



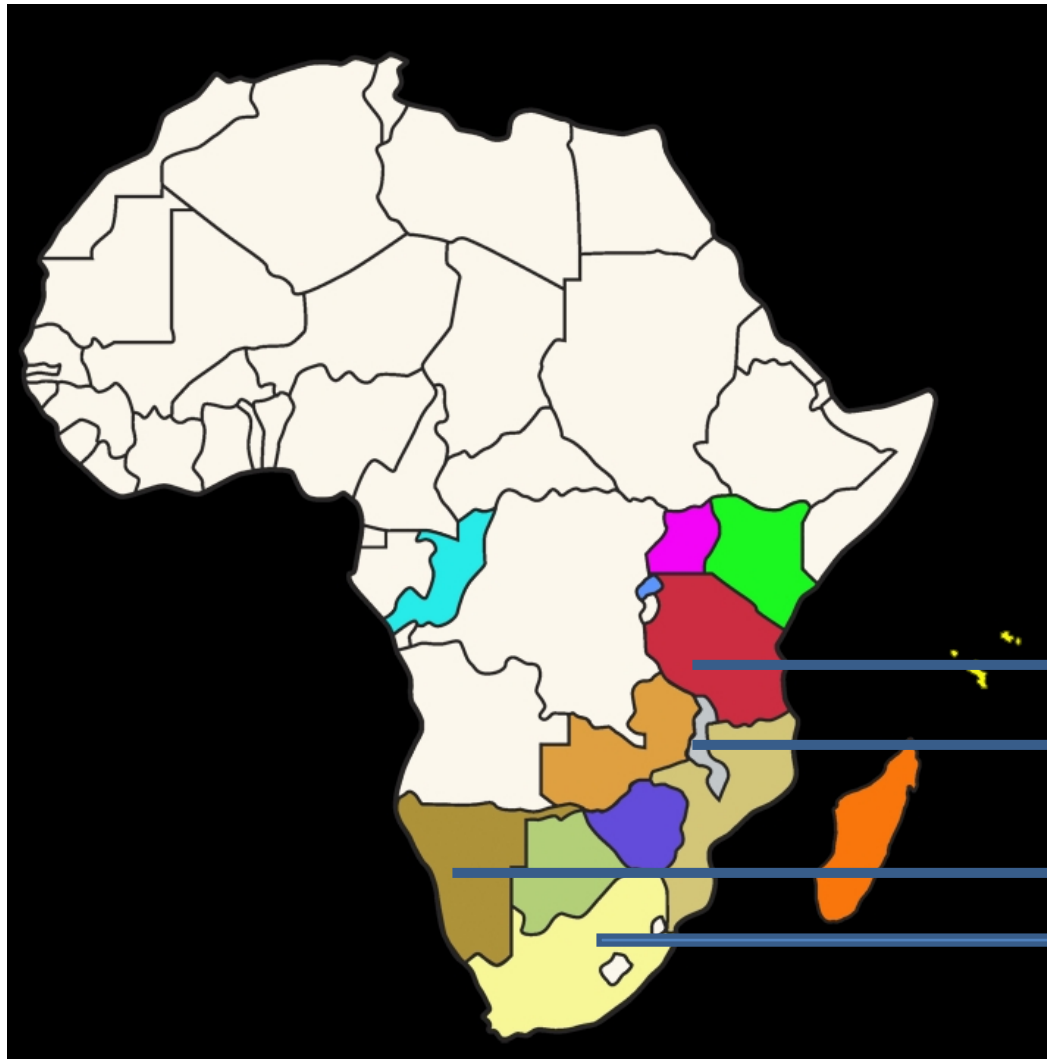
# SOUTHERN AFRICAN BIOCHEMISTRY AND INFORMATICS FOR NATURAL PRODUCTS



## PROGRESS REPORT 2012



SABINA Secretariat, Chancellor College, Zomba, Malawi



University of Dar es Salaam

University of Malawi and  
Tea Research Foundation  
of Central Africa

University of Namibia

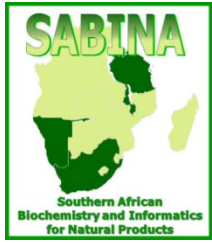
University of Pretoria, CSIR,  
University of the Witwatersrand



# PROJECT PURPOSE AND OBJECTIVES



- The implementation of postgraduate programmes in the biochemistry, chemistry, and bioinformatics of natural products. The specific objectives are:
  - i. New knowledge generated through both PhD and MSc studies
  - ii. A strong and functional regional network integrating chemical and biological sciences
  - iii. Universities and research institutions having better and regionally trained persons capable of teaching and learning and conducting research in their institutions.
  - iv. Strengthening research capacities at the University of Dar es Salaam (UDSM), the University of Malawi (UNIMA) and the University of Namibia (UNAM)



# SABINA NETWORK



## ▣ MALAWI

- ▣ Chancellor College, University of Malawi (Email: [sabinasec@chanco.unima.mw](mailto:sabinasec@chanco.unima.mw))

- ▣ Prof John Saka, Academic Director, Chemistry Department
- ▣ Mr Frank Ngonda, Project Manager, Secretariat
- ▣ Mr Benjamin Chirwa, Project Accountant, College Finance Office
- ▣ Mr Kennedy Ngwira, Department of Chemistry, University of Malawi

## ▣ Tea Research Foundation of Central Africa (TRFCA)

- Dr Albert Changaya
- Dr Hastings Nyirenda

## ▣ NAMIBIA

- ▣ Dr Martha Kandawa -Schultz, Department of Chemistry and Biochemistry, University of Namibia
- ▣ Dr Renate Hans, Department of Chemistry and Biochemistry, University of Namibia





# SABINA NETWORK

## ▣ SOUTH AFRICA

- ▣ Dr John Becker, African Centre for Gene Technologies (ACGT)
- ▣ Prof Jane Morris, African Centre for Gene Technologies (ACGT)
- ▣ Dr Vinesh Maharaj, Centre for Scientific and Industrial Research (CSIR)
- ▣ Prof Zeno Apostolides, University of Pretoria
- ▣ Prof Charles de Koning, University of the Witwatersrand
- ▣ Prof Martin Steyn, University of Pretoria
- ▣ Dr Oleg Reva, University of Pretoria
- ▣ Prof Debra Meyer, University of Pretoria
- ▣ Dr Mervyn Beukes, University of Pretoria
- ▣ Dr Nicolette Taylor, University of Pretoria
- ▣ Ms Ella Nyakunu, Project Manager, POL-SABINA, ACGT



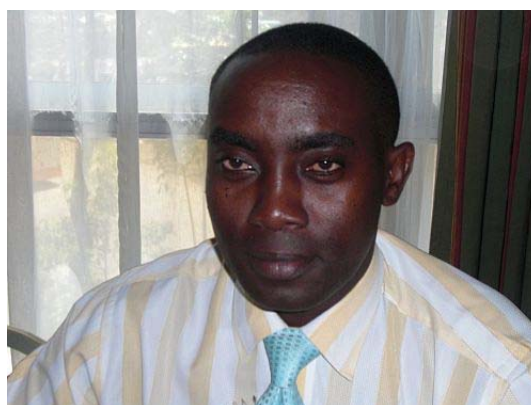


# SABINA NETWORK



## ▣ TANZANIA

- Dr Quintino Mgani, Department of Chemistry, University of Dar es Salaam
- Dr Sylvester Lyantagaye, Department of Molecular Biology and Biotechnology, University of Dar es Salaam
- Dr Justin Omolo, Department of Chemistry, University of Dar es Salaam

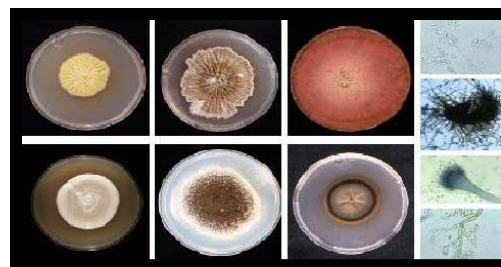
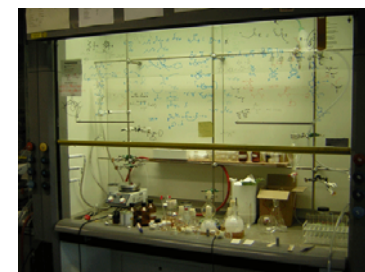


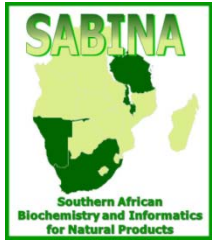


# PROJECT THEMES



1. Natural Product Chemistry
2. Synthetic Chemistry
3. Molecular Biology and Functional Genomics
4. Biochemistry
5. Food Science
6. Bioinformatics





# OUTPUT 1: HUMAN CAPITAL









- Eighteen fellowship grants offered:
  - 2 PhD and 4 MSc students awarded scholarships in December, 2008 (4 males + 2 females)
  - 5 PhD and 2 MSc students awarded scholarships in mid September, 2009 (4 males + 3 females)
  - 3 PhD fellowships awarded –July, 2011 (1 male and 2 females)
  - 2 MSc fellowships awarded—February 2012 (2 females)
- Programme manager on part-time research studies





# SABINA FELLOWS- 1<sup>ST</sup> INTAKE



Fellow	University	Country of Origin	Status
Justin Omolo 	WITS, PhD	Tanzania	Graduated
Nicholas Mphangwe 	UP, PhD	Malawi	24 month extension offered
Tinotenda Shoko 	UNIMA, MSc	Zimbabwe	Completed
Sicilia Ilonga 	UNAM, MSc	Namibia	Completed
Kennedy Ngwira 	UDSM, MSc	Malawi	Graduated
Pelly Malebe 	UP, MSc	South Africa	Graduated



# Miss Malebe after graduation at the University of Pretoria

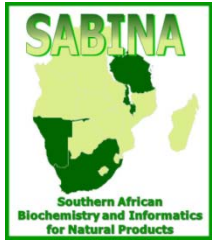




## THESIS TITLES



1. **Justin Omolo, The University of Witwatersrand**, “Bioassay-guided isolation and synthetic studies on natural products obtained from Tanzanian medicinal plants”, PhD thesis, The University of Witwatersrand, completed December 2011, graduated June 2012.
2. **Pelly Malebe, University of Pretoria**, “Development of molecular marker assisted selection for drought tolerance in tea (*Camellia sinensis* (L.) O. Kuntze)”, MSc thesis, University of Pretoria, completed June 2011, graduated September 2012.
3. **Secilia Ilonga, University of Namibia**, “Anti-cancer, antioxidant and antimicrobial screening of extracts from *Ziziphus mucronata*, *Heliotropium ciliatum* and *Gnidia polycephala* from Otjikoto region(Namibia)”, MSc thesis, University of Namibia, completed May 2012, to graduate April 2013.










## THESIS TITLES



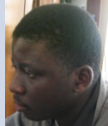


4. **Kennedy Ngwira, University of Dar es Salaam**, “Phytochemical and biological studies of secondary metabolites from *Berberis holstii*”, MSc thesis, University of Dar es Salaam, completed February 2012, to graduate October 2012.
5. **Tinotenda Shoko, University of Malawi**, “A study of volatile flavour constituents of edible fruit pulps of *Parinari curatellifolia*, *Strychnos cocculoides* and leaves of *Fadogia ancyllantha*, *Manihot esculenta* and *Colocasia esculenta* growing in Malawi”, MSc thesis, University of Malawi, completed June 2012, to graduate October 2012.
6. **Liberata Mwita, University of Dar es Salaam**, “Bioactivity and bioinformatics characterization of compounds from *Coprinus* species”, MSc thesis, University of Dar es Salaam, completed September 2012, to graduate October 2012.

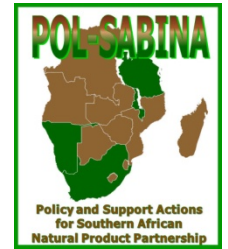


# SABINA FELLOWS-2<sup>nd</sup> INTAKE

Fellow	University	Country of Origin	Status
Adushan Pillay 	Wits, PhD	Republic of South Africa	Final Year, 1 <sup>st</sup> draft of thesis completed
Petrina Kapewangolo 	UP, PhD	Namibia	Final Year, starting thesis writing
Godwil Madamombe 	UP, PhD	Zimbabwe	Final Year, starting thesis writing
Kumbukani Nyirenda 	UNIMA, PhD	Malawi	Final Year, finalising thesis writing
Benjamin Kumwenda 	UP, PhD	Malawi	Final Year, finalising thesis writing
Moola Nyambe 	UNAM, MSc	Namibia	Final Year, starting thesis writing
Liberata Mwita 	UDSM, MSc	Tanzania	Completed

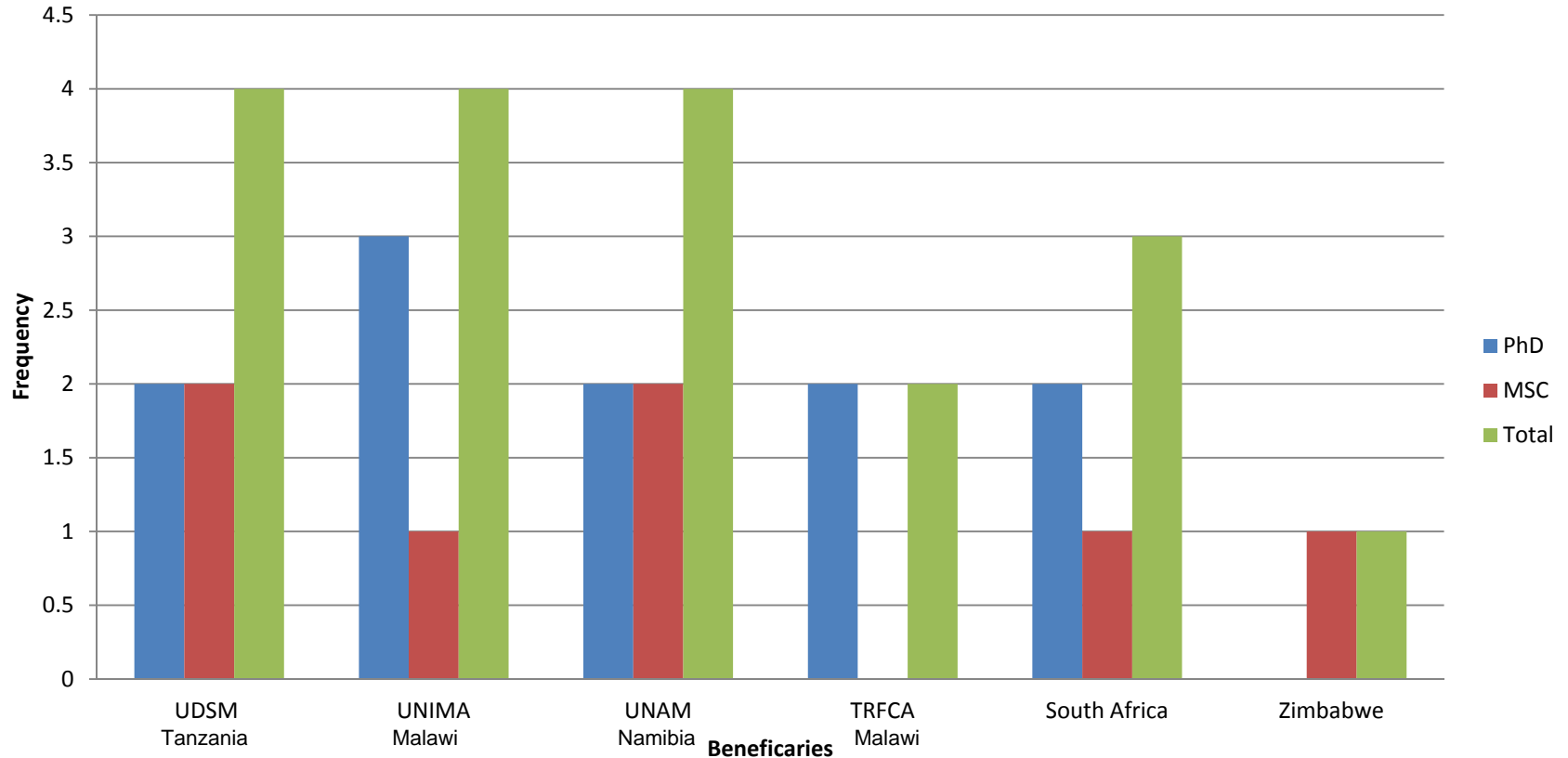
# SABINA FELLOWS- 3<sup>rd</sup> INTAKE

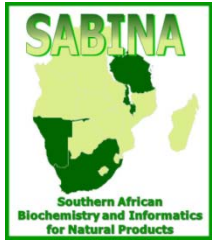
Fellow	University	Country of origin	Status
Jimmy Sumani 	Wits, PhD	Malawi	Completing Year 1
Pelly Malebe 	UP, PhD	Republic of South Africa	Second Year
Lydia Kisula 	UDSM, MSc	Tanzania	In Year 1 at UDSM
Tresia Lipinge	UNAM, MSc	Namibia	In Year 1 at UNAM
	PhD, UDSM	Tanzania	Being identified



# Distribution of Fellowships

Figure 1: Distribution of scholarships amongst beneficiaries

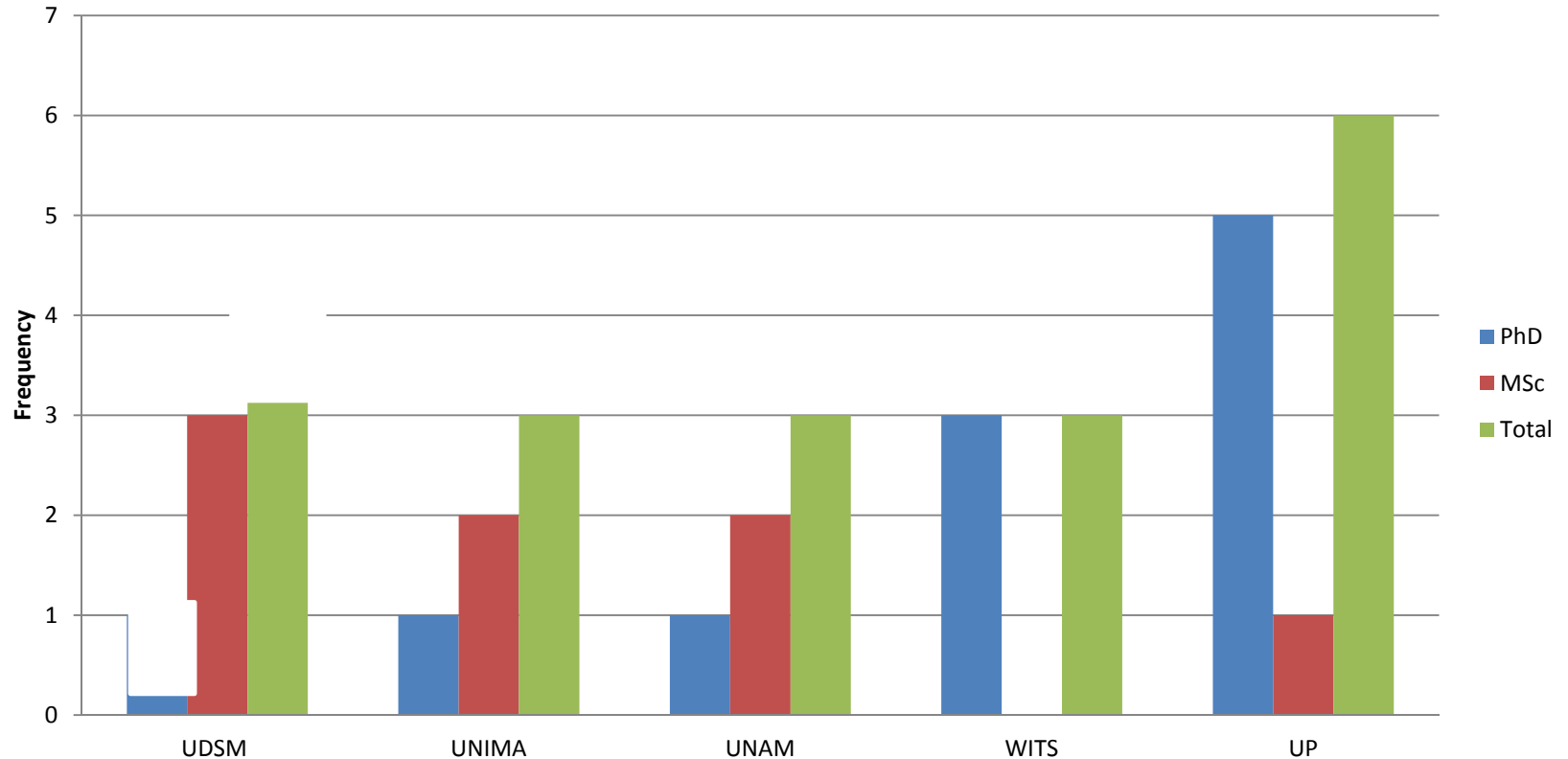




# Universities Hosting Students



Figure 2: Distribution of students at the five SABINA universities







## OUTPUT 2: SCIENTIFIC PUBLISHING

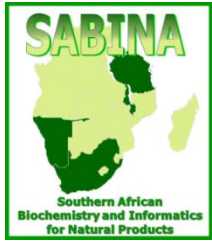
1. Mwita, L, Lyantagaye, S and Mshandete, A (2010). The effect of the interaction of varying chicken manure supplement levels with three different solid sisal wastes substrates on sporocarp cap lengths and diameters, stipe lengths and diameters and dry weights of *Coprinus cinereus* (Schaeff) S. Gray s.lat. *African Journal of Biotechnology*, 10: 1172-1180. (IF 0.573, 2011)
2. Omolo, JJ, Johnson, MM, van Vuuren, SF and de Koning, CB (2011). The synthesis of xanthones, xanthenediones and spirobenzofurans: Their antibacterial and antifungal activity, *Bioorganic & Medicinal Chemistry Letters*, 21: 7085-7088. (IF 2.554, 2011)
3. Kamimi, G, Brzuszkiewicz, E, Liesegang, H, Wolherr, A, Daniel, R, Gottschalk, Reva, O, Kumwenda, B, Srivastava, M, Bricio, C, Berenguer, J, van Heeden, E and Litthauer, D (2011). Sequence of the hyperplastic genome of the naturally competent *Thermus scotoductus* SA-01, *BMC Genomics*, 12: 577. (IF 4.07, 2011, open access journal)
4. Pillay, A, Rousseau, AL, Fernandes, MA and de Koning, CB (2012). Wacker oxidation methodology for the synthesis of the benzo-fused acetal core of marticin. *Tetrahedron*, 68: 7116-7121. (IF 3.025, 2011)

\* IF = Impact Factor



## OUTPUT 2: SCIENTIFIC PUBLISHING

5. **Pillay, A**, L Rousseau, AL, Fernandes, MA and **de Koning, CB** (2012). The synthesis of the pyranonaphthoquinones dehydroherbarin and anhydrofusarubin using Wacker oxidation methodology as a key step and other unexpected oxidation reactions with ceric ammonium nitrate and salcomine. *Organic & Biomolecular Chemistry*, 10: 7809-7819. (IF 2011, 3.696)
6. **Nyirenda, KK**, **Saka, JDK**, Naidoo, D, **Maharaj, V** and Muller, CJF, (2012) Antidiabetic, anti-oxidant and antimicrobial activities of *Fadogia ancyrantha* extracts from Malawi, *Journal of Ethnopharmacology*, 143: 372-376. (IF 2011, 3.014)
7. **Omolo, JJ**, **Maharaj, V**, Naidoo, D, Klimkait, T, Malebo, HM, Mtullu, S, Lyaruu, HVM and **de Koning, CB** (2012). Bioassay-guided investigation of the Tanzanian Plant *Pyrenacantha kaurabassana* for potential anti-HIV-active compounds, *Journal of Natural Products*, in the press, DOI: dx.doi.org/10.1021/np300255r. (IF 2011, 3.128)
8. **Shoko, T**, **Saka, JDK**, **Apostilides, Z** and Monjerezi, M (2012). Volatile constituents of fruit pulp of *Strychnos cocculoides* (Baker) growing in Malawi using solid phase microextraction, *South African Journal of Botany*, in the press. (IF 2011, 1.659)

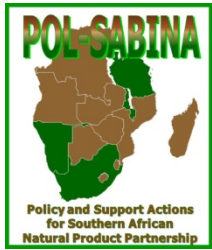


# OUTPUT 3: RETENTION OF NEW ACADEMICS



- Dr Justin Omolo, lecturer at University of Dar es Salaam (PhD, provided with a re-entry grant)
- Kennedy Ngwira, lecturer at University of Malawi
- Sicilia Ilonga, working at School of Medicine, University of Namibia
- Pelly Malebe, doing her PhD at University of Pretoria
- Tinotenda Shoko, lecturer at Masvingo Polytechnic, Zimbabwe





# OUTPUT 4: INSTITUTIONAL STRENGTHENING

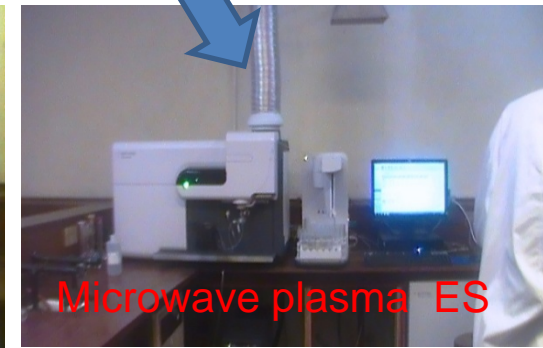
## Research Facilities



Rain Shelter handover ceremony, TRFCA, Malawi, 10 May, 2012



## Lab infrastructure improvements



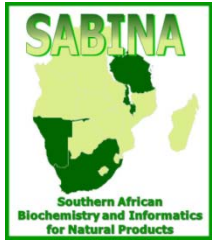




# OUTPUT 5: SCIENTIFIC DISSEMINATION 2012

1. Madamombe, G. *Yield and quality decline in vegetative propagated cultivar tea (Camelia sinensis (L) O. Kuntze) under continuous harvesting.* 2nd All Africa Horticultural Congress, Skukuza Kruger National Park, South Africa, 15-20 January 2012.
2. Pillay, A. *Synthesis of a potential anti-tumour naphthoquinones.* University of Free State, Bloemfontein, South Africa, 15 April 2012.
3. Kapewangolo, P. *Anti-HIV screening of selected plant species belonging to the Lamiaceae family.* Department of Biochemistry, University of Pretoria, 18 May 2012.
4. de Koning, CB. *The Synthesis of Oxygen Containing Heterocycles.* University of Pretoria, Invited seminar, 27 July 2012.
5. de Koning, CB. *The Role of Universities in Research for Developing Natural Products as Medicines.* The Innovation Hub, Pretoria, Invited speaker at SMME Workshop, 14-16 August 2012.





# QUALITY ASSURANCE TO NETWORK ACTIVITIES



- Prof Avrelija Cencic, IAC member visited SABINA nodes (Malawi, South Africa and Namibia) to interact with members and students
- Prof Andrew Marston, IAC member and Dr John Becker to visit SABINA nodes next week
- The Director of ACGT, Dr John Becker visited SABINA nodes (Malawi, South Africa and Namibia) for discussions with members and students
- SABINA staff meeting, TRFCA, Malawi, 10 May 2012





# NETWORKING



1. Joint and or co-supervision of students involving faculty in different partner institutions.
2. Student exchanges between partner institutions (up to 6 months, with a focus on building collaborative research and on training in techniques not available at the student's home institution).
3. Short term faculty visits between institutions (e.g. to run short courses, deliver guest lectures, and liaise concerning student research projects).
4. Longer term faculty visits and sabbaticals between partner institutions (where necessary and strongly motivated, sabbaticals may also involve visits to institutions that are not part of the network).
5. Organization of visits/lecture tours by distinguished guest lecturers and IAC members from advanced academic institutions outside Africa.



ISSUE 8, VOLUME 1



**GENERAL NEWS**

**The cup of herbal tea that could help fight breast cancer: plant extract can kill cells in test tube (Mail Online Health, Aug 2012)**

A traditional herbal tea may hold the key to fighting breast cancer, claim scientists. Extracts from the plant known as virgin's mantle, which is used as a medicinal tea in some countries, can kill cancerous cells in the test tube. The plant-based tea is already drunk by women in rural Pakistan who have breast cancer, but until now its use as a treatment has been regarded as folklore...[Read more](#). To read the research article [click here](#).

**Drought-resistant tea highlighted in natural product research (SciDev, Sep 2012)**

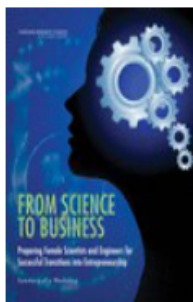
Researchers in Malawi have developed tea clones able to withstand the worst droughts in the country in recent years, a meeting on natural product development has heard. Chris Kamlongera, principal of Chancellor College, University of Malawi, said the Tea Research Foundation of Central Africa, whose members are Malawi and Zimbabwe, used genetic biomarkers to develop the drought-resistant cultivars...[Read more](#)

**Rethinking herbal medicine (The Scientist, Sep 2012)**

Many scientists raise a skeptical eyebrow to traditional herbal treatments, but a new phylogenetic study suggests that such remedies may hold promise—for both medicine and drug development. In the study, researchers from the University of Reading in the United Kingdom found that many medicinal plants used by nearly 100 cultures on different continents are related...[Read more](#)

**RECENTLY PUBLISHED BOOKS**

*Adopted from The National Academies Press*



**From Science to Business**

**Preparing female scientists and engineers for successful transitions into entrepreneurship: a summary of a workshop**

From science to business: preparing female scientists and engineers for successful transitions into entrepreneurship is the summary of an August 2009 workshop that assess status of women undertaking entrepreneurial activity in technical fields, to better understand the nature of the barriers they encounter, and to identify what it takes for women engineers to succeed as entrepreneurs. This report focuses on women's career paths from academic science and engineering to entrepreneurship, with a goal of identifying gaps in women's skills as well as experiences crucial to future success in critical for achieving leadership positions in entrepreneurial organizations.



**VRE interface**

**Researchers of natural products enhancing food security and improving health!**

**Login**

Username

Password

This digital workspace is home to a number of researchers concerned with the utilisation of African natural products - to enhance food security and improve human and animal health.

SABINA is a network that constitutes the following partners: University of Malawi, University of Namibia, University of Dar es Salaam,

**SciDev.Net**

**LATEST NEWS**

on science, technology & the developing world.

18-21 Feb 2012

2nd Biotechnological congress

Venue: Dubai

**VIRE for Natural Products**



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# NETWORKING



- A VRE workshop for Malawi participants 26 September, 2012
- A Natural Product Science Research group formed in Malawi; Mr Kennedy Ngwira of the Chemistry Department is the contact
- Moola Nyambe, MSc UNAM, on a 3 month study tour of UP (from 5 Sept to 30 Nov 2012) supported by POL-SABINA
- Nicholas Mphangwe on research field visit at TRFCA





# Increased Knowledge on Intellectual Property Rights Issues



- National interactive workshops in Malawi, Namibia, South Africa and Tanzania



Participants at the Workshop in Malawi



SMME Policy Workshop in Pretoria





# AWARDS TO STUDENTS



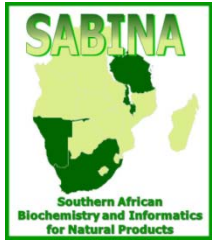
1. Petrina Kapewangolo, **Margaret McNamara Memorial Fund Award**, University of Pretoria
2. Adushan Pillay ,**1<sup>st</sup> Prize for student oral presentation**. Synthesis of potential anti-tumour pyranonaphthoquinones utilizing Wacker oxidations as a key step, A Pillay, A L Rousseau, C B de Koning, 12<sup>th</sup> Frank Warren Conference on Organic Chemistry, Bloemfontein, 15-18 April 2012
3. Godwil Madamombe ,**1<sup>st</sup> Prize for student oral presentation**. Yield and quality decline in vegetative propagated cultivar tea (*Camelia sinensis* (L) O. Kuntze) under continuous harvesting, 15-20 January 2012, 2<sup>nd</sup> All Africa Horticultural Congress, Skukuza Kruger National Park, South Africa
4. Pelly Malebe , **Elected a member of Golden Key International Honours Society after being amongst the top 15% list of academic achievers in 2012**, University of Pretoria



# POTENTIAL PROJECT IMPACT



Research area	Potential application
1. Tea	Drought tolerant and high quality germplasms Low labour intensive tea harvesting technologies (UP)
2. Plants	Anti-HIV compounds (TZ and MW plants) Anti-malarial (MW plant species) Anti-diabetic and potential herbal (MW) Oral healthcare (NAM) Nutritional and flavor properties (MW) (CSIR is involved in many of these projects)
3. Synthesis	Anti-cancer (Wits)
4. Bioinformatics	Development of databases to accelerate biological and health research (UP)



## OUTPUT 7: FINANCIAL SUSTAINABILITY



1. The Network continues to mobilise additional funding for further research and capacity building
  - i. ACGT led an application-NETWORK FOR BIOINNOVATION IN EAST AND SOUTHERN AFRICA submitted to the USAID Higher Education Solutions Network Request for Applications (RFA) RFA-OAA-12-000004, **was not successful.**
  - ii. UNIMA/University of Greenwich-Natural Resources Institute EU funded research project has a component on cassava safety and quality (£25000, 2012-2016)
2. During the interactive dialogue workshop in Malawi, priority research areas were identified; these will be refined to inform the next phase.





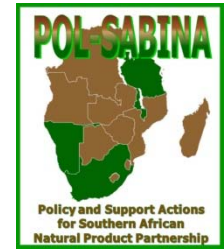
# *Building a cadre of next generation of active and relevant academics and researchers*



SABINA Secretariat, Chancellor College, Zomba, Malawi







# Acknowledgements

- Carnegie-IAS RISE for generous sponsorship from 2008 -2013



- Generous sponsorship from the European Union-African, Caribbean and Pacific (EU-ACP S&T) to POL-SABINA from 2009-2012



- Carnegie and Department of Science and Technology (DST)



- European Union
- University senior leadership teams
- All research fellows

