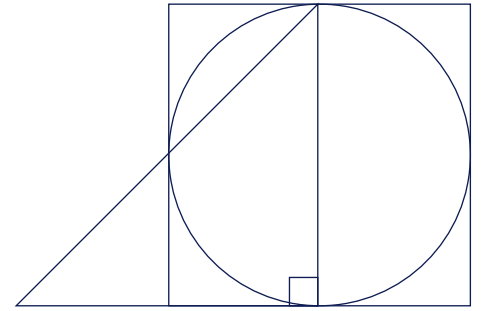


Report

05/06



Faculty of Natural and Agricultural Sciences



Faculty of Natural and Agricultural Sciences

Issued by:
Faculty of Natural and Agricultural Sciences,
University of the Free State

Editorial committee
Lacea Loader
Leonie Bolleurs

Language revision
Nanette Lötter

Revision of bibliographical data
Mercia Coetzee

Layout and cover design
Chrysalis advertising and publishing

Photographers
Gerhard Louw
Stephen Collett

Printing
Print 24

The Afrikaans version is also available on a compact disc
from the dean's office or on the university's website at
www.ufs.ac.za.

Cover page: Aspects of natural and agricultural sciences.

Contact details

Dean

Prof. Herman van Schalkwyk
+27 51 401 2535
hvs.sci@ufs.ac.za

Vice-Dean

Prof. Neil Heideman
+27 51 401 3855
heidemannj.sci@ufs.ac.za

Office of the Dean

Ms Lorinda Rust
+27 51 401 2322
rustl.sci@ufs.ac.za

Faculty Manager

Ms Corné Havemann
+27 51 401 2490
havemach.sci@ufs.ac.za

Liaison

Mr Nelis Maeder
+27 51 401 2531
maedecj.stg@ufs.ac.za

Physical address of the office of the Dean

Room 9A, Biology Building, Main
Campus, Bloemfontein

Postal address

University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Fax

+27 51 401 3728

Faculty website

www.ufs.ac.za

From the Dean's office



Prof. Herman van Schalkwyk.

The Faculty of Natural and Agricultural Sciences at the University of the Free State (UFS) leads the way in the practising of natural and agricultural sciences in South Africa and the highest levels of quality and credibility are reflected.

Our commitment, however, reaches far beyond just this. It reaches beyond the borders of the country and across continents; its multi-disciplinary and practical approach is vested in all the disciplines presented by the faculty.

In 2005/06 the Faculty experienced significant growth in measurable outputs. A contributing factor was the comprehensive apparatus strategy and plan which was implemented in 2005. With this strategy, university funds were used to leverage other funds in order to obtain huge discounts from suppliers of apparatus. In this way the faculty managed to obtain almost R50 million worth of apparatus in 2005.

The strategy was continued in 2006 when an agreement to the value of R7 542 531 was reached with Shimadzu, according to which apparatus was supplied to the faculty at discount prices. The agreement, which is valid for three years, entails the free replacement of apparatus which is purchased during this period with upgraded versions.

The new apparatus forms part of the UFS vision to compete internationally with quality research outputs in certain niche areas, to provide leadership in advanced training to students from the African continent and to establish the university as a leader among South African universities.

Two researchers with a B rating from the National Research Foundation (NRF) were also appointed. Both of these initiatives bore fruit and in 2006 the faculty increased its total research outputs by

about 13%. As an example, the Department of Chemistry's outputs increased by 100%.

The faculty has been bursting at the seams over the past couple of years. Student figures rose from 3 935 undergraduate, postgraduate and occasional students in 2005, to 4 224 in 2006. There is also strong representivity of students from other African countries and in 2005/06 almost 600 students studied at the faculty.

An extended B.Sc. programme has been presented to students since 2005. The programme aims at providing students who do not comply with all the requirements for the B.Sc. programme with the necessary sub-structure to complete the B.Sc. degree successfully. A preliminary evaluation of the results indicates that the programme is delivering the desired results.


The alignment of the Qwaqwa Campus, which was incorporated into the UFS in January 2003, remains a challenge. Regular discussions are held with staff on the campus in order to make the faculty's programmes more sustainable and to align it with the broader strategic plan of the UFS.

On a national level, the faculty is in the process of making its mark in terms of teaching and community service. In 2005 the faculty again actively began utilising its

experimental farms. A three-way agreement between the UFS, the National Farmers Union (NAFU) and the Mangaung Local Municipality led to the establishment of the Lengau Agricultural Development Centre on the Sydenham Experimental Farm. The centre provides training and mentorship to small-scale upcoming farmers.

To be dynamic and progressive requires innovative thinking. It requires commitment and a desire to deliver excellent teaching and learning opportunities to students. It requires a willingness to form partnerships, and a multi-disciplinary and practical approach to the tertiary education environment in South Africa.

This report covers the faculty's activities in 2005/06. It is a reflection of two years' commitment on the part of a team of skilled and motivated academics and support staff.

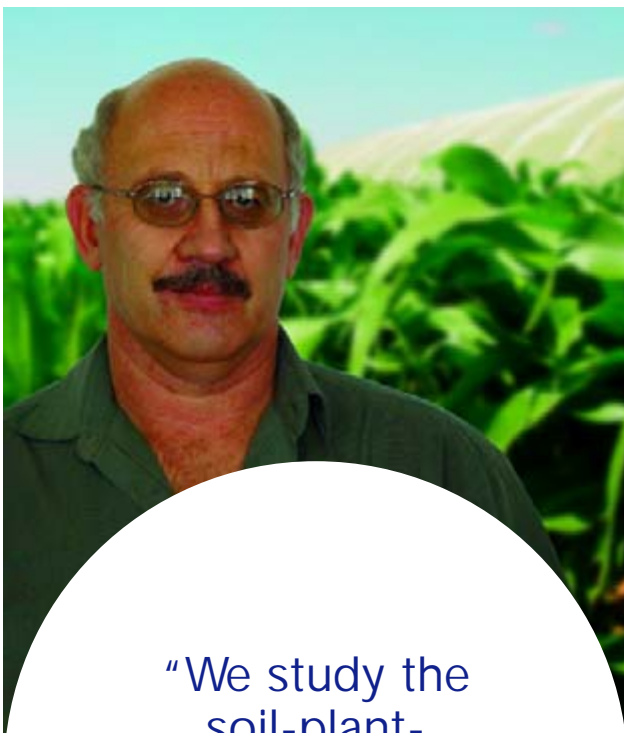


Prof. Herman van Schalkwyk

Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Department of

Soil, Crop and Climate Sciences



“We study the soil-plant-atmosphere system.”

Prof. Chris du Preez.

Overview

The Department of Soil, Crop and Climate Sciences specialises in the disciplines of Agronomy, Soil Science, Horticulture and Agrometeorology. In addition to undergraduate and postgraduate teaching in the four disciplines, the department also delivers important teaching contributions at the Centres for Sustainable Agriculture, Environmental Management, Disaster Management, Developmental Studies and the Department of Quantity Surveying at the UFS.

Over the past few years the department has shown growth not only in the number of undergraduate students but also in the number of postgraduate students. In 2005/06 an average of 36 masters and 21 doctoral students were enrolled. Approximately 40% of these students came from countries like Eritrea, Ethiopia, Kenya, Lesotho, Mauritius, Mozambique, Namibia, Swaziland and Zimbabwe. Twelve master's and eight doctoral students graduated.

During 2005/06 the department has managed to improve some of its infrastructure for teaching and research. Approximately R1 million was spent on apparatus such as a carbon analyser and a spectrophotometer. The climacabinets and the building in which they are situated were upgraded at considerable cost. These cabinets are used for the controlling of factors such as temperature, light and humidity on an hourly basis to test their effects on the growth and development of crops. The cabinets are now computerised, which improves their efficiency. Various improvements were also made to the department's experimental sites on the west campus of the Main Campus in Bloemfontein and at the Kenilworth Experimental Site.

In 2005 Mr Stephan Steyn, in conjunction with Prof. Sue Walker, initiated two community service projects which are still running. The *Lesedi FM* project uses Sotho-speaking students to deliver agricultural predictions and relevant information to the community on a weekly basis in an attempt to better inform young emerging farmers. In the second project, students erect automatic weather stations at certain schools in the greater Mangaung area. They then conduct lectures for learners and teachers on interesting weather-related themes.



Lysimeter unit at Kenilworth Experimental Site for water and salt balance studies.

At the initiative of Prof. Leon van Rensburg, an information day was held in 2005 at the Kenilworth Experimental Site to introduce certain research activities of the department. Various prominent agriculturalists and farmers attended. The feedback was extremely positive and a more focused information day on in-field rain water harvesting was held in 2006 at the Paradys Experimental Farm to demonstrate the commercialisation of this technique.

In 2006 the Agrometeorology section organised the annual national conference for the South African Society of Atmospheric Sciences. Prof. Kees Stigter, from Agromet Vision and founder of the International Society

for Agricultural Meteorology, was the guest speaker. The topic of his speech was: *Problems with the establishment of agrometeorological services: Austral climates can't escape*. Dr John McGregor from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia delivered a keynote address on the topic: *Variable resolution in global modelling*. A total of 60 papers and 31 posters were presented at the conference. Prior to the conference, a workshop was held to strengthen the ties within the South African agrometeorological community by discussing current projects and identifying future projects.

A short course on Agrometeorology and on-farm decision making was presented in 2006 for the Early Warning Unit of the Directorate of Agricultural Disaster Management at the national Department of Agriculture. Representatives from all of the provincial departments of agriculture who are involved in the dissemination of seasonal forecasts and other climate-related agricultural extension matters attended the course.

In 2006 Dr James Allemann was invited to and chaired the opening session of the Crop Strategy Development Workshop of the Centre for Underutilised Crops held in Nairobi, Kenya. He also presented one paper and one poster at the 1st International Conference on Indigenous Vegetables and Legumes. Two scientific papers were published as a result. Dr Allemann played a pivotal role as invited peer-reviewer of research in the Plant Science Division of the Agricultural Research Council (ARC)-Roodeplaat Vegetable and Ornamental Plant Institute. He also presented a paper at the South African Agricultural Technologists Conference in Midrand.

Ms Kimberly Jennings, an honours student in Soil Science, was awarded the medal for the best paper presented by an author under 30 years old at the 2006 combined conference of the South African Soil and Crop Science Societies held at the Howard College Campus of the University of KwaZulu-Natal. The conference was attended by 290 delegates who contributed 150 papers on a wide range of subjects. Ms Jennings' paper addressed the redox behaviour of a Kroonstad soil type in the Weatherley catchment.

Research in the department is aimed at various aspects of the soil-crop-atmosphere system. More than R4 million was spent on research in 2005/06, of which only 10% came from the university. The rest was from institutions such as the National Research Foundation (NRF), the Water Research Commission (WRC), the Protein Research Trust (PRT), Agri Risk Specialist Limited, New York Botanical Gardens, Omnia Fertilizer Limited, Agraforum and Green Valley Nuts.

In his research aimed at crop physiology, Prof. Seef Pretorius' team tested more than 2 000 extracts of South African plants for antifungal, antibacterial, bio-stimulating and herbicidal activity. The extracts of two plants showed extraordinarily high *in vitro* and *in vivo* antifungal activity. Ten active molecules – of which five were new – were isolated, cleared and identified by nuclear magnetic resonance spectroscopy.

The value of this discovery is that natural antifungal products can be developed and commercialised with a higher than average economic potential. An added benefit is that the donor plants can be developed into new crops which might be of economic value, especially to new upcoming farmers. A patent (*Extracts and compounds from "Agapanthus africanus" and their use as biological plant protection agent*) was registered and the production of a natural fungicide is envisaged. Furthermore, ten years of research on natural plant-strengthening agents, under contract for a German company, was completed during 2005. This makes it possible for a second patent to be registered and a natural product to be produced and commercialised.

In 2006 Prof. Pretorius and Dr Elmarie van der Watt registered another patent: *Novel natural chemicals from Lupinus albus with growth and yield enhancing properties as well as application potential in the agricultural industry*.

Additionally, in 2006 a series of commercially available plant growth regulating agents were compared under field conditions in order to assist farmers in making calculated decisions on their use. This project was financed by the PRT.

A novel molecule, pheroid, with the ability to improve translocation of organic substances over plant membranes, was discovered by the North-West University. The application potential of this molecule in agriculture was investigated under contract by this team of researchers both in the greenhouse and under field conditions. Promising results were obtained which could lead to the commercialisation of the product.

Both Dr Gesine Engelbrecht and Ms Anneline Bothma-Schmidt presented posters at the Annual Conference of the South African Society for Horticultural Sciences. Dr Engelbrecht's research focused among others on the sustainable production of vegetable crops by upcoming farmers. As a result, she became involved in community service projects such as vegetable gardens. A video was made to be used as a training aid for communities in the cultivation of vegetable crops and the management of vegetable gardens. She also did research on the

fertilisation of *Lachenalia*, a decorative plant becoming more and more popular both locally and overseas. She is currently editing this research, which will form a chapter in a book in which the cultivation of *Lachenalia* is discussed.

Research by Ms Bothma-Schmidt is aimed at nut crops. Pistachio nut orchards close to Prieska were monitored to ascertain the role of climate on pollination problems. A course on dormancy in pistachios was held in an attempt to better understand the process. A number of propagating techniques for walnuts are currently being evaluated at Aliwal North.

Dr Gert Ceronio has been researching frost damage in wheat for the past four years. He identified the growth stage during which frost damage takes place, and also showed that by employing the correct management practices, the risk of frost damage can be lowered considerably or even avoided. The mechanism of cold damage is currently being investigated. He presented two posters at the 2006 conference of the South African Society for Horticultural Sciences.

Dr Allemann investigated the effect of alachlor on 22 different South African sunflower cultivars. This included an evaluation of alachlor formulations.

The pedology team (Drs Cornie van Huyssteen, Piet le Roux and Malcolm Hensley) completed a research project for the WRC on the role of soil in the hydrological cycle. Soil plays a dominant role in the cycle and the results of the project are already being used by hydrologists to model the water balances of catchment areas. In this regard, collaboration is taking place with hydrologists from the University of KwaZulu-Natal.

Until recently, hydrological models ignored the role of soil, or treated soil as a uniform system. To address this aspect further, the WRC will fund this team with another R1,85 million for the next three years to bridge the gap known internationally as hypopedology. This is the fastest growing career field in the United States of America (USA) and soil scientists from this department are now leading the field of hypopedological research in South Africa.

Dr Hensley initiated research on the collection of rain water in ploughed fields while he was still associated with the Institute for Soil, Climate and Water at the ARC. This research was continued by Prof. Van Rensburg. It was shown that the yield of maize and sunflowers could be increased by up to 50% on soil not considered good enough for dry land cropping. Now that both Prof. Van Rensburg and Dr Hensley have joined the department, research is conducted in collaboration with Dr Le Roux to extend the technique to other soils and also to adapt it for commercial farmers.

The first phase of a research project on the fate of organic matter in cultivated plinthic soils in the Free State has been completed. The research is being conducted by a team under the leadership of Prof. Wulf Amelung from the University of Bonn in Germany. Prof. Chris du Preez, Departmental Chairperson, is a member of this team. Eleven articles have already been published in accredited scientific journals and another three are in the pipeline. The soil samples of the second phase of the project were collected during the spring of 2005. This project is financed by the Research Foundation of Germany.

In conjunction with this research, Ms Elmarie Kotzé and Prof. Du Preez investigated the influence of cultivation practices on the organic matter content of plinthic soil in a long-term experiment of the ARC-Small Grain Institute at Bethlehem.

Research over the past six years on water quality in the catchment area of the lower Vaal River and its influence on soil and crops will continue. This research is financed to the amount of R1,8 million by



Photographed in a controlled environment cabinet are, from the left, back: Mr Adriaan Hugo, head of the UFS Electronics and Mechanisation Division, Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS, and Prof. Koos Terblans, Lecturer at the Department of Physics; front: Mr Koos Uys, engineering consultant from Experto Designa who helped with the cooling systems of the cabinets.



Prof. Leon van Rensburg, measuring the leaf xylem potential of irrigated maize using a Scholander pressure chamber. The leaf was sampled at the lysimeter complex of the Department of Soil, Crop and Climate Sciences at Kenilworth.



Research at Kenilworth Experimental Site to quantify the effect of soil salinity on peas.

the WRC, and a further R2,4 million has been allocated for the next four years. Various staff members will be involved due to the interdisciplinary nature of the research, namely Proff. Du Preez, Van Rensburg and Alan Bennie, Drs Le Roux and Van Huyssteen, Messrs Johan Barnard, Jason Sparrow and Gideon Voigt and Ms Kotzé. They will focus on the management of salinity in irrigated areas like the Riet River and Vaalharts.

Prof. Du Preez is also a member of a team doing research on the modelling of non-point pollution of water by agriculture. Researchers from five universities (KwaZulu-Natal, Pretoria, Stellenbosch, Free State and the Western Cape) as well as two ARC Institutes (Soil, Climate and Water; and Plant Protection) have been incorporated due to the multi-disciplinary nature of the work. This R5,5 million project is managed by Sigma Beta Consulting Engineers.

In 2005 Dr Harun Ogindo and Prof. Walker completed a project for the Water Research Fund for Southern Africa regarding the rainfall usage efficiency of maize-bean intercropping. She was also involved in an investigation undertaken by Ms Muna Elhag on desertification in Sudan.

Ms Linda de Wet, in collaboration with Proff. Walker and Sakkie Pretorius from the UFS Department of Plant Sciences, is trying to develop an early warning system for stripe rust in wheat by using weather data. Such a system could be of great value to researchers and especially farmers.

The Agrometeorology section secured a five-year WRC project entitled: Applications of

rainfall forecasts for agriculturally related decision making in selected catchments in 2006. This is a partnership project with the universities of Cape Town, Pretoria and KwaZulu-Natal as well as the ARC and the South African Weather Service. Mr Steyn is the project leader for the UFS contribution, which includes downscaling of rainfall and temperature predictions for two catchments, namely the upper Olifants River in Mpumalanga and the Modder-Riet in the Free State.

Extraordinary stability in terms of staff has been experienced in the department over the past three years. Prof. Van Rensburg, previously associated with the ARC Institute for Soil, Climate and Water, joined the department in November 2005 with the task of expanding soil physics.

In December 2005, after 26 years, Ms Alida du Plessis retired as secretary. In January 2006 Ms Brenda Oosthuizen was appointed in her place.

Various staff members improved their qualifications. Ms Kotzé obtained an M.Sc. and Drs Ceronio, Engelbrecht and Elmarie van der Watt all obtained their Ph.D. degrees.

Dr Van Huyssteen was promoted to senior lecturer, Ms Kotzé to lecturer and Ms Van der Watt to professional officer.

As usual, departmental staff acted as external examiners for other universities, evaluated articles for scientific magazines, served on pilot committees of research projects, and so forth.

In 2005 Prof. Seef Pretorius was the president of the Crop Production Society of

South Africa. In 2006, he and Prof. Walker were respectively former president and council member of this society. In 2005/06 both Prof. Van Rensburg and Dr Van Huyssteen were council members of the Soil Science Society of South Africa. In 2005 Dr Le Roux was chairperson of the South African Soil Surveyors' Organisation and Dr Van Huyssteen succeeded him in 2006.

In 2005 the World Meteorological Organisation invited Prof. Walker to act as vice-chairperson for a team of experts who presented a workshop on verification and predictions of rainfall and temperatures of seasons in Tokyo, Japan. Prof. Walker was also privileged to represent South Africa in 2006 at the World Meteorological Organisation of the United Nations Meeting in New Delhi, India. At this meeting, she was appointed chairperson of the open programme for the next four years, dealing with agrometeorological services for agricultural production.

For the fourth consecutive time, Prof. Du Preez was a member of a panel evaluating researchers for an award by the International Fertiliser Association in Paris, France.

Academic staff

Professors: Proff. Chris du Preez, Seef Pretorius, Sue Walker, Leon van Rensburg

Senior Lecturers: Drs Cornie van Huyssteen, Piet le Roux, James Allemann

Lecturers: Drs Gert Ceronio, Gesine Engelbrecht, Mss Anneline Bothma-Schmidt, Elmarie Kotzé, Linda de Wet

Junior Lecturer: Mr Stephan Steyn

Assistant Researcher: Dr Malcolm Hensley

Contact details

Prof. Chris du Preez
Department of Soil, Crop and Climate Sciences
University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Telephone: +27 51 401 2212
Fax: +27 51 402 2212
E-mail: dpreezcc.sci@ufs.ac.za
Website: www.ufs.ac.za

Research outputs

Publications

- Ahmed, M.A., Le Roux, P.A.L. & Barker, C.H.** 2005. Soils of Jelo micro-catchment in the Chercher Highlands of Eastern Ethiopia: 1. Morphological and physicochemical properties. *Ethiopian Journal of Natural Resources* 7: 55-81.
- Allemann, J. & Denner, F.** 2006. Allelopathic influence of soils planted to *Amaranthus cruentus* L. on two tomato (*Lycopersicon esculentum* Mill.) cultivars. *South African Journal of Plant and Soil* 23: 143-144.
- Allemann, J. & Hammes, P.S.** 2006. Effect of photoperiod on the tuberisation of *Plectranthus esculentus* N.E.Br. (Lamiaceae). *Field Crops Research* 98: 76-81.
- Baiphethi, M.N., Viljoen, M.F., Kundhlande, G., Botha, J.J. & Van Rensburg, L.D.** 2006. Quantifying the impact of in-field rainwater harvesting (IRWH) production techniques on household food security for communal farmers in Thaba 'Nchu, Free State Province. *Agrekon* 45: 279-293.
- Barnard, A. & Pretorius, J.C.** 2005. The possible role of the oxidative pentose phosphate pathway in seed dormancy in winter wheat cultivars. *South African Journal of Plant and Soil* 22: 257-262.
- Brodowski, S., Amelung, W., Lobe, I. & Du Preez, C.C.** 2005. Losses and biogeochemical cycling of soil organic nitrogen with prolonged arable cropping in the South African Highveld: Evidence from D- and L-amino acids. *Biogeochemistry* 71: 17-42.
- Ghizaw, A., Du Preez, C.C. & Bekele, T.** 2005. Effect of phosphorus fertilization on grain yield and yield components of field pea (*Pisum sativum* L.) cultivars. *Ethiopian Journal of Natural Resources* 7: 1-21.
- Hensley, M., Le Roux, P.A.L., Du Preez, C.C., Van Huyssteen, C.W., Kotze, E. & Van Rensburg, L.D.** 2006. Soils: The Free State's agricultural base. *South African Geographical Journal* 88: 11-21.
- Le Roux, P.A.L. & Du Preez, C.C.** 2006. Nature and distribution of South African plinthic soils: Conditions for occurrence of soft and hard plinthic soils. *South African Journal of Plant and Soil* 23: 120-126.
- Le Roux, P.A.L., Du Preez, C.C. & Buhmann, C.** 2005. Indications of ferrollysis and structure degradation in an Estcourt soil and possible relationships with plinthite formation. *South African Journal of Plant and Soil* 22: 199-206.
- Lobe, I., Bol, R., Ludwig, B., Du Preez, C.C. & Amelung, W.** 2005. Savanna-derived organic matter remaining in arable soils of the South African Highveld long-term mixed cropping: Evidence from ¹³C and ¹⁵N natural abundance. *Soil Biology & Biochemistry* 37: 1898-1909.
- Mebrhatu, M.T. & Venter, J.C.** 2005. Modelling of rainfall occurrences at Grootfontein (Karoo, South Africa). *South African Journal of Plant and Soil* 22: 127-128.
- Molete, S.F., Du Preez, C.C. & Morake, M.V.** 2005. Retention of applied phosphorus by the benchmark soils of Lesotho and quantification of their phosphorus retention indices. *South African Journal of Plant and Soil* 22: 214-222.
- Nteso, L. & Pretorius, J.C.** 2006. *Tulbaghia violacea* L. 1: *In vitro* antimicrobial properties towards plant pathogens. *Australian Journal of Agricultural Research* 57: 511-516.
- Nteso, L. & Pretorius, J.C.** 2006. *Tulbaghia violacea* L. 2: *In vivo* antifungal properties towards plant pathogens. *Australian Journal of Agricultural Research* 57: 517-523.
- Ogindo, H.O. & Walker, S.** 2005. Comparison of measured changes in seasonal soil water content by rainfed maize-bean intercrop and component cropping systems in a semi-arid region of Southern Africa. *Physics and Chemistry of the Earth* 30: 799-808.
- Schmidt, C.J.J., Smalberger, S.A., Adriaanse, F.G. & Du Preez, C.C.** 2006. Relationship between inorganic soil nitrogen and maize grain yield with controlled traffic practices. *South African Journal of Plant and Soil* 23: 190-196.
- Snyman, H.A. & Du Preez, C.C.** 2005. Rangeland degradation in semi-arid South Africa: 2. Influence on soil quality. *Journal of Arid Environments* 60: 483-507.
- Snyman, H.A., Van der Westhuizen, H.C. & Fouché, H.J.** 2005. A degradation gradient for the assessment of rangeland condition of a semi-arid sourveld in Southern Africa. *African Journal of Range and Forage Science* 22: 47-59.
- Solomon, D., Lehmann, J., Lobe, I., Martinez, C.E., Tveintnes, S., Du Preez, C.C. & Amelung, W.** 2005. Sulphur speciation and biogeochemical cycling in long-term arable cropping of subtropical soils: Evidence from wet-chemical reduction and S K-edge XANES spectroscopy. *European Journal of Soil Science* 56: 621-634.
- Tilahun, K., Botha, J.F. & Bennie, A.T.P.** 2005. Transport of bromide in the Bainsvlei soil: Field experiment and deterministic/stochastic model simulation. 1. Continuous water application. *Australian Journal of Soil Research* 43: 73-80.
- Tilahun, K., Botha, J.F. & Bennie, A.T.P.** 2005. Transport of bromide in the Bainsvlei soil: Field experiment and deterministic/stochastic model simulation. 2. Intermittent water application. *Australian Journal of Soil Research* 43: 81-85.
- Tilahun, K., Botha, J.F. & Bennie, A.T.P.** 2006. Bromide movement and uptake under bare and cropped soil conditions. *South African Journal of Plant and Soil* 23: 1-6.
- Tsubo, M., Fantaye, K.T. & Walker, S.** 2006. Radiation interception and radiation use efficiency of three grain legumes under water deficit conditions in a semi-arid environment. *European Journal of Agronomy* 25: 60-70.
- Tsubo, M., Walker, S. & Hensley, M.** 2005. Quantifying risk for water harvesting under semi-arid conditions. 1. Rainfall intensity generation. *Agricultural Water Management* 76: 77-93.
- Van Huyssteen, C.W., Hensley, M. & Le Roux, P.A.L.** 2006. Interpretation of digital soil photographs using spatial analysis: 1. Methodology. *South African Journal of Plant and Soil* 23: 7-13.
- Van Huyssteen, C.W., Hensley, M. & Le Roux, P.A.L.** 2006. Interpretation of digital soil photographs using spatial analysis: 2. Application. *South African Journal of Plant and Soil* 23: 14-20.
- Walker, S.** 2005. Role of education and training in agricultural meteorology to reduce vulnerability to climate variability. *Climatic Change* 70: 311-318.
- Walker, S., Tsubo, M. & Hensley, M.** 2005. Quantifying risk for water harvesting under semi-arid conditions. 2. Crop yield simulation. *Agricultural Water Management* 76: 94-107.
- Woyessa, Y.E., Hensley, M. & Van Rensburg, L.D.** 2006. Catchment management in semi-arid area of central South Africa: Strategy for improving water productivity. *Water SA* 32: 648-654.
- Woyessa, Y.E., Pretorius, E., Hensley, M., Van Rensburg, L.D. & Van Heerden, P.S.** 2006. Up-scaling of rain-water harvesting for crop production in the communal lands of the Modder River basin in South Africa: Comparing upstream and downstream scenarios. *Water SA* 32: 223-228.
- Zere, T.B., Van Huyssteen, C.W. & Hensley, M.** 2005. Development of a simple empirical model for predicting maize yields in a semi-arid area. *South African Journal of Plant and Soil* 22: 22-27.
- Zere, T.B., Van Huyssteen, C.W. & Hensley, M.** 2005. Estimation of runoff at Glen in the Free State Province of South Africa. *Water SA* 31: 17-21.
- Zere, T.B., Van Huyssteen, C.W. & Hensley, M.** 2006. Evaluating the maize production potential of a semi-arid ecotone with four production techniques. *South African Journal of Plant and Soil* 23: 157-162.

Chapters in books

- Twomlow, S.J., Steyn, J.T. & Du Preez, C.C.** 2006. Dryland farming in Southern Africa. In *Dryland Agriculture*, edited by G.A. Peterson, P.W. Unger & W.A. Payne. Wisconsin: American Society of Agronomy. pp. 769-836.
- Walker, S.** 2005. Role of education and training in agricultural meteorology to reduce vulnerability to climate variability. In *Increasing climate variability and change: Reducing the vulnerability of agriculture and forestry*, edited by J. Salinger, M.V.K. Sivakumar & R.P. Motha. Dordrecht: Springer. pp. 311-318.

Reports

- Annandale, J.G. & Du Preez, C.C.** 2005. *Nutrients: Agricultural contribution, management and modelling*. Discussion paper number 1 in "Knowledge review of modelling non-point source pollution in agriculture from field to catchment scale", edited by J.N. Rossouw & A.H.M. Gorgens. Report to the Water Research Commission (WRC), Report No. 1467/1/05.
- Ehlers, L., Barnard, J.H., Dikgwatlhe, S.B., Van Rensburg, L.D., Ceronio, G.M., Du Preez, C.C. & Bennie, A.T.P.** 2006. *Effect of irrigation water and water table salinity on the growth and water use of selected crops*. Report to the Water Research Commission (WRC), Report No. 1359/1/06.
- Pretorius, J.C., Van der Watt, E. & Buitendag, R.A.** 2006. *A comparative study on the growth and yield response of soybean to treatment with different bio-products*. Report to the Protein Research Trust, Pretoria, South Africa.
- Walker, S.** 2005. *Quantifying precipitation use efficiency for maize-bean intercropping*. Report to the Water Research Fund for Southern Africa, Report 123, Gaborone, Botswana.
- Woyessa, Y.E., Pretorius, E., Van Heerden, P.S., Hensley, M. & Van Rensburg, L.D.** 2006. *Impact of land use on river basin water balance: A case study of the Modder River basin, South Africa*. Report to the International Water Management Institute, Report 12, Gaborone, Botswana.

Conference contributions

- Allemann, J.** 2005. *Weeds and plant health management*. Paper presented at the Official Launch of the Centre for Plant Health Management (CePHMa), University of the Free State, Bloemfontein, South Africa.
- Allemann, J.** 2006. *Re-introduction of indigenous vegetables: Some lessons learned*. Paper presented at the First International Conference on Indigenous Vegetables and Legumes, Hyderabad, India.
- Allemann, J. & Swart, W.J.** 2006. *Cropping systems for indigenous vegetables: An ecological perspective*. Paper presented at the First International Conference on Indigenous Vegetables and Legumes, Hyderabad, India.
- Annandale, J.G. & Du Preez, C.C.** 2005. *Is agriculture a major contributor to nutrient non-point source pollution in South Africa?* Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Annandale, J.G., Du Preez, C.C., Cullis, J., Tesfamariam, E. & Kotze, E.** 2005. *Is agriculture a major contributor to nutrient non-point source pollution in South Africa?* Paper presented at the Diffuse Pollution Specialist Conference of International Water Association, Johannesburg, South Africa.
- Botha, J.J., Anderson, J.J., Van Rensburg, L.D., Hensley, M., Groenewald, D.C. & Baiphethi, M.N.** 2006. *Application of the in-field rainwater harvesting technique in rural communities in South Africa to fight poverty and food insecurity*. Paper presented at the Sustainable Rural Livelihood (SRL) Conference, Pretoria, South Africa.
- Botha, J.J., Van Rensburg, L.D. & Anderson, J.J.** 2005. *Evaluating the agronomic sustainability of the in-field rainwater harvesting technique*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Botha, J.J., Van Rensburg, L.D. & Anderson, J.J.** 2005. *Evaluating the long-term risk of the in-field rainwater harvesting technique*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Botha, J.J., Van Rensburg, L.D. & Anderson, J.J.** 2005. *Short-term carbon changes in the topsoil under conventional and in-field rainwater harvesting techniques*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Botha, J.J., Van Rensburg, L.D. & Anderson, J.J.** 2006. *Introduction of a legume in a crop rotation system*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Botha, J.J., Van Rensburg, L.D., Anderson, J.J. & Hensley, M.** 2006. *To plant or not to plant? Impact of pre-plant soil water content*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Botha, J.J., Van Rensburg, L.D., Anderson, J.J., Groenewald, D.C., Kundhlande, G., Baiphethi, M.N. & Viljoen, M.F.** 2006. *Evaluating the sustainability of the in-field rainwater harvesting crop production system*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Botha, J.J., Van Rensburg, L.D., Hensley, M. & Anderson, J.J.** 2006. *Water harvesting through in-field runoff*. Paper presented at the 2nd Symposium of the South African National Committee on Irrigation and Drainage, Aventura Swadini, South Africa.
- Buitendag, R.A., Pretorius, J.C. & Van Rensburg, L.D.** 2005. *Yield and fruit quality assessment of cactus pear (Opuntia ficus-indica L.) treated with natural bio-stimulants*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Ceronio, G.M.** 2005. *The effect of water quality on growth and yield of irrigated wheat (Triticum aestivum)*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- De Wet, L.** 2006. *Life in an austral climate: Comparison of THI equations for the Free State*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- De Wet, L.** 2006. *Weather conditions affecting wheat stripe rust: Field experiment results*. Paper presented at the Combined Congress of South African Society of Crop Production and Soil Science Society of South Africa, Durban, South Africa.
- Dikgwathe, S.B., Ceronio, G.M. & Van Rensburg, L.D.** 2006. *The effect of water quality on growth and yield of irrigated peas (Pisum sativum L.)*. Paper presented at the Annual Conference of the South African Society for Horticultural Sciences, Stellenbosch, South Africa.
- Du Plessis, M.J., Le Roux, P.A.L. & Van Huyssteen, C.W.** 2005. *Recognition of a new soil form with the sequence of horizons: Orthic A / red apedal B / hard plinthic B horizon*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Du Preez, C.C. & Snyman, H.A.** 2005. *Soil organic matter along a degradation gradient in a semi-arid range of South Africa*. Proceedings of the 20th International Grassland Congress, Wageningen, The Netherlands. p. 735.
- Du Preez, C.C., Amelung, W., Lobe, I. & Brodowski, S.** 2006. *Fate of organic matter in cultivated plinthic soils of the Free State*. Paper presented at the Combined Congress of South African Society of Crop Production and Soil Science Society of South Africa, Durban, South Africa.
- Du Preez, C.C., Strydom, M.G., Le Roux, P.A.L., Pretorius, J.P., Van Rensburg, L.D. & Bennie, A.T.P.** 2006. *Water quality of the lower Vaal River catchment and its influence on soils and crops*. Paper presented at the 6th Plant Breeding Symposium, Club Mykonos, South Africa.
- Elhag, M. & Walker, S.** 2006. *Impact of climate variability on vegetation cover in the Butana area of Sudan*. Paper presented at the International Conference on Ecosystems Changes and Implications on Livelihoods of Rural Communities in Africa, Dar es Salaam, Tanzania.
- Elhag, M. & Walker, S.** 2006. *Impact of climate variability on vegetation cover in the Butana area of Sudan*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Elhag, M. & Walker, S.** 2006. *Rainfall and the impact of human activities on environmental degradation in the Butana area of Sudan*. Paper presented at the Arid Zone Ecology Forum, Kamieskroon, South Africa.
- Elhag, M. & Walker, S.** 2006. *Rainfall trend in Butana area of Sudan*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Elhag, M. & Walker, S.** 2006. *Time series analysis of rainfall in Butana area of Sudan*. Paper presented at the South African Environmental Observation Network Summit, Centurion, South Africa.
- Jennings, K., Le Roux, P.A.L., Van Huyssteen, C.W., Hensley, M. & Zere, T.B.** 2006. *Redox behaviour in a soil of the Kroonstad form in the Weatherley catchment, Eastern Cape Province*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Joseph, L.F., Le Roux, P.A.L., Van Huyssteen, C.W., Hensley, M. & Du Preez, C.C.** 2005. *Fe-Mn profiles of plinthic soils in the Weatherley catchment, Eastern Cape Province*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South African Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Kosters, R., Preger, A., Du Preez, C.C., Brodowski, S. & Amelung, W.** 2006. *Reaggregation of secondary grassland top soils in the South African highveld: A chronosequence study*. Paper presented at the Annual Conference on Tropical and Subtropical Agricultural and Natural Resource Management, Bonn, Germany.
- Kotze, E. & Du Preez, C.C.** 2006. *Influence of long-term wheat residue management on organic matter content of an Avalon soil in the eastern Free State*. Paper presented at the Combined Congress of South African Society of Crop Production and Soil Science Society of South Africa, Durban, South Africa.
- Le Roux, P.A.L. & Hensley, M.** 2006. *Quantifying rainfall-runoff relationships on a Regosol in Ethiopia*. Paper presented at the Combined Congress of South African Society of Crop Production and Soil Science Society of South Africa, Durban, South Africa.
- Le Roux, P.A.L., Van Huyssteen, C.W., Hensley, M. & Zere, T.B.** 2006. *Drainage characteristics of the Longlands form in the Weatherley catchment, Eastern Cape Province*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Le Roux, P.A.L., Van Huyssteen, C.W., Hensley, M. & Zere, T.B.** 2005. *Drainage characteristics of selected soils of the Weatherley catchment*. Paper presented at the 12th South African

- National Committee for the International Association of Hydrological Sciences (SAN CIAHS) Symposium, Midrand, South Africa.
- Mapungwa, W., Walker, S. & Twomlow, S.** 2006. *Rainfall variability and the potential for rainwater harvesting in semi-arid Southern Zimbabwe*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Mbuende, M.R. & Steyn, A.S.** 2006. *Analysis of the 2006 Mariental flood*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Mockie, S.M.A. & Steyn, A.S.** 2006. *The severe weather event of 1-6 August 2006*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Mokoena, L.H. & Walker, S.** 2005. *Proposed Lesedi FM agrometeorological forecast for the Motheo District Farmers*. Paper presented at the National Climate Outlook Forum (NaCOF) Conference, Pretoria, South Africa.
- Molete, S.F. & Du Preez, C.C.** 2005. *Relations between phosphorus retention indices and some properties of the benchmark soils of Lesotho*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Molete, S.F., Du Preez, C.C. & Marake, M.V.** 2006. *Phosphorus buffer capacity of the benchmark soils of Lesotho: Its relationship with phosphorus retention and other soil properties*. Paper presented at the Combined Congress of South African Society of Crop Production and Soil Science Society of South Africa, Durban, South Africa.
- Motseki, P.C., Engelbrecht, G.M. & Ceronio, G.M.** 2006. *The effect of nitrogen fertilisation on the growth, yield and quality of swiss chard (Beta vulgaris var. cicla)*. Paper presented at the Annual Conference of the South African Society for Horticultural Sciences, Stellenbosch, South Africa.
- Ng Cheong, L.R., Ng Kee Kwong, K.F., Ah Koon, P.D. & Du Preez, C.C.** 2005. *Soil quality changes caused by sugarcane cultivation in a sub-humid inceptisol of Mauritius*. Proceedings of the International Society of the 25th Sugar Cane Technologists Congress, Guatemala, Mexico. pp. 50-53.
- Nhlabatsi, N.N., Van Rensburg, L.D. & Walker, S.** 2006. *Application of an evaporation model to aid in crop productivity for small-scale farmers in semi-arid areas*. Paper presented at the Sustainable Rural Livelihood (SRL) Conference, Pretoria, South Africa.
- Nhlabatsi, N.N., Van Rensburg, L.D., Walker, S. & Botha, J.J.** 2006. *The effect of various mulching strategies on temperature regimes in a clay soil under semi-arid conditions*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Phahlane, M.O. & Walker, S.** 2005. *The importance and application of long term forecasting in agriculture*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Preger, A., Rillig, M.C., Johns, A.R., Du Preez, C.C., Lobe, I. & Amelung, W.** 2006. *Arbuscular mycorrhizal residues decline with prolonged arable cropping: A chronosequence study on glomalin-related soil protein in sandy soils of the South African highveld*. Paper presented at the Annual Conference on Tropical and Subtropical Agricultural and Natural Resource Management, Bonn, Germany.
- Pretorius, J.C.** 2005. *ComCat: A new natural product inducing resistance to biotic and abiotic stress factors in crops*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Pretorius, J.C. & Allemann, J.** 2005. *The role of agronomy in plant health management*. Paper presented at the Official Launch of the Centre for Plant Health Management (CePHMa), University of the Free State, Bloemfontein, South Africa.
- Steyn, A.S.** 2006. *Forecasting wind chill temperatures in South Africa*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Tekle, S.A., Hensley, M. & Le Roux, P.A.L.** 2005. *From land type to soilscape to detail survey*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Van den Heever, E., Allemann, J. & Pretorius, J.C.** 2006. *Seasonal influence on the vegetative growth of T. violacea and the antifungal activity of a crude extract*. Paper presented at the South African Association of Agricultural Technologist Conference, Midrand, South Africa.
- Van der Laan, M., Annandale, J.G., Tesfamariam, E. & Du Preez, C.C.** 2006. *Role of irrigation in agricultural non-point source nutrient pollution: A review*. Paper presented at the 2nd Symposium of South African National Committee on Irrigation and Drainage, Aventura Swadini, South Africa.
- Van der Watt, E. & Pretorius, J.C.** 2005. *Com Cat: A new natural product with yield enhancing properties and its implication for the agricultural industry*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Van Huyssteen, C.W.** 2006. *Critical evaluation of diagnostic criteria for gleyic properties in the World Reference Base*. Paper presented at the 18th World Congress of Soil Science, Philadelphia, USA.
- Van Huyssteen, C.W. & Lin, H.** 2006. *A search for hydropedological order in the WRB: An example from Weatherley*. Paper presented at the Agronomy Society of America, Crop Science of America, Soil Science Society of America (ASA-CSSA-SSSA) International Annual Meeting, Indianapolis, USA.
- Van Huyssteen, C.W., Hensley, M. & Le Roux, P.A.L.** 2005. *Correlating soil hydrology with soil morphology*. Paper presented at the 12th South African National Committee for the International Association of Hydrological Sciences (SAN CIAHS) Symposium, Midrand, South Africa.
- Van Huyssteen, C.W., Le Roux, P.A.L. & Hensley, M.** 2005. *Hydrological interpretation of diagnostic horizons to aid in hill slope process modelling*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Van Huyssteen, C.W., Le Roux, P.A.L. & Hensley, M.** 2006. *Interpretation of digital soil photographs to aid in soil classification*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.
- Van Huyssteen, C.W., Le Roux, P.A.L., Hensley, M. & Zere, T.B.** 2005. *Duration of water saturation in selected soils of Weatherley*. Paper presented at the 12th South African National Committee for the International Association of Hydrological Sciences (SAN CIAHS) Symposium, Midrand, South Africa.
- Van Rensburg, L.D.** 2005. *Procedures for estimating evaporation and drainage on bare sandy soils*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Van Rensburg, L.D., Joseph, L.F. & Botha, J.J.** 2005. *A review on the technical aspects of rainwater harvesting for crop production*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Van Rensburg, L.D., Strydom, M.G., Du Preez, C.C., Bennie, A.T.P. & Le Roux, P.A.L.** 2005. *Estimating the sustainability of irrigated soils along the lower Vaal River system using salt balance techniques*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Walker, S.** 2005. *Agrometeorology*. Paper presented at the Official Launch of the Centre for Plant Health Management (CePHMa), University of the Free State, Bloemfontein, South Africa. (Invited speaker).
- Walker, S.** 2005. *Improved fertilizer recommendations for dry regions of Southern Africa and development of emerging farmer crop-livestock systems in northern RSA*. Paper presented at the Meeting of the Australian Centre for International Agricultural Research (ACIAR) Projects in Limpopo Province, along with partners Limpopo Department of Agriculture, Commonwealth Scientific and Research Organisation (CSIRO), and International Crops Institute for Semi-arid Tropics (ICRISAT), Polokwane, South Africa.
- Walker, S.** 2005. *Local developments: Universities and private sector*. Paper presented at the Stakeholder Workshop: Agricultural Risk Decision Support System, Department of Agriculture in collaboration with Agricultural Research Council - Institute for Soil, Climate and Water, Pretoria, South Africa. (Invited speaker).
- Walker, S.** 2005. *Statistical analyses of rainfall variability in the Central Rift Valley and Lakes Regions of Ethiopia*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.

- Walker, S.** 2005. *Support systems in policy making for agrometeorological services: The role of intermediaries*. Policy paper presented to the CAgM/MG Meeting (Commission for Agricultural Meteorology, International Society for Agricultural Meteorology), Guaruja, Brazil.
- Walker, S.** 2006. *Dissemination of agrometeorological information: Strengthening operational agrometeorological services at the national level*. Proceedings of the Inter-Regional Workshop, United States Department of Agriculture, Washington, USA. pp. 145-155.
- Walker, S. & Elhag, M.** 2006. *Impact of climate variability on vegetation cover in the Butana area of Sudan*. Paper presented at the World Meteorological Organization Conference on Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks, Espoo, Finland.
- Walker, S. & Haasbroek, P.D.** 2006. *Use of weather data for early warning for downy mildew in vineyards*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Walker, S. & Mamo, G.** 2006. *Tactical decision support tool for sorghum production in the Central Rift Valley of Ethiopia*. Paper presented at the Annual National Conference for the South African Society of Atmospheric Sciences, Bloemfontein, South Africa.
- Walker, S. & Ogindo, H.O.** 2005. *Remaining questions concerning intercropping maize and beans*. Paper presented at the International Edible Legume Conference (IELC) & 4th World Cowpea Congress, Durban, South Africa.
- Walker, S., Ogindo, H.O. & Mokoena, L.H.** 2005. *Evaluation of yield from maize-bean intercropping*. Paper presented at the Maseno University, Maseno, Kenya. (Invited speaker).
- Walker, S., Ogindo, H.O. & Mokoena, L.H.** 2005. *Maize-bean intercropping: A guide to the production within the smallholder sector*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Zere, T.B., Van Huyssteen, C.W., Hensley, M. & Le Roux, P.A.L.** 2005. *Soil hydrology during a drying cycle on a hillslope at Weatherley*. Paper presented at the Combined Congress of Soil Science Society of South Africa, South Africa Society of Crop Production, Southern African Society for Horticulture and Southern African Weed Science Society, Potchefstroom, South Africa.
- Zere, T.B., Van Huyssteen, C.W., Le Roux, P.A.L. & Hensley, M.** 2006. *Degrees of wetness of selected diagnostic horizons in the Weatherly catchment*. Paper presented at the Combined Conference of the South African Soil and Crop Science Societies, University of KwaZulu-Natal, Durban, South Africa.

Statistical data of the faculty



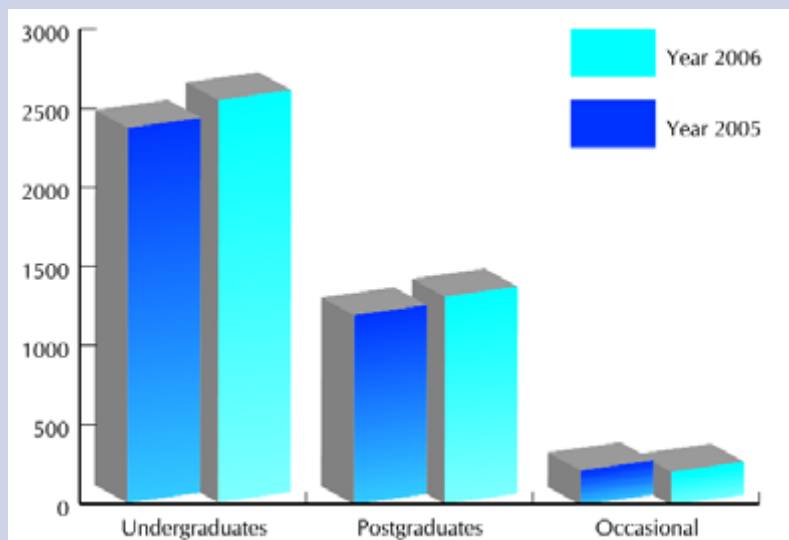
Student figures

Faculty of Natural and Agricultural Sciences, 2005/06

Male					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	676	31	26	724	1457
Postgraduate	351	22	15	400	788
Occasional	84	3	4	17	108
Total 2005	1111	56	45	1141	2353
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	729	28	21	768	1546
Postgraduate	385	21	16	431	853
Occasional	68	2	2	23	95
Total 2006	1182	51	39	1222	2494

Female					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	563	41	11	394	1009
Postgraduate	206	16	11	221	454
Occasional	101	5	2	11	119
Total 2005	870	62	24	626	1582
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	641	39	17	401	1098
Postgraduate	243	15	17	234	509
Occasional	103	2	2	16	123
Total 2006	987	56	36	651	1730

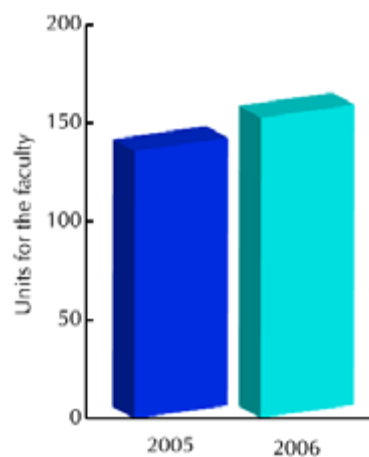
Total					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	1239	72	37	1118	2466
Postgraduate	557	38	26	621	1242
Occasional	185	8	6	28	227
Total 2005	1981	118	69	1767	3935
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	1370	67	38	1169	2644
Postgraduate	628	36	33	665	1362
Occasional	171	4	4	39	218
Total 2006	2169	107	75	1873	4224



Student figures

Student nationality		
Nationality	2005	2006
Angola	1	
Asian countries	21	18
Botswana	20	20
European countries	6	6
Lesotho	142	142
Malawi	2	1
Mauritius		2
Mozambique	8	7
Namibia	40	42
No information	1	
North America	4	4
Other Africa	45	48
South Africa	3610	3893
South America		1
Swaziland	13	13
Zambia	4	6
Zimbabwe	18	21
Total	3935	4224

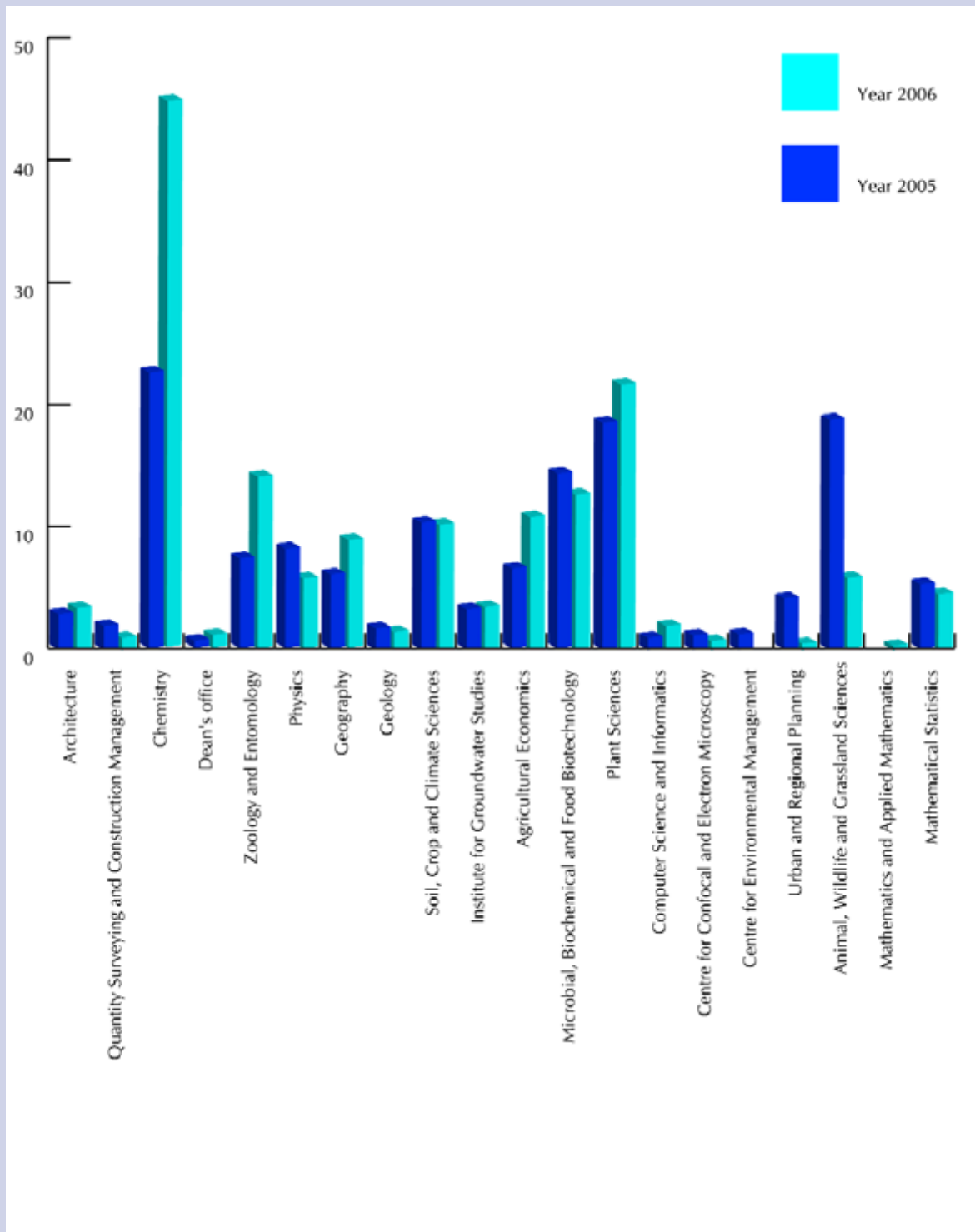
Research outputs for the Faculty of Natural and Agricultural Sciences



Articles published in accredited approved research journals.

Departmental research outputs

Articles published in accredited approved research journals, 2005/06



Glossary



Glossary

A

ACIAR	Australian Centre for International Agricultural Research
AEASA	Agricultural Economics Association of South Africa
ALPRU	African Large Predator Research Unit
ARC	Agricultural Research Council
ARMSCOR	Armaments Corporation of South Africa
ARS	Agri Risk Specialists
ASAQS	Association of South African Quantity Surveyors
ASSA	Anatomical Society of South Africa
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVS	American Vacuum Society

C

CANSA	Cancer Association of South Africa
CATSA	Catalysis Society of South Africa
CBD	Convention of Biological Diversity
CCEM	Centre for Confocal and Electron Microscopy
CePHMa	Centre for Plant Health Management
CfPB	Centre for People and Buildings
CIAT	International Centre for Tropical Agriculture
CIDB	Construction Industry Development Board
CIMMYT	International Maize and Wheat Improvement Centre
CIOB	Chartered Institute of Building
CIOB-SA	Chartered Institute of Building - South Africa
CSACEE	Central South African Council on Economic Education
CSIC-INTA	Centro de Astrobiología
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation

D

DEAT	Department of Environmental Affairs and Tourism
DiMTEC	Disaster Management Training and Education Centre for Africa
DMISA	Disaster Management Institute of South Africa
DST	Department of Science and Technology

E

EAAP	European Association for Animal Production
EASA	Education Association of South Africa
ECA	European Crystallographic Association
EIGG	Environmental Inorganic Geochemistry Group
EPWP	Expanded Public Works Programme
ESBES	European Symposium on Biochemical Engineering Science
ESREL	European Safety and Reliability
ESRP	Economic and Social Rehabilitation Programme

F

FAO	Food and Agriculture Organisation
FEMS	Federation of European Microbiological Societies
FMP	Facilities Management Programme
FOTIM	Foundation of Tertiary Institutions of the Northern Metropolis

FSRPO	Free State Red Meat Producers Organisation
-------	--

G

GIS	Geographical Information Systems
Glen ADI	Glen Agricultural Development Institute
GM	Genetically Modified
GMBA	Gauteng Master Builders' Association
GMO	Genetically Modified Organisms
GWK	Griekwaland-Wes Koöperasie

H

HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
HPLC	High Performance Liquid Chromatography
HSPCM	Health and Safety Programme for Construction Managers

I

IAGOD	International Association on the Genesis of Ore Deposits
IAH	International Association of Hydrogeologists
ICCC	International Conference on Coordination Chemistry
ICEC	International Cost Engineering Council
ICID	International Commission on Irrigation and Drainage
ICP	Inductively Coupled Plasma
ICRBM	International Conference on Rodent Biology and Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDC	Industrial Development Corporation
IGS	Institute for Groundwater Studies
IITA	International Institute of Tropical Agriculture
INCRoP	Insects on New Crops Programme
INTSORMIL	International Sorghum and Millet Research Support Programme

IPMA

IPMA	International Project Management Association
IPMP	Intensive Project Management Programme
IRDP	Institutional Research and Development Programme
IRWH	In-field Rainwater Harvesting
IUCr	International Union of Crystallography
IUMS	International Union of Microbial Societies
IUPAP	International Union of Pure and Applied Physics

J

JFM	Journal of Facilities Management
-----	----------------------------------

L

LExEn	Life in Extreme Environments
-------	------------------------------

M

MIRCHEN	Microbiological Resources Centre
MIT	Massachusetts Institute of Technology
MRM	Mineral Resource Management
MSA	Master's Degree in Sustainable Agriculture
MSSA	Microscopy Society of Southern Africa
MUCPP	Mangaung University Community Partnership Programme
MURP	Master's Degree in Urban and Regional Planning

N

NaCOF	National Climate Outlook Forum
NAFU	National African Farmers Union
NAMC	National Agricultural Marketing Council
NASA	National Aeronautics and Space Administration
NASSP	National Astrophysics and Space Science Programme
NCEE	National Council for Economic Education
NDA	National Department of Agriculture
NECSA	National Energy Commission of South Africa
NELSAM	Natural Earthquake Laboratory in South African Mines
NERPO	National Emergent Red Meat Producers' Organisation
NGO	Non-Governmental Organisation
NML	National Metrological Laboratory
NMMU	Nelson Mandela Metropolitan University
NMR	Nuclear Magnetic Resonance
NRF	National Research Foundation
NUFU	Norwegian Council of Universities Committee for Development, Research and Education
NWGA	National Wool Growers' Association

O

OABS	Optimal Agricultural Business Solutions
OECD	Organisation for Economic Co-operation and Development

P

PARSA	Parasitological Association of Southern Africa
PDMIW	Processing and Disposal of Mineral Industry Wastes
POT	Peaks over Threshold
PPP	Public Private Partnership
PRT	Protein Research Trust

R

RICS	Royal Institute of Chartered Surveyors
RIEP	Research Institute of Education Planning
RNA	Research Niche Area
RPO	Red Meat Producers' Organisation

S

SA	South Africa
SAACE	South African Association of Consulting Engineers
SAB	The South African Breweries Limited
SACI	South African Chemical Institute
SACPCMP	South African Council for the Project and Construction Management Profession
SACPVP	South African Council for the Property Valuation Profession
SACQSP	South African Council for the Quantity Surveying Profession
SADC	Southern African Development Community
SAFMA	South African Facilities Management Association
SAFOI	South African Fryer Oil Initiative
SAIP	South African Institute of Physics
SAISC	Southern African Institute of Steel Construction
SAMSI	Statistical and Applied Mathematical Sciences Institute

SANCIAHS	South African National Committee for the International Association of Hydrological Sciences	SEDA	Small Enterprise Development Agency	UNEP	United Nations Environment Programme
SANCU	South African National Consumer Union	SMME	Small, Medium and Micro Enterprises	UNESCO	United Nations Educational, Scientific and Cultural Organisation
SANPAD	South Africa-Netherlands Research Programme on Alternatives in Development	SRC	Student Representative Council	USA	United States of America
SAPOA	South African Property Owners' Association	SRL	Sustainable Rural Livelihood	USAID	United States Agency for International Development
SAPS	South African Police Services	SSAG	Society of South African Geographers	UTCHEM	University of Texas Chemical Compositional Simulator
SAQA	South African Qualifications Authority	T		UWC	University of the Western Cape
SASAS	South African Society for Animal Science	THRIP	South African National Research Foundation Thrust for Industry-Related Projects	W	
SASQUA	Southern African Society for Quaternary Research	TUE	Technical University Eindhoven	WARFSA	Water Research Fund of Southern Africa
SAVAH	South African Association of Visual Arts Historians	U		WATOC	World Association of Theoretically Orientated Chemists
SBE	Sustainable Built Environments	UCT	University of Cape Town	WFP	World Food Programme
		UFS	University of the Free State	WITS	University of the Witwatersrand
		UJ	University of Johannesburg	WRC	Water Research Commission
		UK	United Kingdom	WUA	Water Users' Association
		UN	United Nations		