CAREERS IN AGRICULTURAL RESEARCH
This career guide was produced by the South African Agency for Science and Technology Advancement, a business unit of South Africa’s National Research Foundation, with assistance from the Agricultural Research Council.

www.saasta.ac.za
www.arc.agric.za

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If you think agriculture is just about planting seeds and tending animals, think again. Agriculture is about providing safe, affordable and nutritious food – for today and for the future – while also protecting our natural environment.

The demands on agricultural research will continue to increase as the world’s population grows and a changing climate presents a host of new challenges to farmers.

For farmers to continue producing food and fibre for more and more people, researchers must continue to develop improved crops, healthier animals and more productive farming methods. These researchers must also help to protect our country’s precious biodiversity by developing environmentally friendly farming methods, for example by replacing harmful pesticides with safer bio-control methods.

Agricultural research is a diverse field – ranging from cutting-edge work at the molecular level to engineering high-precision equipment for commercial farming. In a country like South Africa, there is also a huge need to help emerging farmers who play a key role in rural food security. Agricultural research includes cutting-edge work on processing, preservation and packaging of a wide variety of foods, and developing novel convenience foods and so-called “smart foods”. That is why there is a role for engineers, biologists, veterinarians, food scientists, microbiologists, communicators, marketers, analysts, administrators, environmentalists, managers, economists, technicians and even mathematicians, statisticians and physicists in agricultural research.

‘Where do I sign up?’

You can apply to the institutes listed on the next page for Bachelor’s degrees, technical degrees and diplomas. For some courses Maths and Science are required, and Biology and Geography would also be helpful. It is best to check each university’s requirements on their individual websites. If you did not take the right subjects at school, be sure to check if universities or colleges offer bridging courses.
Start exploring at these web sites …

Cape Peninsula University of Technology (www.cput.ac.za)
Faculty of Applied Science

Central University of Technology, Free State (www.cut.ac.za)
School of Agriculture and Environmental Sciences

Elsenburg Agricultural Training Institute (www.elsenburg.com)

Nelson Mandela Metropolitan University (www.nmmu.ac.za)
Faculty of Science

North-West University (www.nwu.ac.za)
Faculty of Agriculture, Science and Technology

Rhodes University (www.ru.ac.za)
Faculty of Science

Stellenbosch University (www.sun.ac.za)
Faculty of Agrisciences & Faculty of Science

The Grootfontein Agricultural Development Institute
(gadi.agric.za)

UNISA (www.unisa.ac.za)
College of Agriculture and Environmental Sciences
College of Science, Engineering and Technology

University of Cape Town (www.uct.ac.za)
Faculty of Science

University of KwaZulu-Natal (www.ukzn.ac.za)
College of Agriculture, Engineering and Science

University of Limpopo (www.ul.ac.za)
Faculty of Science and Agriculture

University of Pretoria (www.up.ac.za)
Faculty of Natural and Agricultural Sciences
Faculty of Veterinary Science

University of the Free State (www.ufs.ac.za)
Faculty of Natural and Agricultural Sciences

University of the Witwatersrand (www.wits.ac.za)
Faculty of Science

About South Africa’s Agricultural Research Council

The Agricultural Research Council (ARC) is one of the first places you can look to for funding and career opportunities. Established in 1990, it is South Africa’s principal agricultural research organisation and has institutes across the country.

By studying the role of soil, water, air, plants, animals and other living things in forestry and agriculture, the ARC helps us make better use of our natural resources. They also ensure that their research is applied in industry and shared with society to improve the quality of life for all South Africans. After all, knowledge is power, and even more so when it comes to knowledge about producing food and fibres such as cotton, wool and wood.

The ARC places special emphasis on empowering rural and poor communities with knowledge to help them participate in the country’s economy. This stimulates local production, processing and marketing, which goes a long way towards building a better South Africa.

A career in agricultural research is a certain path to making a real difference!
Azwihangwisi grew up in a rural village in Limpopo. His family had a few goats, cattle and a vegetable patch. Living so close to the land, he was always curious about how rain, soil and grass affected the biological processes of plants and animals. But his school did not have access to microscopes and other scientific equipment.

“My decision to pursue agricultural science, and animal science in particular, was therefore a natural one,” he says.

“Success is 99% hard work and 1% talent”

“The first few months of my first degree were quite tough since I had a lot of catching up to do due to my ‘not so good’ background from a village high school,” he says. But Azwihangwisi rose to the challenge because growing up as part of a farming family had given him a good work ethic. “My advice to young people who want to pursue a career in science is that it does not matter what your background is. What matters is your resolve to reach your goal no matter what the circumstances are. My own view about success is that hard work is far more important than talent,” he says.

“Local is lekker”

At the ARC’s Animal Production Institute, Azwihangwisi and his colleagues are looking for the genes that make Nguni cattle more tolerant than other breeds to blood-sucking ticks. If they find those genes, they will be able to breed highly tick tolerant animals. This will increase beef production and may even help protect the environment against the harmful chemicals that are currently being used against the ticks. “The focus of my research is to better understand our own breeds of cattle that are well-adapted to our conditions. Information about our breeds will be useful in building a highly informed farmer who responds to the needs of the country,” he says.

Science is the right choice

Azwihangwisi says that choosing science as a field of study will open doors to many funding opportunities and bursaries. He adds that science can help to solve South Africa’s many social challenges, and, from his own experience, it is “cool” to be a scientist.

“Hard work is far more important than background or talent!”
The best weapons against poverty are education and agriculture, says Ivy, who works on vaccines against livestock diseases at Pretoria’s Onderstepoort Veterinary Institute.

**Healthy animals, healthy people**

Ivy studies animal immune systems and how we can make better vaccines to help protect animals against disease. “The vaccines that we are trying to develop are based on genetics and DNA, which means that we are not using any live bacteria or viruses to make them. They will therefore be much safer than existing vaccines,” she explains. She adds that better vaccines will benefit communities, farmers and the economy, and that healthier animals will improve South Africa’s livestock trade, both locally and internationally. “If our animals are healthy, our people will be too,” she says.

**Unity in diversity**

Research has the potential to solve many problems, but South Africa does not have enough scientists, says Ivy. “Agriculture is one of our greatest assets as a country and it requires constant improvement and investment.” She explains that agricultural research in particular can involve scientists from many different fields, including physics, botany, zoology, soil science, genetics, economics, veterinary science, climate science, forestry, engineering and microbiology. As an example of this diversity, she mentions the 2013 discovery by German physicists that plant seeds can be protected from bacterial and fungal infections by treating them with electrons, rather than chemicals.

**An inquiring mind**

Ivy always wondered how the cells and molecules of living things worked, and she was inspired by the scientific discoveries of vaccines and antibiotics. She knew that she wanted to be someone who made those kinds of discoveries. She enrolled for a BSc degree at the University of Limpopo and later completed a PhD in Biochemistry at the University of Pretoria. Despite all the hard work, she really enjoyed her time at university. She says her passion for science, as well as financial support from the government, got her to where she is today.
“What is more exciting and important than contributing to knowledge generation?” asks Dr Aart-Jan Verschoor, who heads a team of nine agricultural economists. They assess the impact of past and potential research to help scientists focus on priorities, and to illustrate the importance of agricultural research in society.

Hooked on science
Aart-Jan was hooked after just one year of studying Agricultural Science. All he wanted was to do research, expand the frontiers of knowledge and explore new ways of feeding the world. “It’s impressive how research makes a huge contribution to improving crops and animals so that the growing population of the world can be fed,” he says.

Breeding for bread
Part of his job is to show potential funders just how important agricultural research really is. For example, he says, they have determined that South African wheat crop yields have grown by 300% since 1970. “That means you can now get three times more grain from a hectare of land than 40 years ago. This remarkable achievement is largely because of new cultivars that were developed through agricultural research.” His team also helps the ARC determine which research topics would be most beneficial, especially in terms of social needs and environmental pressures. “It’s exciting to see how the investment made on behalf of the tax payer is actually resulting in better technology that benefits all South Africans,” he says.

“We need more agricultural economists”
Aart-Jan says the ARC, which is home to over 500 researchers, needs more people to do what he does. He became an agricultural economist by obtaining a PhD in Agricultural Economics and Development. He says hard work and diligence at university will pay off. “You also have to be adaptable, be prepared to move out of your comfort zone and be able to work with different types of people who think and do things differently. Nothing in life that is worth something, comes without effort,” he says.
David looks at how we can control weeds using natural, biological methods. He is part of an advisory panel to the Working for Water Programme and leads an international research project that involves the exchange of scientists between the ARC and Argentina.

“South Africa is leading the pack”
David’s research is helping to keep South Africa in the top three countries in the world involved in weed bio-control. “In certain research areas, including the three weed species in which I am personally involved (lantana, Mexican sunflowers and balloon vine), South Africa is leading the pack,” he says. He adds that while agricultural research is important for food security in South Africa, it also addresses the protection of biodiversity and the environment. This is where his research comes in.

Invasive aliens
Scientists can use insects, bacteria, viruses, funguses and other disease-causing agents to control invasive weeds biologically. For example, David’s team has tested the safety of using a seed-feeding weevil against the South American alien plant known as balloon vine. This weed threatens biodiversity in Mpumalanga and KwaZulu-Natal. David reckons that bio-control is the only sustainable and environmentally friendly way to control alien invaders.

“Those myths are false”
David says that when he started his career, not much was expected from a black researcher. “I had to go the extra mile and work extremely hard.” But his advice to all young people is to do the same: they must work hard to make sure they remain relevant and become nationally and internationally recognised. He also says certain beliefs about agriculture, like that it is not a prestigious career, are simply not true. On the contrary, agriculture needs agronomists, animal and veterinary scientists, agricultural engineers, manufacturers, economists, farmers, policy makers, sales people and more. “Young people can always find their niche in agriculture, whether based ruraly or in the city,” he says.
In 1976, after matric, Ansie started working at the ARC’s Plant Protection Research Institute as a technical assistant. She was responsible for the spider component of a project that looked at the environmental effects of certain pesticides. This is when her love of spiders first started.

**Women in science**

“Agricultural research is for people who love the outdoors,” says Ansie, who completed her BSc degree through UNISA and later finished her studies with a PhD from the University of Johannesburg. “In my case I was working while studying and that gave me a good opportunity to immediately apply my new knowledge at work,” she says. Now she is a specialist researcher, an extraordinary professor at the University of Pretoria and the project manager of the South African National Survey of Arachnida (SANSA). “In the earlier years women were not sent to university by the government and they needed to pay for themselves.” Luckily, she says, this is no longer the case and there are now many different agricultural qualifications and job opportunities in government, science councils and industry.

**A web of spiders**

Ansie discovers and describes new species of spiders. She is currently working on an atlas that shows how South Africa’s 2060 species are distributed across the country, as well as a full colour book about the spiders of the Savanna biome. She is also in the process of publishing a review of all South Africa’s crop and orchard spiders that have been sampled in the last 30 years.

**“The farmer’s best friend”**

Spiders are natural, “greener” alternatives to pesticides, says Ansie. These eight-legged creatures thrive on crops throughout the year, and they feed on pests. This is why Ansie and her colleagues call them the “the farmer’s best friend”.

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**Dr Ansie Dippenaar**

*Specialist researcher: Spiders*

“AGricultural research is for people who love the outdoors!”
Hangwani is completing his PhD at the ARC’s Grain Crops Institute in Potchefstroom in the North West Province and is hoping to graduate soon. “I have learned that the harder you work the more successful you become, and soon you grow into a figure to be reckoned with,” says Hangwani, who spends his days in the laboratory, the greenhouse or the field. In the lab, he prepares bacterial cultures and analyses DNA from plants and bacteria. In the greenhouse, he waters and harvests plants, and checks how they respond to diseases. “In the summer months I plan and plant field trials, maintain them, evaluate diseases and collect and record data,” he says.

Hangwani’s goals
He hopes one day to develop his own crop varieties and to train young scientists like himself in agricultural research. “I want to do something that will be helpful to our communities, especially to farmers and unskilled labourers,” he says. “It is important to remain humble, though, since you can learn a few important things from farmers and farm workers.”

Feeding the world
Through agricultural research, Hangwani hopes that he will help farmers to produce better crops and achieve higher yields. He is excited about the prospect of making a real difference to people’s lives and livelihoods. “It feels great to play a part in feeding the masses, and also in presenting your own research findings to colleagues,” he says. “South Africa remains an economic stronghold in Africa, so if we can improve agricultural science locally, we can also help the rest of the continent,” Hangwani believes. “South Africa needs more researchers so that we can deliver home-grown solutions to feeding Africa’s ever-growing population.”

Knowledge makes you competitive
He advises young people to “seize study opportunities” because knowledge allows one to grow and be competitive in one’s career. He has found that in addition to job opportunities in government and science councils, agricultural researchers are also in demand at companies that focus on improving and developing new crop varieties or producing seeds.

“It feels great to play a part in feeding the masses!”
Agriculture is a huge social and environmental responsibility for mankind, says Ben. “We must feed our people and improve their quality of life, but at the same time we need to take care of biodiversity and the life-supporting ecosystems we depend on. He recounts a proverb to illustrate: “Once all the trees have been cut down, all the fish been caught and the last river polluted, only then will man realise that he cannot eat money.”

**Beefing up with DNA technology**

Ben manages a team of about 50 researchers, technicians, animal attendants and administrative staff who use genetic technology and data to improve beef production on farms. For both farmers and meat eaters, this means more beef and better quality meat. Ben also studies the African buffalo. He wants to understand how DNA technology can help us find links between the buffalo’s natural surroundings, their behaviours and the diseases that affect them.

**The ‘wow’ factor**

“It is very rewarding to see how young scientists develop,” says Ben, “especially to witness a young scientist that appreciates the ‘wow’ of science and nature.” He adds that these young researchers have a bright future ahead of them since the field is probably one of the top job creators in South Africa. “It is one of the most important sectors since it is responsible for food security and improving the quality of life of all people - if you want to make a difference, agriculture is one of the best sectors to do it in!” He says young people are needed to create awareness of new knowledge because they are quick to adopt advanced technologies and new ways of thinking.

**The power of positivity**

Although Ben found it tough to work and attend university at the same time, he enjoyed field trips, learning new techniques and socialising at the end of a difficult week. He paid for his studies using loans and bursaries. “I have a lot of sympathy for young people who struggle financially. Remember, money does not guarantee success. Getting good grades is all about yourself and having a positive attitude about work and life.”

“We need young people in agricultural research, since they are quick to adopt advanced technologies and new ways of thinking.”
Justin’s research aims to find and use beneficial organisms in the fight against harmful insects. This method of biological control needs to be applied in a way that is both friendly to the environment and affordable for farmers.

Nature’s remedy
Not all insects are harmful to crops, but there are certain pests that threaten food security, especially in Africa, says Justin. Farmers use chemical insecticides to kill these pests but more and more plant-feeding insects around the globe are becoming resistant to pesticides. In South Africa, 16 insect pest species are known to have some level of resistance and they pose a threat to our crops. Farmers respond by using higher doses of insecticides, which harms the environment and puts the welfare of animals and people at risk. Another problem with insecticides is that they often kill beneficial insects along with the harmful ones. A natural, safer alternative would be to use microorganisms that infect and/or deter pests without harming the plants or other insects. His team is evaluating such a solution in the form an endophyte – a fungus that targets insect pests while growing harmlessly in wheat.

The perks of the job
Justin divides his time at work between his office, a greenhouse and working in the field, and the greatest perk of the job is attending national and international congresses. “There are few better career choices than science to feed an inquisitive mind,” he says. “To me, agricultural science calls for the responsible exploitation of the natural environment for the benefit of human-kind. Food security impacts every person on Earth and it is here where I, as an agricultural scientist, can make a meaningful difference.” He says factors like food security, harmful chemicals and an increase in small-scale and emerging farmers have created opportunities for young agricultural researchers. “In these fields they can enjoy an innovative and rewarding career that contributes to finding social, environmental and economic solutions”.

Thinking out of the box
“Economic growth is fuelled by innovation and research is the catalyst inspiring scientists to achieve this,” says Justin. “South Africa needs innovative scientists, those so-called ‘out-of-the-box’ thinkers.” He says that being motivated by the very nature of what one is studying is the key to success in any career. “You don’t have to be an Einstein to succeed, just a passionate, hard-working individual!”
Lerato studies the unintended effects of producing genetically modified plants, with a special focus on fungal diseases. Her work forms part of her PhD in Biochemistry. She works at the Horticulture Division of the ARC.

Put on your lab coat

Researchers use scientific results to prove or disprove their expectations and predictions, which are collectively known as hypotheses. When a researcher manages to prove a hypothesis the job is very rewarding indeed. For Lerato, laboratory work and experimentation is the most crucial component of agricultural research. “With the current climate change realities we are facing, we need to develop new kinds of products able to cope with changing environmental conditions. It is very rewarding to work on products that have the potential to benefit food security, and help South Africa’s economy,” she says.

Agriculture is about more than just farming

“In some cultures, agricultural research is not common.” Lerato says it can be difficult to explain that agricultural research is not always about working in a field, driving a tractor or owning a farm. “Agricultural research means any form of research one conducts towards improvement of agriculture,” she explains, adding that even those in project or financial management careers can play a role in advancing the field. She started her career with a Bachelor’s degree in Biological Sciences from the University of the Free State. After that she went on to do an Honours degree in Genetics and a Master’s in plant science at the University of Pretoria. “You are only recognised as a scientist once you have a PhD and start to deliver outstanding, peer-reviewed research,” she says. This requires a full-time commitment for a number of years, which could lead to financial pressures for students. Lerato overcame these and other pressures with the help of the ARC and her family.

“We need to grow and groom researchers in South Africa”

Lerato points out that food security has become a huge issue in a mostly dry country like South Africa. And, climate change is aggravating the situation both in terms of the availability of water for farming and damage to crops by new pests and diseases. Smallscale and resource-poor farmers are most at risk, which is why South Africa needs researchers to develop drought-, pest- and disease-resistant crops, as well as eco-friendly biological pesticides. Such local agricultural solutions could also see the country becoming more self-sufficient, she says.

“Local agricultural solutions can make South Africa more self-sufficient.”
As a child, Lizette was fascinated by the stereotypical “test tube” scientist who performs experiments to discover new information. “I found science much more interesting than grammar,” she remembers.

The science behind food
After school, Lizette completed all of her food science degrees (BSc, BSc Honours, MSc and PhD) at Stellenbosch University. “Remember that Maths and Science are absolutely essential if you want to follow this career path,” she says. Although Food Science is considered one of the more difficult courses, she enjoyed the challenge, especially at a postgraduate level where she was able to work at her own pace on a specific research project. During her time at university, Food Science was not appreciated as a discipline and it was undervalued. In addition, there was still stereotyping at the time that “women are not real scientists”.

Rooibos is good for you
Now Lizette is a specialist scientist at the ARC’s Institute for Deciduous Fruit, Vines and Wine, where she focuses on herbal teas like rooibos and honeybush. She develops tools and optimises processes to ensure that better quality products reach consumers. She also investigates the health-promoting properties of herbal teas. Her daily activities include project planning and problem solving with her co-workers and students. One of the highlights of her job is training motivated students and seeing them graduate, knowing that she helped to foster their critical thinking. She also enjoys the freedom to plan and execute research, and to find solutions that satisfy the ARC’s clients.

Part of the puzzle
“Research is knowledge creation – we are in the business of creating solutions to agricultural problems, which will eventually benefit everybody, whether through cheaper food, more nutritious products or healthier food,” she says. Even small scientific discoveries are exciting, she adds, because it forms part of the puzzle, even when the bigger picture is not always clear. “Science, and specifically research, creates new knowledge and solutions that could lead to economic growth. Research is an investment in the future,” says Lizette.

“Even small scientific discoveries are exciting, because it forms part of the puzzle, even when the bigger picture is not always clear.”
“The great thing about agricultural research is that it is not limited to one field or industry but incorporates a diverse range of skills,” says Lucio, a citrus breeding technician at the ARC’s Addo Experimental Farm in the Eastern Cape.

It’s worth the wait
The citrus breeding programme has been running since 1974 and is the only one of its kind in South Africa. “In these long-term programmes scientists may have to wait up to ten years for results, but it gives us a great feeling when we manage to create an improved cultivar,” Lucio explains. To do this, researchers selectively breed citrus plants with favourable qualities, such as disease resistance or a high fruit yield. They try to combine all these positive traits in one type of plant. Lucio and his colleagues are developing improved scion citrus cultivars for cooler climates using conventional breeding methods. A scion is a young shoot or twig of a plant that can be grafted, or joined, to a root system to make more plants.

Doing what you love
Lucio obtained a B-Tech in Agricultural Management from the Nelson Mandela Metropolitan University. “For the first time I was actually doing something I loved and always wanted to do,” he says regarding his studies. Since being introduced to Biology at school, his dream was to be a plant scientist. His advice to young people interested in the field: take Biology, Agricultural Science, Physics, Geography and Mathematics as subjects in school.

A rural background won’t stop you
Lucio faced some obstacles along the way, including transport and accommodation costs, and fitting in at a big city university. But, he says, he was fortunate to be in a class with other students who shared his background and experiences. Because many students might have the ability to succeed while lacking the means, he advises that students should decide on their career path by the time they reach grade 9. In this way, they can choose the right subjects and investigate all the funding opportunities from universities, businesses and government. “Study hard and make your career your passion. If you do that you will enjoy and love what you do,” says Lucio.

“Study hard and make your career your passion!”
Agricultural research and development seeks to feed the world’s population, while preventing biosafety problems that may affect human health and the environment,” explains Lucky, a senior scientist at the ARC’s Animal Production Institute in Pretoria. He is also involved in the South African Veterinary Council, the Board of Governors of the International Embryo Transfer Society and advises the office of the Ministry of Agriculture, Forestry and Fisheries.

Fuelling the fire
Lucky says agricultural issues encourage ongoing social and religious debates because of the complex interplay between humans and their environment. Recent examples include bird flu, mad cow disease, in vitro fertilisation and food produced from genetically modified organisms. He says the “green revolution” and global warming are also interesting factors affecting current agricultural research.

Home-grown steers
His specific research focuses on using new reproductive technologies to upgrade the cattle of emerging farmers. He says South Africa currently imports steers from Namibia for beef, but if we could improve production among the 5,7 million cattle in emerging sectors, rural farmers could participate more effectively in South Africa’s market and contribute to our GDP. This project forms part of the Department of Science and Technology’s goal of creating a knowledge-based economy in South Africa, and the project’s success will be measured by how well science can be combined with traditional, basic farming techniques.

We need you!
Lucky says it was not easy to obtain his qualifications during the apartheid era in South Africa, and that there were negative perceptions around agriculture. But he says students need to know that everything around us is linked to agriculture in some or other way. As such, there are many different career paths and the right skills are scarce. He quotes US president George Washington who said, “I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture”.

“Everything around us is linked to agriculture in some or other way.”
Since childhood, Mardulate wanted to discover everything there is to know about agriculture. “As a kid, I always loved to work with plants,” she remembers. “I even had a small vegetable garden at my home where I used to plant several veggies and even sugar cane.”

Juggling work and play
Now Mardulate is busy with an MSc in Agronomy at the University of the Free State. She is researching innovative water conservation systems and how to adapt these systems to increase crop yields. “Being part of the ARC as a postgraduate is a blessing because of financial support,” she says. But, even during her first few years of study at the Universities of Limpopo and the Free State, she was fortunate enough to get funding from the National Student Financial Aid Scheme (NSFAS). She says many students might experience financial pressures but that it is important not to let one’s background or circumstances get in the way of hard work. At the same time, she says, work must be balanced with play. “Schedule your time properly and you will enjoy studying.”

“We all have to eat”
“I believe my work has a huge impact since we are doing research to assist those who are in need or unable to solve their farming problems,” says Mardulate. “We all have to eat, so we need to invest in skills to improve food production.” To her, being an agricultural researcher means being able to give advice to small-scale farmers and contributing to food security in South Africa. She adds that agricultural research helps us minimise waste by optimising food production.

Adapting to climate change
“Agriculture depends highly on the climate. We can’t necessarily control climate change but we can adapt our farming methods to sustain agriculture in the face of these new pressures,” says Mardulate. For her, hydroponic farming, which involves growing plants using nutritious water instead of soil, is an exciting alternative to conventional methods.
“Science is life,” says Martha, who tests medicinal plants for resistance against nematodes at ARC’s Vegetable and Ornamental Plant Institute. “Nematodes are tiny worm-like animals, sometimes invisible to the naked eye,” she says. She is in her element perched in front of a microscope, observing their wonderfully unique shapes and behaviours. Martha nurtures her nematodes in a greenhouse and she explains that all treatments developed for real fields and crops are first tested on plants in a greenhouse.

**Human error**

Plant parasitic nematodes have successfully adapted to survive in many different ecosystems and unfortunately human error plays a major role in their spread. For this reason, Martha and her colleagues are developing a strategy to manage crop losses caused by nematodes and she will only be satisfied when her goals are achieved. “I have observed that the best researchers are those who care the most about their research.” In her view, passion and an eye for detail are essential qualities of a scientist.

**Be part of the engine driving South Africa forward**

Martha hopes to contribute to the United Nations’ Millennium Development Goals (MDGs), which include the eradication of poverty and ensuring environmental sustainability. She says the government needs dedicated problem solvers like agricultural researchers to develop food security programmes, sustainable management of pests and disease, better irrigation techniques and correct fertiliser applications. “The agricultural sector is an engine for our country’s social and economic growth.” In her opinion it is difficult, if not impossible, to develop a country without investing in social and economic agricultural programmes.

**You can’t go wrong with a career in agriculture**

“When I was at high school, I did not think I would ever be able to go to a university. Coming from a poor family, it’s a privilege for me to be where I am today,” says Martha. She was supported by the National Student Financial Aid Scheme (NSFAS) for her Bachelor’s in Agricultural Administration and, for her Master’s and PhD, she was funded by the ARC and the National Research Foundation (NRF). “Basically,” she explains, “your background should not stop you from achieving your goals. Dream big and believe in yourself.”

“Your background should not stop you from achieving your goals. Dream big and believe in yourself!”
As a junior researcher, Mkateko’s daily activities at Pretoria’s Onderstepoort Veterinary Institute include receiving, recording and processing specimens, evaluating bacterial cultures and identifying bacterial species.

**Opportunities**
Mkateko has a BSc degree in Biochemistry and Microbiology from the University of Venda, a BSc (Med) Honours in Medical Microbiology from the University of Limpopo and is currently writing up her MSc dissertation. Science is all about practical work, researching and reporting, says Mkateko, and it can be tough to meet deadlines. It is a lot of hard work, she says, but when one’s classmates also become one’s friends, it is possible to fit in a social life as well. “I strongly feel that it’s an exciting field,” she says. She advises students to obtain a postgraduate degree to ensure that more job opportunities will be available to them and that they should research these opportunities before enrolling for a qualification.

**A passion for science**
“I never wanted a career without diversity,” says Mkateko. “I never wanted a career that would bind me to one environment – I wanted to be in medical, industrial and agricultural fields. After my graduation I got an opportunity in agriculture and it has been five wonderful years.” She disagrees with the idea that agricultural science is only for “bright” students, saying, “I believe it’s for the dedicated and passionate.” For her, the biggest reward is knowing that she contributes to the safety of people and the health of animals. “When people are healthy, they will work. And when animals are not sick or dying, farmers benefit financially too,” she says.

**Our survival**
Agriculture depends on the land and its natural resources, and humans depend on agriculture for food. For this reason, Mkateko says humans need to take care of their environment in the same way they take care of themselves. “Food security and food safety are important for the survival of people and animals.”
For Petrus, the ultimate combination of knowledge involves both the “soft” biological sciences and the “hard” engineering sciences.

**Mentoring and problem solving**
At the ARC’s Institute for Agricultural Engineering, Petrus mentors his younger engineering staff by developing their original thinking skills towards innovative solutions. Their biggest challenge is balancing the time and budget of a project with high quality outcomes. “Every working day is different and I am still learning something new every day,” he says.

**Turning waste into wealth**
“We are currently working on a project to provide biogas digesters for rural communities in the Free State,” says Petrus. Within biogas digesters, micro-organisms break down biological waste into gas that can be used for fuel and generating electricity. These digesters will allow the community to supply all of their energy needs themselves and the left-over waste can even be used to fertilise their vegetable gardens. “Turning waste into wealth is exciting,” he says, adding that scientists and engineers are creators of wealth because they develop healthier, faster, cheaper and higher quality products. He says such creators of wealth will always be needed, whatever the state of the economy, and that they also create new jobs all the time.

**Need versus greed**
Petrus grew up relatively poor, and says that even today, he still does not waste water, food or electricity. “There is enough for everybody’s need, but not enough for everybody’s greed.” His humble beginnings equipped him with good values and determination, so he made the sacrifices he needed to in order to graduate from university. He obtained Science and Mechanical Engineering qualifications from Stellenbosch University, and says that it was a very demanding course. But, he says, students with the right attitude will succeed. He adds that self-development is actually fun and prepares one for a better life. “Through agricultural research we are facilitating the production of more affordable and healthier food for the nation, and we are making the world a better place,” he says.
The ARC’s Professional Development Programme is about creating opportunities for suitable candidates from previously disadvantaged backgrounds to develop and promote their existing skills, potential and talents to their ultimate benefit as well as that of the ARC, agricultural sector and the science and technology sector for the economic growth of South Africa.

One of the major factors leading to this project is the scarcity of adequately qualified and skilled natural scientists in the labour market. The development of this capacity, within the category of young agricultural graduates from disadvantaged communities and groups, is seen as the most important objective to be achieved through this programme.

**Conditions of Service**

Successful applicants are appointed on a fixed term contract basis for the duration of their study programme. The participants are mentored by ARC senior researchers and candidates are evaluated throughout the programme.
REQUIREMENTS (CANDIDATES)

This programme is aimed at benefiting South African citizens. Applicants must have an interest in pursuing a career in agricultural research and /or science and technology.

Applicants should be in possession of the following degrees or studying towards the following fields:

**BSc:** BSc (Engineering); BVSc;

**MSc:** Natural Science e.g. Botany, Biochemistry, Biology, Microbiology, Mathematics, Statistics, Physiology, Zoology

**PhD** candidates must be studying Natural Science e.g. Botany, Biochemistry, Biology, Microbiology, Mathematics, Statistics, Physiology, Zoology

Benefits for Candidates

Special projects, such as the Professional Development Programme, can contribute substantially to the development of young people for future employment within the science and technology environment.

**Full cover of study fees; mentorship; life skills training and a stipend**

Contact Persons & Details

Applications, together with a FULL CV and certified statement of your most recent academic record, must be sent to:

Manager: Human Resources Development,
ARC
PO Box 8783
PRETORIA
0001
- Attention: Mrs LK Molope
Tel: (012) 427 9859
Fax: (012) 430 5814
Email: Lorraine@arc.agric.za