



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



European Commission

CELEBRATING TEN YEARS OF FRUITFUL PARTNERSHIPS



ESASTAP

european - south african science and technology
advancement programme

Background of South Africa European Union Science and Technology Partnership

South Africa's relationship with the EU is one of the country's most strategic partnerships in international S&T relations. The first intergovernmental agreement concluded between South Africa (SA) and European Union (EU) was the Agreement on Science and Technology Cooperation signed in 1996 and which entered into force on 11 November 1997. This agreement afforded SA researchers the opportunity to participate fully in the EU's Framework Programmes for Research and Technology Development. The privileged partnership, which was established under the Agreement, complemented the longstanding political, economic and development cooperation ties between SA and the EU. Ten years of mutually beneficial cooperation under the Agreement and very successful South African participation in the Framework Programmes significantly contributed to enriching the global knowledge base and to supporting human resource development, as well as to contributing markedly to improving the quality of lives of both SA and Europeans.

The SA-EU bilateral Trade, Development and Cooperation Agreement (TDCA) has recently been revised to strengthen the comprehensive and mutually beneficial SA-EU partnership. The revision of the TDCA and the conclusion of the new SA-EU Strategic Partnership recognised the role of S&T as a key component of the overall relationship between SA and the EU. SA-EU S&T cooperation is also supported within the ambit of the European Programme for Reconstruction and Development (EPRD) in South Africa.

The SA-EU S&T partnership also constitutes a powerful force in advancing multilateral efforts to address shared global challenges such as advancing sustainable development. SA-EU S&T cooperation therefore incorporates a multilateral dimension encompassing Africa EU programmes; Africa, Caribbean and Pacific (ACP) EU relations; South-South and South-North cooperation (e.g. G8-Africa); international S&T policy forums and partnership initiatives such as the Group on Earth Observations (GEO). Of special importance is cooperation within the context of the EU support for implementing Africa's Science and Technology Consolidated Plan of Action.

Over the past decade, the SA-EU Joint Science and Technology Cooperation Committee (JSTCC) at its annual meetings to review collaboration, to share new developments in science and technology policy and to devise strategies for enhancing cooperation, could acknowledge with satisfaction the constant growth and deepening of the partnership.

South Africa Participation in FPs

SA is one of the most active and successful Third Country participants of the EU's Framework Programmes. SA researchers participated in more than 100 research projects under the 4th and 5th Framework Programmes. Participation in the Sixth Framework Programme (FP6) proved to be most successful with close to 140 participations.

The extent of SA participation, viz. number of participations / thematic priority area also significantly increased in FP6, with first-time participation by SA researchers in the Aeronautics and Space, Transport and the Citizens and Governance in the Knowledge-based Information Society priority areas. The success of SA's participation in FP6 may in large part be attributed to the role and activities of the European - South African Science and Technology Advancement

Programme (ESASTAP). ESASTAP, a dedicated platform for the advancement of EU-SA scientific and technological (S&T) cooperation which is an FP6 funded Specific Support Action implemented by the SA Department of Science and Technology (DST). An overview of SA's FP6 participation in each of the Thematic Priority Areas is given in the figure below.

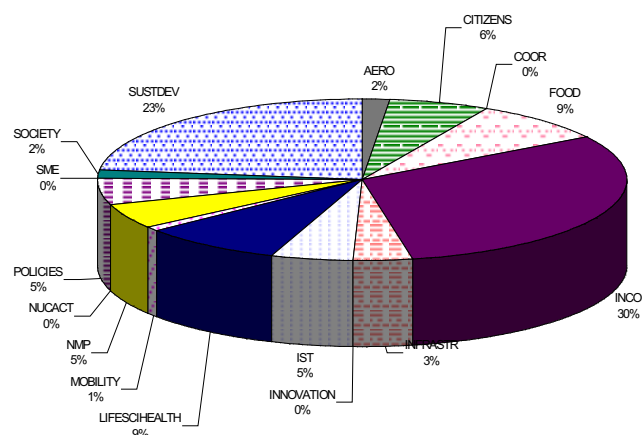


Figure 1: Summary of SA participation in FP6 per thematic priority area

Traditionally SA participation in the Framework Programmes has been dominated by science councils and selected universities, but through ESASTAP both the public and private sectors are now aware of the programme and have participated in a few calls. Twelve of the 23 SA universities participated in FP6 projects including "traditional" academic universities and six of the 8 science councils successfully participated in FP6. SMEs accounted for up to 9% of total FP6 participation by SA. Government participation (at national and municipal level) was 5%, and the public sector participation was significantly higher, as

many of the organisations classified under "Other" are public sector legal entities. Figure 2 provides an overview of the FP6 participation statistics in regards to the different sectors of the research community.

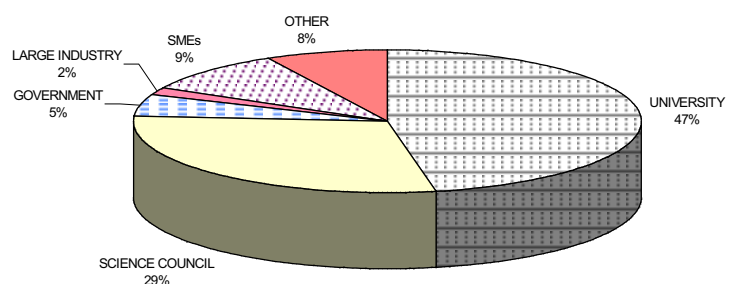
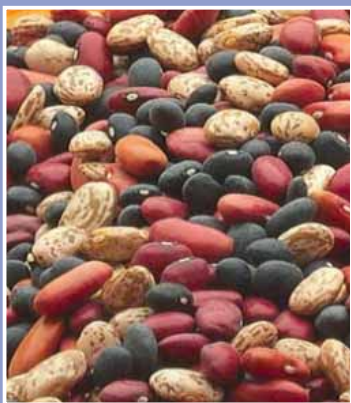


Figure 2: Participation across various sectors of the South African research community

Participation in FP7 calls

South Africa's continued success in the Framework Programme is now evident in FP7 with the outcomes of the first calls in Food, Agriculture and Biotechnology, Health, ICT, Euratom and Transport confirming South Africa as one of the top performers. South Africa is also participating in a number of support actions projects aimed at facilitating international networks and regional cooperation.

Successful FP6 Projects



SAFE FOODS

Promoting food safety through a new integrated risk analysis approach for foods

FP6 Instrument: Integrated Project
Project Duration: 2004-2008

Project Summary

SAFE FOODS aims at improving the current risk analysis practices for foods produced by different breeding approaches and production practices deploying high and low input systems. The research activities will result in designing new effective procedures for risk analysis under pinned by new scientific assessment methods, and embedded in a broad impact analysis of social, financial and economic consequences, and with high levels of transparency, active public engagement and improved risk communication.

List of project participants

Italy, Hungary, United Kingdom, Netherlands, Greece, Denmark, Sweden, Switzerland, Germany, Latvia, Ireland, China, Finland, Norway, France, South Africa, Czech Republic, Poland, Belgium.

The South African participation

The South African participant is the Council for Scientific and Industrial Research (CSIR) which works in collaboration with the Agricultural Research Council (ARC) and the University of Pretoria (UP). SA contribution to the BIOMINE project entails sample collection, identification and preparation, database construction and also specifically in the metabolic profiling, using nuclear magnetic resonance spectroscopy (NMR). The CSIR has been tasked with the NMR analysis of all the maize and potato samples studied for the duration of the project. Participation in the project will develop participants' skills in bioinformatics.

Project achievements

Focus is on the potato and maize crops produced by different agricultural practices, including high- and low-input (organic) agriculture, and through different breeding approaches. Samples of these crops have been collected from all over the world and are currently being evaluated using profiling methods. The data generated are captured in a comparative database that will allow for the determination of what compounds, metabolites and nutrients make up crops, which ones remain constant, which ones change, and the production of new ones depending on the specific agricultural practice or breeding approach used in the production of that crop.

Information is also being gathered on the type of mycotoxins associated with the crops and the effect of their presence on the normal crop profile. This comparative analysis of compositional profiles of foods, produced by different agricultural practices, under different environmental conditions, will provide relevant information for establishing baselines and will document the history of the safe use of foods, which is an important element in the safety and nutritional evaluation of foods.

www.safefoods.nl



BioMinE

Biotechnology for Metal bearing materials in Europe

FP6 Instrument: Integrated Project
Project Duration: 2004-2008

Project Summary

BioMinE aims to integrate biotechnology-based processes for the recovery and/or removal of metals from primary ores and concentrates and secondary metal-bearing materials (such as mining wastes, metallurgical slags, metal bearing scrap, and power plant ashes). The project involves biotechnological research to provide radical changes in the basic materials industry for cleaner, safer and more eco-efficient production. The objective of BioMinE is to establish environmentally-friendly biotechnologies which are economic, particularly at a small scale, and which will provide an alternative to current technologies such as roasting and smelting.

The introduction of biometallurgical processes in Europe will lead to substantial improvements in metal production by increasing recoveries, reducing costs and energy demands, increasing revenues, and the identification of new resources. Biometallurgy has the potential for a major technology breakthrough in the metals and minerals industry. This is underlined by the great interest shown by major international companies in this new technology.

The biotechnologies being investigated include bioleaching, biooxidation, biosorption, bioreduction, bioaccumulation, bioprecipitation, bioflotation, bioflocculation, and biosensors, as well as microbiological research. The RTD programme includes commercial evaluation through integrated piloting of the new processes, together with preliminary economic assessments. This will provide a sound basis for decisions by industrial companies on whether to proceed to commercial demonstration. The work is being enhanced by training and educational activities. BioMinE has adopted a multi-disciplinary approach involving universities and research organisations, mining companies, waste treatment facilitators, and equipment and instrument suppliers.

List of project participants (countries not institutions)

Serbia And Montenegro, Spain, United Kingdom, Sweden, South Africa, Portugal, Greece, Poland, France, Romania, Germany, Finland, United Kingdom, Netherlands and Belgium.

The South African contribution to the project

The leading South African participant in the project is Mintek working in collaboration with the University of Cape Town, the University of Stellenbosch, and De Beers.

Mintek is responsible for research and development of bioleaching technologies in the project. Mintek has undertaken extensive amenability testing of a wide range of target resources, and is currently undertaking an integrated piloting campaign on two of these

resources. Mintek is also involved in the development of techniques to identify and quantify bioleach microorganisms, and to manipulate and control microbial consortia in bioleaching processes.

The University of Cape Town is contributing to the development of a model of the bioleaching process that is sufficiently complex to describe all the physical and chemical sub-processes that occur, but sufficiently simple to facilitate use by industrial practitioners. The University of Stellenbosch is contributing to the assessment of the metal tolerance

of bioleaching bacteria, through an understanding of the genetic structure of these organisms. And De Beers is assessing the use of bioleaching to assist in the recovery of diamonds from kimberlite ores.

Project Achievements to date

The project has made many significant advances in the past three years. Some of the project's achievements to date include:

- The development of thermophilic bioleaching processes for the treatment of gold and base-metal concentrates. These processes are currently being evaluated at pilot-plant scale.
- The development of a range of techniques for the characterisation and quantification of bioleaching bacteria and archae.
- The development of two websites that will serve as a source of information in this field for many years to come:
 - **BioMinE Wiki** : http://wiki.biomine.skelleftea.se/wiki/index.php/Main_Page
 - **BioMinE Learning Hub** : <http://biomine.skelleftea.se/html/HUB/biomineguide.htm>

As the project moves forward to its conclusion in 2008, it is anticipated that further breakthroughs will be realised, bring commercial implementation of the developed technologies in Europe closer to fruition.



AVIP

AIDS Vaccine Integrated Programme

FP6 Instrument: Integrated Project
Project Duration: 2004-2009

Project Summary

Non-structural vaccine antigens have proven to be safe and immunogenic in preclinical and clinical trials. Promising efficacy data have also been obtained in nonhuman primates, where immunity to non-structural viral proteins provided long-lasting protection against challenge with pathogenic simian immunodeficiency virus (SIV) or simian-human immunodeficiency virus (SHIV) strains. In particular, novel vaccine strategies combining non-structural and structural antigens have been developed to the aim of inducing broad cellular and humoral immune responses able to kill cells infected early on, and to neutralize infectious virions, respectively. The AVIP strategy, for both preventative and therapeutic vaccination, includes both nonstructural and structural viral products. In fact, the immune responses to the regulatory proteins Tat, Rev and Nef have been shown to be important in controlling disease onset and progression. Further, with regard to Env, modifications have been introduced by partners of AVIP Consortium that permit exposure of conserved epitopes, thereby circumventing clade-related issues and allowing the generation of a cross-clade vaccine against HIV/AIDS. This rationale is further supported by the high conservation and immunological cross-clade recognition of the regulatory components.

Four different vaccine candidates have been selected by AVIP, which will soon enter phase I trials in 6 clinical centers in Europe (Estonia, Finland, Germany, Italy, Sweden and United Kingdom). The first two are based on the combination of the same structural gene product (V Env) with two different regulatory proteins, whereas the other two vaccines are complex combinatory vaccine formulations involving the use of blocks encompassing multiple structural and non-structural antigens.

Project Summary (Continued)

1. Tat V Env
2. Nef V Env
3. Multi-HIV antigens/epitopes full-length rev, tat, nef, gag, full-length antigens, and over 20 T cell epitopes from Pol, Protease and Env antigens
4. HIV multigene (nef, rev, tat, gag, rt, env).

The major objectives of AVIP are as follows:

- Preclinical studies aimed at selecting the best formulation and immunization protocol of the 4 AVIP vaccine candidates, to produce them according to GMP conditions, to perform testing and toxicology studies needed for approval for human use, and to prepare the clinical protocols, clinical sites and the core laboratories to conduct preventative and therapeutic phase I trials in EU. Efficacy studies in animal models will be continued in parallel with phase I studies.
- Technology transfer and studies on cross-clade recognition of AVIP candidate antigens in order to move rapidly into phase II/III trials in Developing Countries (DC).
- Training of scientists, clinicians, health workers in EU and DC via the established AVIP International School.
- Preparation and connection of Community Advisory Boards (CAB) in EU and DC.

List of project participants

Italy, Sweden, France, Germany, Finland, United Kingdom, South Africa and Swaziland.

The South African participation and project achievements

Two South African sites were involved with the project from its inception, the University of Stellenbosch and the University of the Witwatersrand. The Stellenbosch site provided immunological laboratory support for the project conducted in South Africa. The University of the Witwatersrand site enrolled participants from Soweto into a study to determine the baseline immunological and viral characteristics of HIV infection in this population and to determine whether the HIV vaccines developed in Europe could be used in either a therapeutic or preventative context in South Africa. Towards the end of the third year two further Southern African sites were added, the laboratory site based in Mbabane and a new rural clinical trial site at the Ndlela HIV Clinical Trials Centre in rural Mpumalanga. These Southern African sites will allow technologies developed in Europe to be directly applicable in areas with high HIV prevalence and incidence rates. This FP6 programme has allowed the development of local laboratory and clinical infrastructure in the pursuit of an appropriate HIV vaccine for South Africa.



PHARMA-PLANTA

Recombinant pharmaceuticals from plants for human health

FP6 Instrument: Integrated Project
Project Duration: 2004-2010

Project Summary

The expression of recombinant pharmaceutical proteins in plants has been under investigation for over ten years. Plants are attractive for several reasons, but the primary advantages are that they represent an inexpensive and versatile expression system for a wide variety of recombinant proteins, and they offer the potential for rapid and economical scale-up.

Pharma-Planta aims to move beyond proof-of-concept studies and develop candidate products for clinical evaluation in phase I human trials. This will include compliance with all regulatory requirements, good manufacturing practice (GMP) standards and pre-clinical toxicity testing. The consortium will also develop robust risk assessment practices for recombinant pharmaceutical molecules produced in plants, based on health and environmental impact, working closely with the appropriate regulatory authorities. Finally, the consortium will develop a coordinated programme for securing and managing intellectual property, which will facilitate the availability of high priority, plant-derived recombinant pharmaceuticals to the poor in developing countries.

List of project participants

Germany, United Kingdom, Ireland, France, Austria, Italy, Sweden, South Africa, Portugal, Greece, Chile, Netherlands and Belgium.

The South African participation

The CSIR's primary role and tasks relate to the genetic transformation of maize and tobacco with the experimental vaccines, to perform crossing into elite lines and to monitor stability of Mab expression, molecular analysis and growing the transgenic plants in a contained environment to produce seeds that will be used for downstream processing.

Project achievements

The research has already led to successful expression of molecules in host plants. Two papers have been published and a further four manuscripts are in advanced draft form. The CSIR trained two post doctoral fellows while two PhD and two MSc students are still completing their studies. Two further postdoctoral candidates are to be interviewed shortly.



EO-LANDEG

Earth Observation Initiative in former homeland of South Africa in support to EU activities on land degradation and integrated catchments management

FP6 Instrument: Specific Support Action

Project Duration: 2006-2007

Project Summary

Action plan from NEPAD (New Partnership for African Development) and the 6th Community Environmental Action Programme (EAP) of EU have identified poverty alleviation via rational use of natural resource and ecosystem protection as priority issue. The aim of EO- ANGED is to strengthen a multi-task research team currently involved in integrated catchments management programmes and to contribute to EU experience in relevant scientific projects. The catchments of the former Transkei homeland correspond to semi-humid/semi-arid vulnerable ecosystems. This pilot action on a site will include activities such as assessing the relevance of current research and available earth observation tools and data sets to support conservation measures and adequate management strategies. Networking with EU teams and African teams embarked on similar research project will be instrumental. Dissemination of results and education will also be a major component of EO- ANDEG, involving local stakeholders, universities, school and the community. and and ecosystem degradation and resource depletion in homelands include interaction between natural (geology, soil, hydrology, climatology) and societal (history, demography, land-use practices) issues. These disadvantaged Ed regions are thus representative of severely affected regions elsewhere and hence makes an invaluable test area to develop the proposed earth observation initiative.

List of project participants

South Africa

Project achievements

The project drove a Pilot Earth-Observation Initiative for land degradation and integrated water management in the former Transkei homeland catchments characterized by semi-humid/semi-arid vulnerable ecosystems. This pilot action included activities such as:

- Assessment of the relevance of current research and available EO tools and data sets to support conservation measures and adequate management strategies.

- Networking with EU teams and African teams embarked on similar research project was instrumental.
- Dissemination of the results, education and awareness was also a major component of EO-LANDEG, involving local stakeholders, universities, school and the community.

The project also organized several networking workshops in South Africa and in Europe to attract new partners to the team and to identify potential partners for future participation in the FP7.



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