empowerment – a central aspect of member certification through the Fairtrade organisation, which is active in 74 countries.

Kotze says the organisation's gender-equity model – which requires increased female land ownership, participation in the smallholder management as well as equal profit access – is key to the co-op's success.

In Heiveld's case, empowerment standards have been so effective that the business now supports around 40 men to 30 women, nine of whom co-own plots ranging between 48 en 82 productive hectares.

"We no longer sit around at home, waiting for the men. The money comes straight into our bank accounts. Set hours. Set salaries," says Kotze, a single, child-free woman. "I support myself and my mother. My father died recently. He was my sower, but life goes on."

Founded in 2001 by 14 small-scale farmers through the government's land-reform programme, the co-op comprises 10 smallholdings that yield between 50 and 80 organic tons of South Africa's most famous tea export every year, excluding 2016 in which 30 tons were produced due to the drought.

The co-op is organically certified through French eco-label EcoCert, while Fairtrade promotes environmental sustainability by prohibiting certain pesticides. The organisation also connects member organisations to dynamic, developed markets where organic produce is in high demand.

The co-op exports cultivated and wild rooibos harvested by hand to 12 countries including Australia, the US, Canada and Japan, plus the EU. Kotze adds annual profit–R1.2-million last year–"helps support our schools, send our children to study further and pay for the elderly's medical care. It's worth the investment."

It's a far cry from the "old days", as Kotze puts it, when co-op members were forced to rely on renting facilities from commercial farmers "at a fortune".



Maria Kotze

"Now we can afford our own tea-processing facilities and are financially independent because we can charge premium prices for our products internationally, where Fairtrade is highly respected," she says.

To become a Fairtrade member, the co-op pays an annual certification fee of around €1 800 (R27 260) to independent global auditors FLO-Cert headquartered in Germany.

Kotze's mother Bet Sass, 65, says her lifestyle has "changed completely" since the co-op was certified in 2003.

"I used to live in a reed hut. Now my home is made of brick and mortar," says Sass.

Globally women make up 26% of Fairtrade's 1.5 million farmers and workers. "But the numbers do not necessarily include the female relatives who also make a crucial contribution to production," cautions Ana Lemmer, strategic communications and partnership co-ordinator, Fairtrade Label SA. "So we've refreshed our 2016 - 2020 gender strategy: we are expanding our analysis to get a better understanding of how these women are also impacted."

Kotze says the co-op's transformation into a gender-equal business is evident in her own life, empowering her more than she had once imagined possible. As vice chair, she has represented Heiveld as a speaker at sustainability conferences and buyers meetings in Swaziland, and across the EU.

"The first time I flew anywhere was to Paris in 2012," smiles Kotze. "I have seen beautiful places I never thought I would see. I have learnt so much. The only problem with all the air travel is having to sit still for far too long. Apart from that, life's good."

Nicola Paine

Best in the West

Two Western Cape women have won top honours at the National Female Entrepreneur Awards

Alan Winde, Minister of Economic Opportunities, congratulated Lindelwa Mabuya and Caroline de Villiers who were announced as national winners during an award ceremony in Polokwane on 25 August.

Earlier this month, in the Western Cape leg of the Female Entrepreneur Awards, Mabuya won the Best Female Worker and De Villiers was selected as the Top Entrepreneur Commercial.

Minister Winde commended the winners for their achievement. "Lindelwa and Caroline

serve as an inspiration to this country's agriculture sector. I am pleased that their hard work has been recognised nationally and I want to thank them for their commitment to taking agriculture forward."

Best Female Worker—Lindelwa Mabuya—Abagold Abalone Farming, Hermanus

Lindelwa has worked at Abagold for the past 19 years. She started as a general worker and was promoted to specialist abalone spawning manager in 2000. Her work entails spawning, settling, cleaning the brood stock and feeding them.

Top Entrepreneur Commercial—Caroline de Villiers, Themba Trees, Elgin

Caroline started Themba Trees in 2007 as a small tree farm. Today it is a large-scale business supplying young saplings and mature trees to government departments, landscapers, farmers, wine estates, residential estates, nurseries and wholesale nurseries throughout South Africa.

The other winners of the Western Cape Female Entrepreneur Awards were announced at a ceremony at Ashanti Estate in Paarl on 11 August 2016.

Minister Winde congratulated the winners.

"The women honoured by these awards serve as an inspiration to agriculture entrepreneurs across the Western Cape. They



(From left) Essolita Poole; Ashleigh-Ann May; Viona Kapank; Anastasia Smith; Caroline de Villiers and Lindelwa Mabuya

represent success in areas across the sector and will be valuable partners in reaching Project Khulisa's goals of adding 100 000 jobs to the agri-processing sector.

"I wish our winners well ahead of the national competition."

Best Subsistence Producer went to Viona Kapank of Haarlem Vroue Vereniging, Haarlem.

Haarlem Vroue Vereniging, led by Viona Kapank, is a community garden in Haarlem, tended by women farming with vegetables. The garden was started in 2013 by a group of unemployed women looking for a source of food security. They also donate to their community.

Top Entrepreneur Smallholder went to Anastasia Smith of Antastasia's Fresh Farm Produce, Atlantis.

Anastasia started a small vegetable farm in 2012. Since then her formal and informal markets have grown to such an extent that she had to increase her production. Anastasia

stood out for her passion and dedication to her business.

Top Entrepreneur Processing—Essolita Poole, Hopefield Abattoir, Hopefield Essolita started her business in 2001, slaughtering 800 broiler chickens per week. Her business has grown and now deals with plus minus 4000 broiler chicken per week. In addition, the abattoir slaughters 1000 rabbits per month and 500 other poultry such as ducks. The abattoir is the only registered Kosher abattoir in the Western Cape and also caters for the Halaal market.

The Ministerial Award (Youth) went to Ashley-Ann May of Latana Cheese, Oudtshoorn. Ashley-Ann is responsible for the cheese-making at Latana Cheese, a small cheese company manufacturing cheese in the traditional way. This process includes no chemicals, colourants or taste substances. Ashley-Ann's duties include management of the planning, making the cheese, to getting it ready for the market.

"The women honoured by these awards serve as an inspiration to agriculture entrepreneurs across the Western Cape"



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Making the most of the land

Government to promote multiple land use

The Department of Agriculture, Forestry and Fisheries will finalise the development of its agroforestry strategy this year to promote multiple land use.

"It is expected that the strategy will promote multiple land use, address food security, and most importantly, offer short-term alternatives for growers who have to wait for a long period of time before realising their harvest in the timber production enterprises.

"The roll-out of the strategy will be tested with identified pilots and will take effect from the next financial year. The final product will be a culmination of extensive consultations with all relevant stakeholders such as farmer and grower representative organisations, NGOs, academic institutions and community based organisations," Agriculture, Forestry and Fisheries Minister Senzeni Zokwana said at the launch of National Arbor Week.

The launch was held on Thursday at Nkawkank Stadium in Tzaneen, Limpopo. The theme for this year's Arbor Week is "Forests and Water". Minister Zokwana said the theme was particularly important, given the effects the drought has had on South Africa.

"Our country has been severely affected by drought, which led to water resources being affected adversely.

"As we promote tree planting, we encourage the planting of indigenous species that save water and practises such as agroforestry, which build diversification and resilience, especially for small and medium farmers and growers," said Minister Zokwana.

Projects to be profiled in 2016/17 and 2017/18 include:

- One tree, One child, which focuses on the greening of schools
- Move it - Moving matters. The project involves 40 schools in Soweto, focusing on physical education. Trees and vegetable gardens will be integrated into the project.
- A furniture making project led by Safcol in Mpumalanga.
- Forest of Remembrance projects in KwaMakhutha and Ingquza Hill.
- The Living Laboratory for Research on Agroforestry, in partnership with the Nelson Mandela Metropolitan University (George Campus).

These projects were identified following the XIV World Forestry Congress hosted by South

Africa in 2015. The congress, which took place in eThekweni Municipality in KwaZulu-Natal, was held under the theme 'Forests and People: Investing in a Sustainable Future.

During the congress, it was decided that in order to leave a living legacy, certain initiatives need to be developed and sustained to benefit South Africa.

The department, in conjunction with the Institute of Environment and Recreation Management (IERM), has conducted the National Arbor City Awards Competition to encourage municipalities to undertake greening initiatives, especially in previously disadvantaged areas.

"The department and other role players are trying to promote environmental conservation and development, thereby securing a healthy living environment for all. It is a known fact that in the past dispensation, the provision of services was not done in an equitable manner. The same approach applied to the provision of greening services," Minister Zokwana said.

He, however, warned that the awards should not be viewed as a competition, but more of a programme that provides incentives to those who have gone the extra mile to green their areas of jurisdiction.

"The Arbor City Awards is definitely not only a competition, since the adjudication process gives an opportunity to share experiences. It is also a platform for networking and improving partnerships between national and local government and institutions such as the IERM.

"All the participating municipalities will benefit from programmes within the department especially where specific areas of support and needs were identified," said Minister Zokwana.

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SA moves to secure water sources

The Department of Water and Sanitation (DWS) is consulting stakeholders to get inputs on the National Groundwater Strategy.

The strategy is aimed at ensuring water security in South Africa and to optimise water resource management.

Consultations are taking place throughout the country. Last Thursday, stakeholders in Mpumalanga were engaged for their inputs and comments.

The stakeholders in attendance came from different sectors including municipalities, government departments, mining, agriculture, industries, service providers, NGOs and SANParks.

The public can access and view the National Groundwater Strategy document on www.dwa.gov.za/Groundwater/NGS2016.aspx and can also submit their inputs and comments via the email address: NGS@dws.gov.za.

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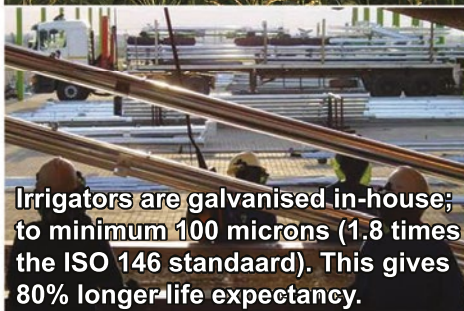


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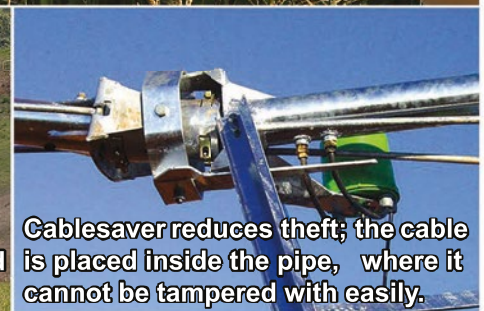
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