



Solidarity

Equality

Sustainability

# Dr. Lawrence Banks ICGEB Director-General



International Centre for Genetic  
Engineering and Biotechnology

## G20 Initiative on Bioeconomy

September 2025



**Solidarity**

**Equality**

**Sustainability**

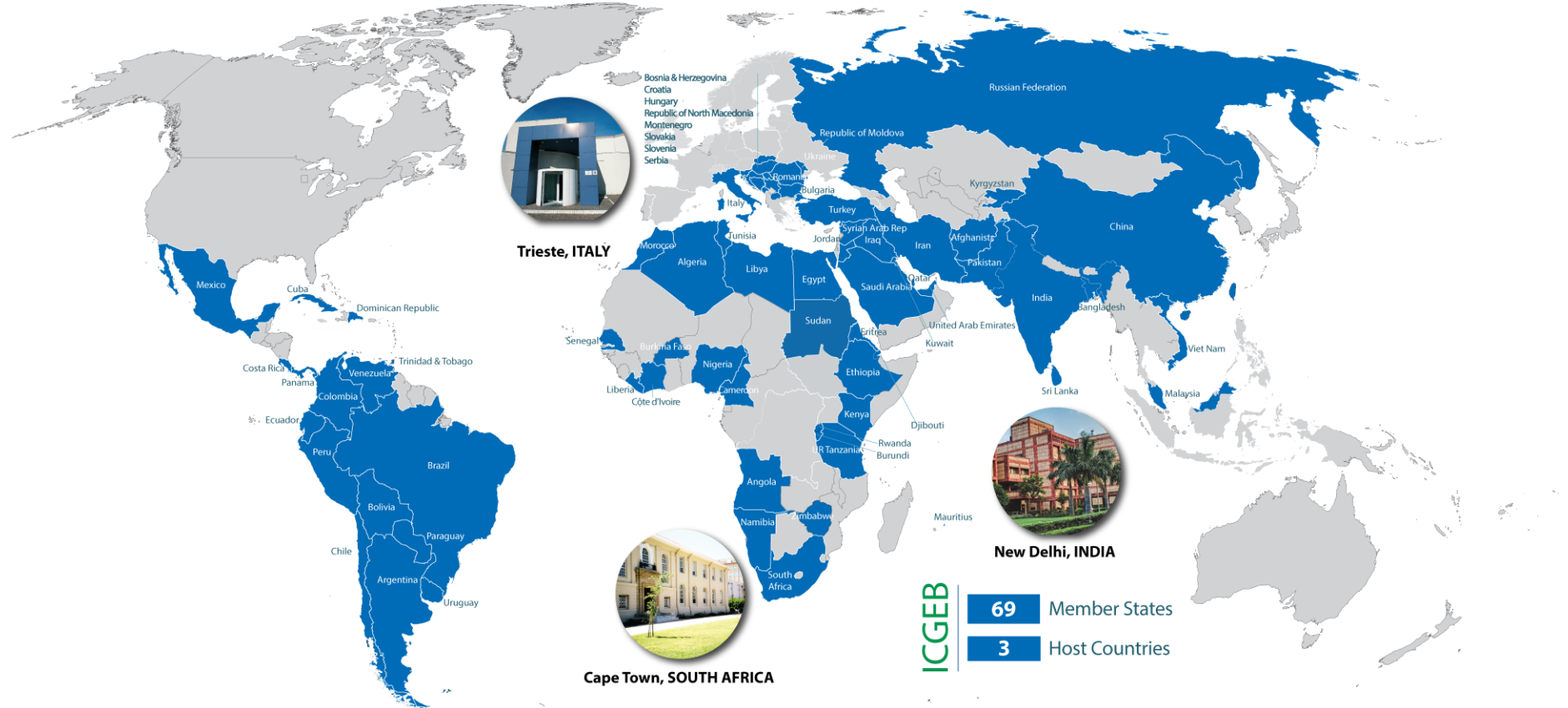
## ICGEB's approach to promoting the Bioeconomy in Africa

- Training and Capacity Building
- Leveraging South-South Cooperation
- Equality and Access to Technology and Subsequent Ownership
- Appropriate Technology Transfer
- Assistance with Regulatory and Production Capacity



# ICGEB





International Centre for Genetic  
Engineering and Biotechnology

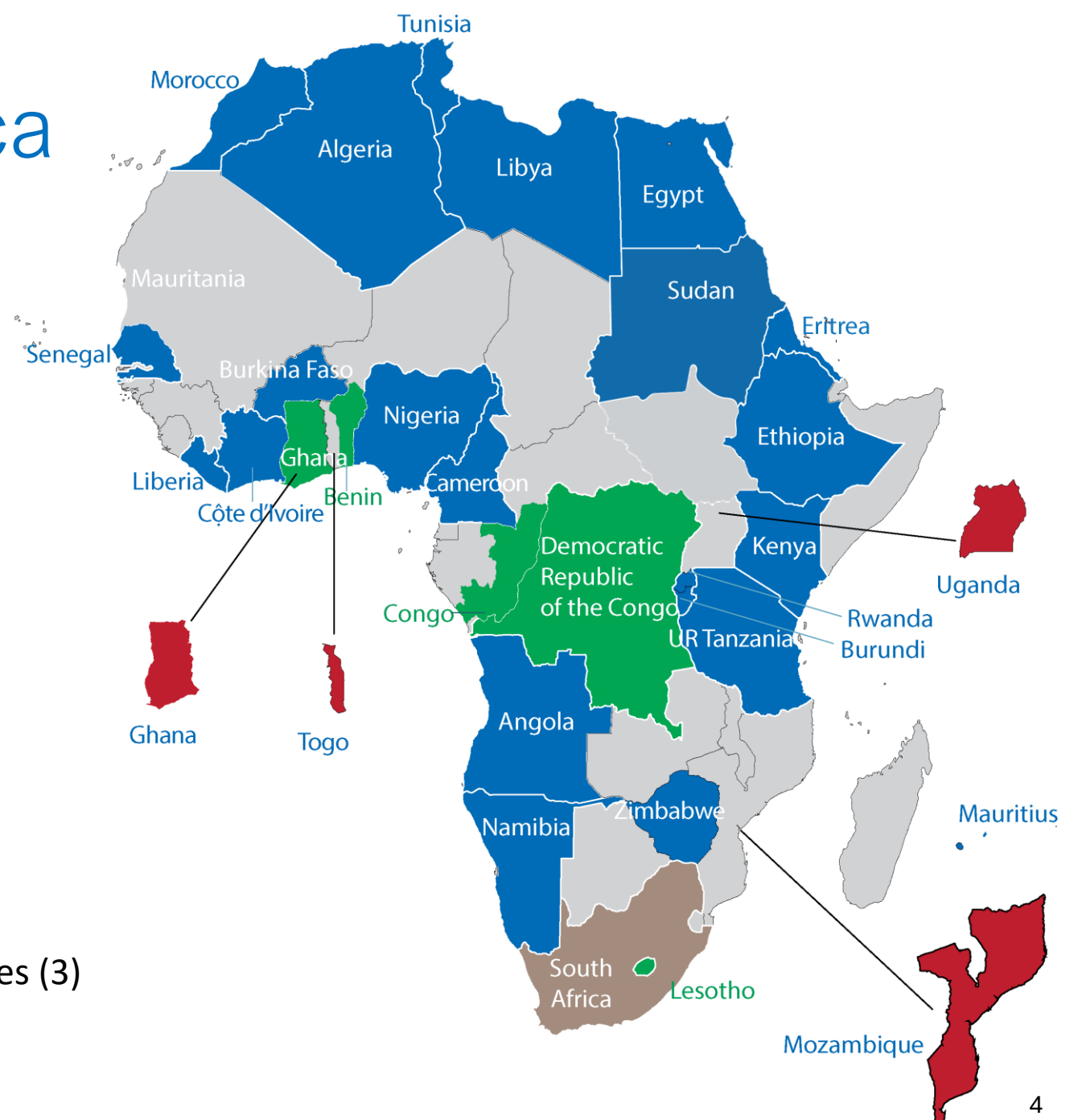


## ICGEB's Global Community



# ICGEB in Africa

-  Host Country
-  Member States (24)
-  Additional Signatory Countries (3)
-  Membership in progress (4)

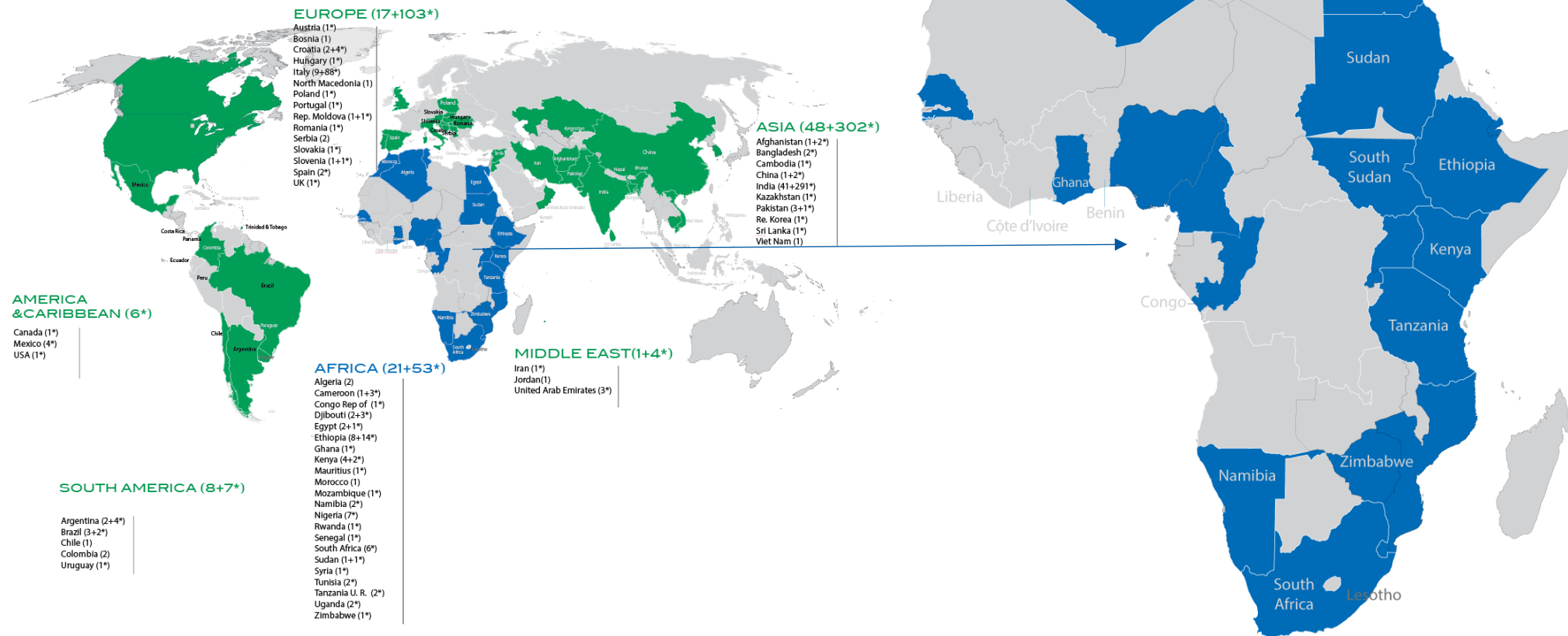


1. HUMAN CAPITAL: TRAINED IN THE  
SCIENTIFIC PROCESS FORMS THE  
BEDROCK FOR FUTURE HOME GROWN  
INNOVATION

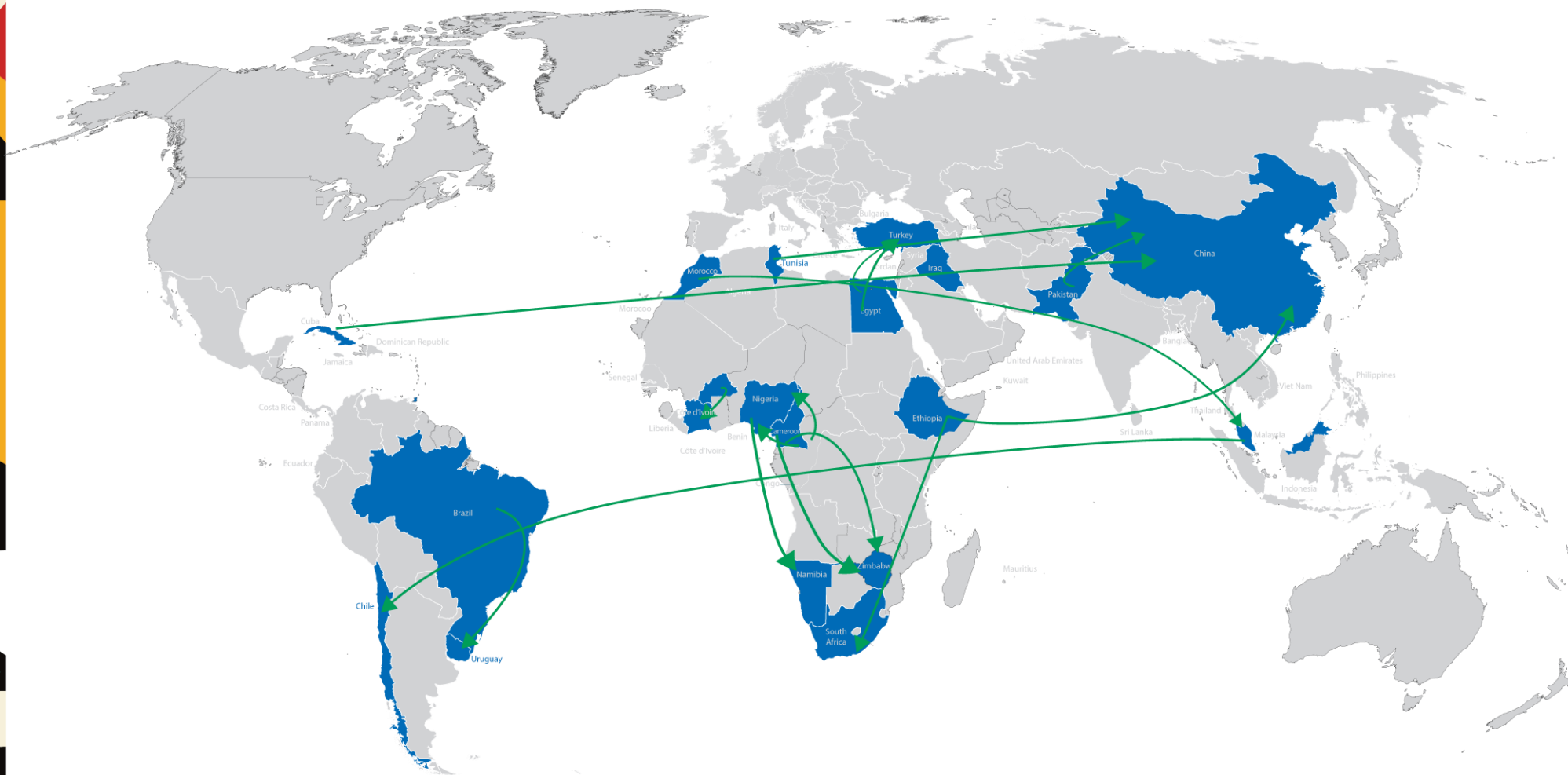
2. TRAINED IN BIOMANUFACTURING AND  
PRODUCTION PROCESSES – PROVIDES  
ACCESS TO ALREADY AVAILABLE  
TECHNOLOGIES AND PRODUCTS

3. MANUFACTURING INFRASTRUCTURE

# ICGEB Fellows in Africa in 2024



## 7





# WE-STAR

## Postdoctoral fellowships for WomEn ScienTists in AfRica



1. Infectious Diseases
2. Non-Communicable Diseases
3. Medical Biotechnology
4. Industrial Biotechnology
5. Plant Biology and Biotechnology



*Ministero degli Affari Esteri  
e della Cooperazione Internazionale*





# ICGEB DSI WE-STAR PROGRAMME



International Centre for Genetic  
Engineering and Biotechnology



science & innovation  
Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA

## ICGEB-DSI WE-STAR Project

### Supporting **African women** in Science



Cape Town  
**SOUTH AFRICA**



*Africa* MAY 25  
DAY

Celebrating **Africa Day**,  
we announce  
the **ICGEB-DSTI WE-STAR**  
Fellows 2025



Chiamaka Jessica Okeke  
Nigeria  
Chibuzor Onyinye Okonkwo  
Nigeria  
Sabrine Hdira  
Tunisia



International Centre for Genetic  
Engineering and Biotechnology



science, technology  
& innovation  
Department:  
Science, Technology and Innovation  
REPUBLIC OF SOUTH AFRICA

Supporting  
African Women in Science

## DO NOT FORGET THE NEXT GENERATION OF SCIENTISTS – FOLDSCOPE WORKSHOPS



ICGEB Campaigns  
fund Foldscope  
Workshops



Foldsopes  
donated from  
ICGEB Cape Town  
for the STEAM  
Camp, run by  
BIOAFRICA

# RESEARCH FUNDING TO ENSURE SUSTAINABILITY

- Returning Fellows have the possibility to be funded under the Collaborative Research Programme
- Ensures they can continue their studies upon returning home – and maintains a direct collaboration with ICGEB labs
- Provides funds for consummables, equipment, travel and student support
- Whilst established Pis can be supported special emphasis is placed on early stage researchers returning home after a successful period overseas and wanting to establish their own research programmes
- Current emphasis on translational research – and support to promote commercialisation

# ONGOING ICGEB CRP – 52 Grants active in Africa

BURKINA FASO	1
BURUNDI	1
CAMEROON	2
DJIBOUTI	5
EGYPT	3
ETHIOPIA	8
GAMBIA	1
KENYA	1
MAURITIUS	1
MOZAMBIQUE	1
NAMIBIA	2
NIGERIA	1
SOUTH AFRICA	20
TOGO	1
TUNISIA	2
UGANDA	1
UNITED REPUBLIC OF TANZANIA	1



# ICGEB CRP prize winners

## Dr. Cecilia Mweu

Jomo Kenyatta University of Agriculture and Technology, Institute for Biotechnology Research, **Nairobi, Kenya**

Project **“Generation of cyanogen-free Cassava with reduced post-harvest physiological deterioration through gene-specific genome editing”**





**BIOINOCULANTS**  
Starter cultures are pure cultures of meticulously selected strains of microorganisms such as yeast, bacteria, and mold and are one of the most important ingredients in food industries for controlled production of products with desired qualities.  
**Dejene Girma, Ethiopian Institute of Agricultural Research (EIAR), ETHIOPIA**



**CASSAVA**  
Gene editing of cassava to delay post harvest physiological deterioration in storage roots. Cassava is the most important food root crop in the world, playing a significant role as a source of calories for millions of subsistence farmers in sub-Saharan Africa.  
**Cecilia Mweu<sup>1</sup> - Jomo Kenyatta Univ. of Agriculture & Technology, Juja, Kenya**



**CARDIOVASCULAR THERAPY**  
Cardiovascular diseases, such as ischemic heart diseases and stroke, are the leading cause of deaths in Egypt. These diseases are usually characterized by hyper coagulation and constriction of blood vessels. Nanotechnology offers many advantages including enhanced permeability and retention into affected blood vessels, enhanced drug targeting and delivery potential and minimized undesirable side effects, hence improved drug safety and efficacy.  
**Mina Mehanny Habeeb Kaldas**



**WASTEWATER**  
Utilizing a significant portion of the sugars available in renewable biomass is crucial for the development of sustainable strategies in biofuel and green chemical production. *Saccharomyces cerevisiae* has emerged as a promising candidate in this industry using a consolidated bioprocessing approach, due to its high ethanol production, genetic malleability, and tolerance to industry relevant stresses.  
**Riaan den Haan - University of the Western Cape, Bellville, South Africa**

## CRP Research Grants: Stories of Impact



# ICGEB CRP Grants Awardees meeting in Cape Town

The event brought African recipients of ongoing ICGEB awards, to expand collaboration and networking across the Continent and involving both scientific and governmental institutions.

- 80 delegates from 19 countries, including 38 CRP grant holders.
- Including HDI awardees from 6 institutes across South Africa (University of the Western Cape, Walter Sisulu University, University of Fort Hare, Mangosuthu University of Technology, and the Universities of Venda and Limpopo).
- 9 sessions with contributions from EDCTP and Afrigen.

Future Meetings are planned to be held in New Delhi (Asia and Middle East), Trieste (Europe) and South America





# ICGEB Meetings and Courses



## Meetings and Courses 2025

Feb	17 Feb 19	<b>"Bioinformatics Education in Low Resource Settings: Introduction to Bioinformatics Using R"</b> Mthatha, <b>SOUTH AFRICA</b>	Organiser: Hannibal Musarunwa (Walter Sisulu University, Mthatha, South Africa) Contact: hmusarunwa@wits.ac.za
	24 Feb 26	<b>"Computational and Systems Biology Workshop 2025"</b> Durban, <b>SOUTH AFRICA</b>	Organiser: Saheed Sabu (Durban University of Technology, South Africa); Co-organiser: Stefano Cacciatore (ICGEB Cape Town, South Africa) Contact: ssabu@dur.ac.za
	25 Feb 27	<b>"Enhancing regulatory capacity for application of SADC harmonized guidelines for registration of biopesticides and biological control agents in Tanzania"</b> Arusha, <b>UNITED REPUBLIC OF TANZANIA</b>	Organiser: Chian Mkombozi Maracle (Tanzania Plant Health and Pesticides Authority - TPHPA, Arusha, Tanzania) Contact: mmaracle@gmail.com
March	10 Mar 14	<b>"Practical Course on Artificial Intelligence in Data Science and Bioinformatics"</b> Trieste, <b>ITALY</b>	Organiser: Silvano Piazza (ICGEB Trieste, Italy) Co-organisers: Michael Myers (ICGEB Trieste, Italy) and Stefano Cacciatore (ICGEB Cape Town, South Africa) Contact: courses@icgeb.org
	21 April 30	<b>"STRUCTURAL BIOLOGY 2.0: Integrating X-ray diffraction and modern computational tools"</b> Montevideo, <b>URUGUAY</b>	Organiser: Alejandro Buchiazzi (Institut Pasteur de Montevideo, Uruguay) Contact: nabio@pasteur.edu.uy
May	6 May 8	<b>ICGEB Sponsored Event "3rd International Conference of the World Society for Virology 2025"</b> Kuala Lumpur, <b>MALAYSIA</b>	Organiser: World Society of Virology (Kuala Lumpur, Malaysia) Contact: wsv2025@wsv.org, kslaj@wsv.org
June	19 May 23	<b>"Malaria Molecular Surveillance with the AmpliSeq assays"</b> Lima, <b>PERU</b>	Organiser: Dorena Gamboa (Universidad Peruana Cayetano Heredia, Lima, Peru) Contact: luis.cabrera@upch.pe
	4 June 8	<b>ICGEB Sponsored Event "Emerging issues in oncogenic virus research"</b> Manduria, <b>ITALY</b>	Organiser: Susanna Chicco (IEO European Institute of Oncology, IRCCS, Milano, Italy) Contact: Cristina.raimondo@ieo.it
	9 June 13	<b>"Carbon Capture and Biofuels"</b> New Delhi, <b>INDIA</b>	Organiser: Shashi Kumar (ICGEB New Delhi, India) Contact: shkshashi@icgeb.res.in
	11 June 13	<b>"ICGEB Alumni Meeting 2025"</b> Trieste, <b>ITALY</b>	Organisers: Serena Zaccagna and Marco Baralle (ICGEB Trieste, Italy) Contact: alumni@icgeb.org
	16 June 20	<b>"Enzyme Manufacturing Masterclass"</b> Addis Ababa, <b>ETHIOPIA</b>	Organiser: Yordanos Ali Hassan (Bio and Emerging Technology Institute - BETI, Addis Ababa, Ethiopia) Contact: ali.yordanos703@gmail.com
Jul/Aug	30 July 1 Aug	<b>ICGEB Sponsored Event "II Brazilian Conference on Synthetic Biology"</b> São Paulo, <b>BRAZIL</b>	Organiser: Cleber Zehner Souza Dos Nascimento (Brazilian Association of Synthetic Biology - SynBioBr, São Paulo, Brazil) Contact: contato@synbiobr.org
	25 Aug 29	<b>ICGEB Sponsored Event "XII Course on Molecular Biology of trypanosomatids and XII Symposium of molecular and cellular biology of Chagas disease"</b> Santiago de Chile, <b>CHILE</b>	Organisers: Ulrike Krennerting (Facultad de Medicina, Universidad de Chile, Santiago de Chile, Chile) Contact: ukrennerting@uchile.cl
Sep	8 Sep 12	<b>"Latest Advances in Genome Editing and ART Technologies in Laboratory Animals"</b> Izmir, <b>TURKEY</b>	Organiser: Kasim Dilek (Bmr Biomedicine and Genome Center, Izmir, Turkey) Contact: kasim.dilek@ilg.edu.tr
	9 Sep 11	<b>Arturo Falaschi Conference "2nd biennial conference on TDP-43 function and dysfunction in disease"</b> Trieste, <b>ITALY</b>	Organisers: Emanuele Barattini (ICGEB Trieste, Italy), Yana Ayala (Saint Louis University, MO, USA), Sami Bernards (University of Michigan School of Medicine, Ann Arbor, MI, USA), Christopher Donnelly (University of Pittsburgh School of Medicine, USA) and Jemima Sweeney (King's College London, UK) Contact: TDP43Conference@icgeb.org

For the events to be held in **2025**, **29** proposals were approved from **19** Member States out of a total of 80 applications received from 27 Member States

Oct	11 Sep 13	<b>ICGEB Sponsored Event "HPV-associated diseases: screening, prophylactic and therapeutic vaccines"</b> São Paulo, <b>BRAZIL</b>	Organiser: Laura Sicheiro (ICESP - Instituto do Câncer do Estado de São Paulo, Brazil) Contact: laura.sicheiro@icp.fm.usp.br
	15 Sep 26	<b>ICGEB Sponsored Event "ICTP, IFOM and ICGEB Hands-on School in Quantitative Biology"</b> Trieste, <b>ITALY</b>	Organiser: Vittorio Venturi (ICGEB, Trieste, Italy) Contact: venturi@icgeb.org
Nov	17 Sep 19	<b>ICGEB Sponsored Event "SINAPSA Neuroscience Conference 2025"</b> Ljubljana, <b>SLOVENIA</b>	Organiser: Boris Rogelj (Slovenian Neuroscience association, Ljubljana, Slovenia) Contact: boris.rogelj@ijs.si
	22 Sep 25	<b>Sponsored Event "Central European Symposium on Antimicrobials and Antimicrobial Resistance (CESAR 2025)"</b> Zadar, <b>CROATIA</b>	Organiser: Gordana Maravic Vahovcsek (Croatian Microbiological Society, Zagreb, Croatia) Contact: gmaravic@pharma.hr
Dec	23 Sep 24	<b>ICGEB Sponsored Event "Modern Biotechnologies in Sustainable Development of the Danube Delta"</b> Murighiol, <b>ROMANIA</b>	Organiser: Manuela Sidoroff (Romanian Society of Bioengineering and Biotechnology, Bucharest, Romania) Contact: manuela.sidoroff@yahoo.com
	24 Sep 26	<b>"Harnessing Functional Genomics in Cancer Research: Opportunities for Diagnosis and Treatment"</b> Windhoek, <b>NAMIBIA</b>	Organiser: Lamech Mwapagha (Namibia University of Science and Technology - NUST, Windhoek, Namibia) Contact: lmwapagha@must.na
Nov	29 Sep 3 Oct	<b>ICGEB Sponsored Event "4th Molecular Biosystems Conference on Eukaryotic Gene Regulation &amp; Functional Genomics"</b> Puerto Varas, <b>CHILE</b>	Organiser: Luis Larrondo (Fundación Instituto Milenio de Biología Integrativa, Santiago, Chile) Contact: molbiosystems@bio.cl
	14 Oct 16	<b>"Fluorescence in Microscopy - FluorMicro@ICGEB"</b> New Delhi, <b>INDIA</b>	Organisers: Dhiraj Kumar (ICGEB New Delhi, India), Alessandro Marcello and Luca Braga (ICGEB Trieste, Italy) Contact: dhiraj@icgeb.res.in
Dec	20 Oct 24	<b>"Elevating Infectious Disease Research in Developing Nations with Spectral Flow Cytometry: Insights and Applications"</b> Homagama, <b>SRI LANKA</b>	Organiser: Peshala Gunasekara (Sri Lanka Institute of Biotechnology - SLIBTEC, Homagama, Sri Lanka) Contact: slibtec.events@gmail.com
	28 Oct 30	<b>Arturo Falaschi Conference "Cell-cell communication in bacteria: new insights and future trends"</b> Trieste, <b>ITALY</b>	Organiser: Vittorio Venturi (ICGEB Trieste, Italy) Contact: Cell2CellBacteria2025@icgeb.org
Nov	29 Oct 1 Nov	<b>"South Asian Biotechnology Conference"</b> New Delhi, <b>INDIA</b>	Organiser: Ritu Gaur (South Asian University, New Delhi, India) Contact: rgaur@saau.ac.in, sneedev@saau.ac.in
	10 Nov 13	<b>Arturo Falaschi Conference "Innovative strategies for mitigating pesticide residues in agricultural produce"</b> Johannesburg, <b>SOUTH AFRICA</b>	Organiser: Dennis Ndolo (ICGEB Cape Town, South Africa) Contact: ndolo@icgeb.org
Dec	11 Dec 13	<b>ICGEB Sponsored Event "The third Rencontres de Quy Nhon: International Conference on Molecular Diagnostics in Microbiology and Diseases (MDMD2025)"</b> Quy Nhon, <b>VIET NAM</b>	Organiser: Nguyen Bao Quoc (Faculty of Biological Sciences, Nong Lam University, Ho Chi Minh City, Vietnam) Contact: baoquoc@hcmui.edu.vn

# Bioinformatics Network Meetings and Courses in Africa

*Jul 2023. Addis Ababa, Ethiopia.*



*Oct 2022. Djibouti, Djibuti.*



*Nov 2024. Kigali, Rwanda.*



*May 2024. Abuja, Nigeria.*



*Oct 2021. Harare, Zimbabwe.*

*Feb 2025. Durban, South Africa.*

*Feb 2025. Mthatha, South Africa.*

*Nov 2022. Cape Town, South Africa.*

# TECH TRANSFER AND LOCAL PRODUCTION

- 1. Technologies to Industry
- 2. Training in production processes
- 3. Reagent production and supply chain independence
- 4. Biofoundry and Industrial Biotechnology
- 5. Enset and Sorghum

# BIOLOGICAL DRUG DEVELOPMENT FACILITY



## CELL LINE DEVELOPMENT

High-throughput screening of mammalian cell line using Clonepix2 technology.

## UPSTREAM PROCESSING

4 x 250 ml parallel single use bioreactors and 2 l bioreactor for mammalian cells, 2 x 2 l parallel bioreactors and 30 l bioreactor for microbes.

## DOWNSTREAM PROCESSING

Expertise in all kind of chromatography for lab to industrial-scale purification of biologics.

## LINKERS CHEMISTRY

PEGs and fatty acids polymers preparation and conjugation.

## QUALITY CONTROL OF BIOLOGICS

RP-HPLC, IEF, WB, SDS-PAGE, related proteins, dimers and oligomers detection, impurities detection (HCP, endotoxins, residual DNA), peptide mapping, flow cytometry, in vitro and in vivo bioactivity, protein identification and mapping by LC-MSMS, oligonucleotide QC by LC-MSMS, small molecule quantification by LC-MSMS, CZE, glycan analysis, HPLC-UV-ELSD analysis)

*New pharma-compliant fully-equipped facility, comprising 215 m2 of clean rooms, operational since May 2021*

## TECHNOLOGY TRANSFER IN AFRICA

Country	Technology transferred
Egypt	Materials transfer: EPO vials
South Africa	TT -Insulin standard and long lasting (TA)
South Africa	TT - EPO Beta & Pegylation
Zimbabwe	TT - Insulin and long-acting Insulin *signed but not completed due to issue son their side*
Zimbabwe	Training/TT on Filgrastim
South Africa	Technical Support/TT on development of mammalian cell testing/validation methods
Algeria	TT Filgrastim and GMP training
South Africa	Development and TT of Pembrolizumab cell line
South Africa	Development and TT of separation methods for purification (with Sartorius)



# BIOSIMILARS – TRAINING ON BIOMANUFACTURING AND GMP

**Dedicated to EDCTP Regional Networks of Excellence:**

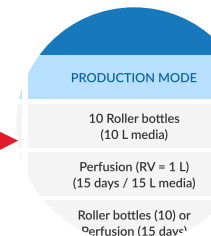
2-week hands-on on bioprocessing, QC and GMP biomanufacturing.



**Funded by:**



**Capacity Building & Training**



**Bioprocessing workshop:**



UNIVERSITY OF  
**KWAZULU-NATAL**  
INYUVESI  
**YAKWAZULU-NATALI**

Pharma  
QC and GLP:

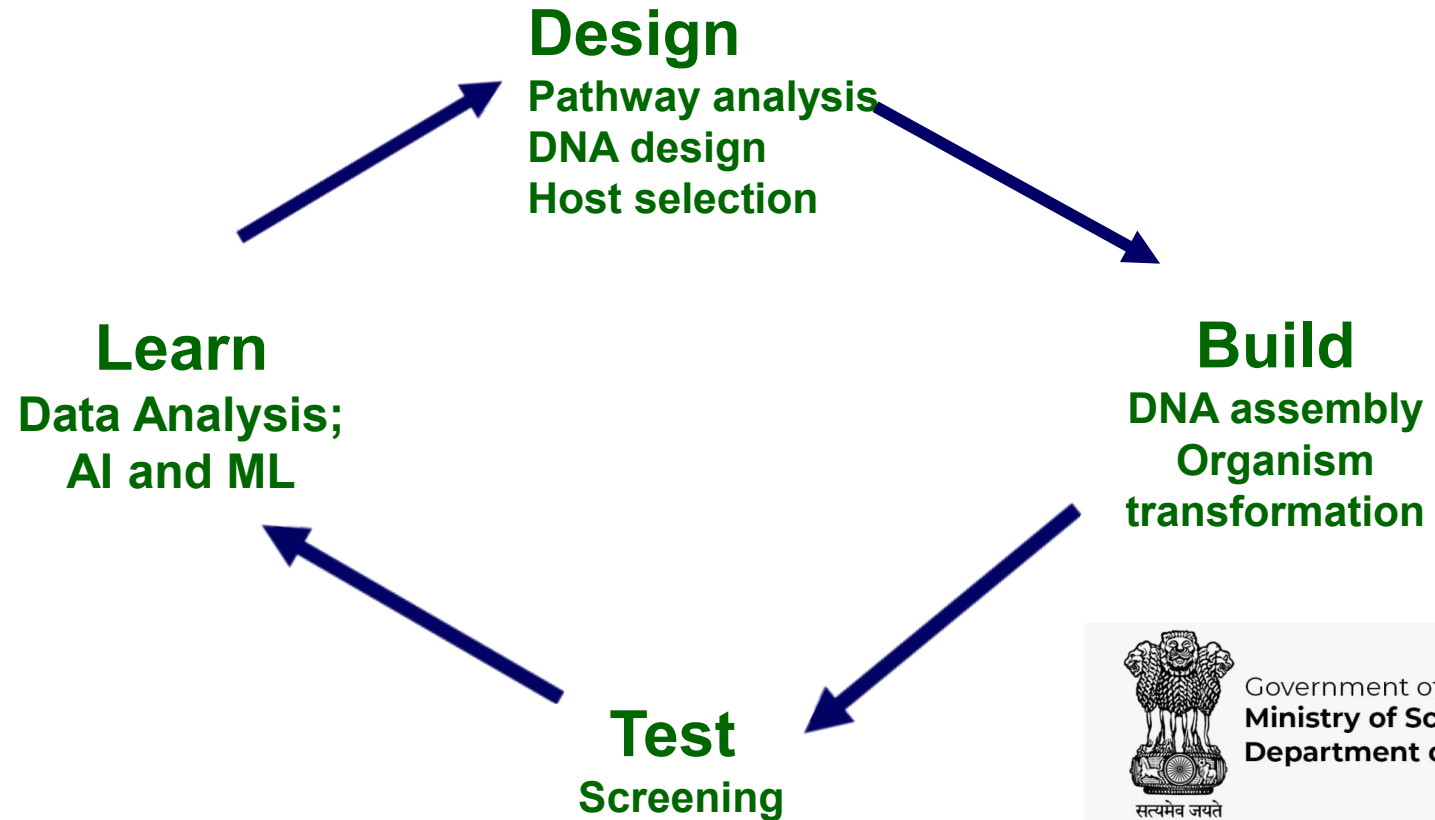


**College of  
Science  
and Technology**

**Technology  
Transfer**



# BIOFOUNDRY FOR MICROBIAL BIOMANUFACTURING



Government of India  
Ministry of Science & Technology  
Department of Biotechnology

सत्यमेव जयते

Chassis organism: start with yeast (*S. cerevisiae*); *E. coli*  
4 internal projects; 10 external projects  
As we gain experience, we will include additional chassis strains  
such as fungi, microalgae and cyanobacteria

# 2G ETHANOL (CONVERSION OF AGRI-BIOMASS TO ETHANOL)

<https://news.mit.edu/2022/processing-waste-biomass-reduce-airborne-emissions-0929>



<https://www.indiamart.com/proddetail/0-20mm-pvc-petrol-pump-machine-cover-22800031455.html>

pretreated  
agri biomass

Enzymes

Sugars

Yeast  
strains

ethanol



Government of India  
Ministry of Science & Technology  
Department of Biotechnology

सत्यमेव जयते

The ICGEB-developed enzyme mixture is going to be tested at scale  
in a newly established biorefinery in India  
Yeast strains are being engineered for converting sugars (hexose and  
pentose) into ethanol

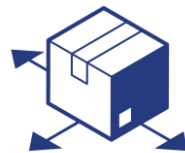
# ICGEB IS DEVELOPING OPEN-SOURCE REAGENTS & LOCAL MANUFACTURING FOR SUSTAINABLE SUPPLY CHAINS TO ACCELERATE THE BIOECONOMY



Developing open-source tools and technologies for manufacturing essential DNA testing & sequencing reagents (e.g. PCR, RT-LAMP, CRISPR & NGS library prep)



Training and capacity building (e.g. building on Enzyme Manufacturing Masterclass, delivered to 300+ researchers in Africa & Latin America)



Integrating with local hubs for distribution & community building. Developing partnerships for specific applications e.g. ENABLE toolkit for plant gene editing (Grow More Foundation)



## Open Enzyme Collection (v1 & 2)

81 genes for "workhorse" enzymes for molecular biology, including DNA/RNA polymerases, ligases, reverse transcriptases.

Developed by: Open Bioeconomy Lab, Lab de Tecnologia Libre, Scott Pownall

[More info](#)



## Reclone.org

a global collaboration for equitable access to biotechnology

# ENABLING LOCAL MANUFACTURING



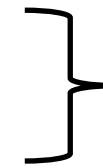
Engineered bacteria overexpressing crude enzymes, dried to be used directly as reagent packets

+

Simple and low-cost protein purification mechanism with in-house manufactured magnetic nanoparticles.

+

Further liophilisation of the purification reagents



Transfer to  
Burkina Faso and  
Senegal

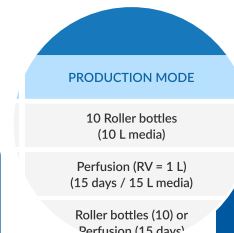


Transfer to  
Senegal and  
Kenya

The Group has provided training in several Member States, including Kenya, Rwanda, and Senegal, as well as in Latin American countries (Argentina, Chile and Peru) under the Reclone Network, funded by the Chan Zuckerberg Initiative Award.



**Capacity Building  
& Training**



**Technology  
Transfer**







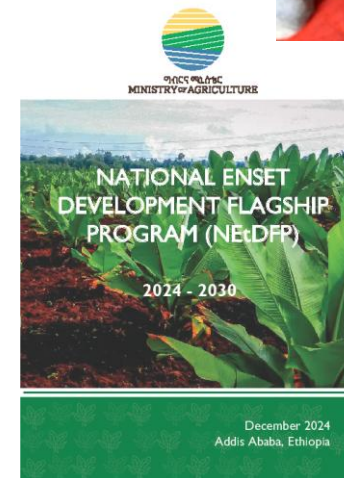
# DEVELOPMENT OF FERMENTATION PROCESSES FOR ENSET IN ETHIOPIA

- Staple food for 25 millions Ethiopians: subsistence economy
- Traditional fermentation: high % of post-harvest loss and time consuming
- Drought resistant plant

**Innovation: development of a starter culture and related technology for fermentation and transfer of the technology to the communities – funded through regular ICGEB Grant support**

Results:

- Technology patented, Ethiopian FDA approved
- 32 villages adopted the new technology
- >4000 jobs created
- Surplus product: New start-up selling flour and baked goods
- Families moving back to the countryside
- Valorization of byproducts (fibers) for handicrafts
- National Enset Development Flagship Programme



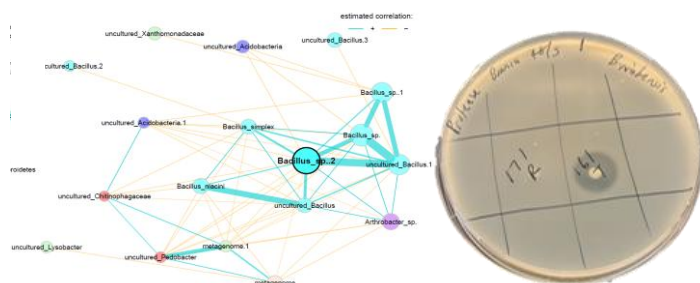
*Ministero degli Affari Esteri  
e della Cooperazione Internazionale*





# SORGHUM MICROBIOME

- Collaborative project across Africa
- Partnerships through B-inoc Africa
- Aim to understand sorghum microbiome
- Harness bioproducts for crop improvement
- Collected more than 1000 samples
- Established culture collection
- Formulating low-cost biostimulants





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## Actions:

- Build bridges between cutting-edge science and practical uptake in developing economies: invest in local science, facilities, and skills
- Replace short-term profit-driven approaches with long-term, sustained commitments
- End predatory capitalism: ensure value stays in Africa through transparent, fair value chains
- Confront the regulatory vacuum: regulators cannot approve what they don't understand, urgent training and harmonisation is needed
- Recognise that without labs, GMP facilities, and bioengineers, there is no bioeconomy.
- Accept that “policy talk” is not enough — financing must flow into infrastructure and people.
- Encourage partners in the North to act as enablers, while coordination and ownership remain with the South.



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- Governments should take more responsibility for promoting Bioeconomy within their own countries
- Engage in regional networks to make products and production economically viable
- Leverage experience from other major players in the global South who have built successful Bioeconomies
- Partner with countries in the global north who truly believe in generating economic independence and sustainability for the global south



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# Thank you

**Lawrence Banks: [banks@icgeb.org](mailto:banks@icgeb.org)**

# REAGENTS AND DIAGNOSTICS

## Industry Overview

Africa imports >90% of diagnostics and reagents.

Global reagent market >\$20bn, fastest growth in LMICs

SA capacity is limited despite rising demand in labs, clinics, and universities

### Benefits of Local/In-House Manufacturing

- Bypass supply bottlenecks and ensure consistent availability
- Prevent experiment disruptions, improve research speed and reliability
- Better UG and PG student experience
- Lower expenses

### Additional opportunities

- Capacity Building and Skill Development:
  - Student/staff training in biomanufacturing, QC, formulation.
- Customized antibody production.

### Long-term Opportunities

- Build a centre of technical excellence
- Enhance science sovereignty and national preparedness.

Increases access to high quality education (especially for HDIs)

Gateway to world class molecular biology research including genomics, genome editing, and biosimilars

Localisation contributes to SDGs such as universal access to healthcare, food security, clean environment and climate change