Training Next Generation Plant Breeders for Food and Nutrition Security in Africa

WACCI: Africa Centre of Excellence for Agricultural Innovation and Entrepreneurship
College of Basic and Applied Sciences, University of Ghana

Eric Yirenkyi Danquah
Professor, Founding Director & PI ACE Impact Project

Presented by:
John Saviour Yaw Eleblu, Ph.D. Paris Orsay
Coordinator, Research (Francophone Africa)

Plant and Animal Genome Conference: January 13 – 18, 2023
Low Productivity in Farmers’ Fields
Higher Education in sub-Saharan Africa


Brain drain

1. Poor Infrastructure
2. Inadequate Funding for R & D
3. Low Staff Morale
4. Weak Post Graduate Programmes
The “NextGen” African Breeder

Focus on Developing Quality Food

Open to Modern Trends

Practical

Demand Driven
Established in June 2007 to train plant breeders over a 10-year period (AGRA-PASS grant) - US$11.5 m initial grant
Total commitments - US$ 40+ m
Status in the University of Ghana

- Established in June 2007 as a semi-autonomous unit in the defunct College of Agriculture and Consumer Sciences to train Plant Breeders for West Africa

- Became a unit of the College of Basic and Applied Sciences in 2014 and a World Bank Africa Centres of Excellence in 2015
Vision

To become the foremost Centre for postgraduate training and research in crop improvement in Africa

Mission

To develop the next generation of plant breeders and seed scientists needed for the transformation of Africa’s Agriculture through high-quality research, teaching, learning and knowledge dissemination
WACCI Multipurpose Building – World Bank ACE Project Funded in 2018

- Staff Offices
- Lecture Rooms
- Bioinformatics Lab
- Tissue Culture Lab
- Seed Science Lab
- Seed Bank
- Library
- Research Commons
- Auditorium
- Board Room
- Enterprise Hub
- Staff Offices
Teaching, Learning and Research Environment

- Tissue Culture Lab
- Board Room
- Research Commons
- Seed Science Lab
- Bioinformatics Lab
- Plant Growth Room
- Conference Auditorium
- Library
- Lecture Room
- Cold Room
- Enterprise Hub
- Automated Greenhouse
WACCI at a Glance

Africa Centre of Excellence for Agricultural Innovation and Entrepreneurship: Developing talent in Africa for the future of Africa’s Agriculture

Investments to date: US$ 40+ million

Enrolment from 20 African Countries
- 160 PhDs
- 88 MPhil

Graduates from 15 African Countries
- 105 PhD (36 F)
- 30 MPhil (10 F)

Publications (students & faculty) >250

227 varieties released from 7 African countries

3 viable PPPs for scaling up seeds (Soybean, Tomato, Maize)

Total Grants Attracted by Alumni > US$ 57 million

Training and Outreach: > 5,474 farmers, 400 AEAs, 67 FFS, 53 Entrepreneurs
Innovative PhD and MPhil Programmes

**PhD Plant Breeding**

**Year 1: Foundation Courses and Modules**
Courses and modules of special topics in plant breeding, genetics, biotechnology, biometry and related subjects

**Year 2-4: Thesis Research**
Students return to their home institutions to conduct theses research
Internships in Advanced Laboratories, Mentoring
Students return to the University of Ghana to submit theses

**MPhil Seed Science & Technology**

**Year 1: Coursework and Internship**
Coursework and up to 3 months experiential learning with industry

**Year 2: Thesis Research**
Thesis research
National and International Accreditation for PhD and MPhil Programmes

Board Chair of AQAS (Germany), Prof. Eberhard Menzel presents accreditation certificates to Prof. Eric Danquah of WACCI

Panel of Experts from AQAS (Germany) meets with University of Ghana Senior Management
<table>
<thead>
<tr>
<th>Research Focus</th>
<th>Team Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand-led Breeding and Innovation Platform for the Improvement of Cowpea for Sustainable Value Chain Development in Africa</td>
<td>Dr. Daniel K. Dzidzienyo</td>
</tr>
<tr>
<td>Development of maize inbred lines and hybrids for enhanced genetic gains towards food and nutrition security</td>
<td>Dr. John S. Y. Eleblu</td>
</tr>
<tr>
<td>Research Focus Developing Frafra potato into a major food Crop</td>
<td>Prof. Pangirayi Tongoona</td>
</tr>
<tr>
<td>Developing heat tolerant, high yielding tomato varieties for all year production.</td>
<td>Dr. Naalamle Amissah</td>
</tr>
<tr>
<td>Development of high yielding and resilient hybrid sorghum varieties using accelerated breeding methods</td>
<td>Dr. Agyemang Danquah</td>
</tr>
<tr>
<td>Exploiting the genetic diversity of maize landraces for resilience to climate change: the potential of drought tolerant doubled haploid lines.</td>
<td>Dr. Theresa Ankamah-Yeboah</td>
</tr>
<tr>
<td></td>
<td>Dr. Pearl Abu</td>
</tr>
</tbody>
</table>
WACCI Hybrid Maize Varieties

Partnership with LCIC, a private seed company to put the innovations in farmers’ hands

Abụọfo Aburo
(WACCI-M-1205)
10 tons/ha
Matures: 90 – 95 days

Akufo Aburo
(WACCI-M-1218)
7 tons/ha
Matures: 80 – 85 days

Aburo Legon
(WACCI-M-1210)
9 tons/ha
Matures: 90 – 95 days
WACCI’s New Hybrid Tomato Varieties

Received government support under Ghana Care “Obataan Pa” programme for scaling up

Ante Dede
Av. Yield 48.0 t/ha

Legon Tomato
Av. Yield 52.7 t/ha

Tomato Queen
Av. Yield 47.7 t/ha
WACCI-led Public-Private Consortium Scaling Up Early Generation Seed Production of Key Staple Foods

Maize
779.76kg breeder seeds
33 MT hybrid foundation seeds

Soybean
3,308kg breeder seeds
140 MT hybrid foundation seeds

Cowpea
4,567kg breeder seeds
11.5 MT hybrid foundation seeds

Groundnut
4,140kg breeder seeds
18 MT hybrid foundation seeds

- 4 seed research production fields set up
- 30 seed growers trained
- 3 MOUs signed
- 38 demonstration plots established.
- WACCI has registered as a Certified Breeder Seed producer.
Compelling Case to Government of Ghana for Investment

Workshop with Key Strategic Partners

Outcome: US$ 2.1 M commitment from the Ghana Food Systems Resilience Programme (effective, January 2023)
Kofi Annan Enterprise Hub for Agricultural Innovation (KAEHAI)

**Objective**

Equip young graduates with the knowledge and skills needed to birth and grow ideas into Agri-businesses

Maiden KAEHAI Lunch Hour Conversation with Mr. Alhassan Andani, C.E.O Stanbic Bank.

WACCI-ECE Entrepreneurship Training Programme (30 Young Entrepreneurs Trained)

WACCI-MIT Global Startup Labs Entrepreneurship Programme (26 Young Entrepreneurs Trained)
Success stories

Evans Larbi, participant WACCI-MIT Global Startup Lab (GSL) programme in 2019.
Founder, Smallholder Farmers Cooperative group, Beit with 60,000 farmers across Ghana with 80% being women and youth

Mr. Evans Agortey Sackey, maiden class of the 2-year MPhil in Seed Science and Technology
Trial Officer, Syngenta Seeds BV, Netherlands

Dr. Maxwell Darko Asante, Deputy Director, CSIR - CRI
Ph.D. in Plant Breeding, WACCI in 2013
8 rice varieties, US$ 2.5 M, 49 publication in high impact journal
Success stories

Dr. Dorcas Olubunmi Ibitoye, Assistant Director, Research, National Horticultural Research Institute (NHORT), Nigeria
Ph.D. in Plant Breeding, WACCI, 2016.
US$ 2.7 M, 33 publications
Tomato Resistant to Tuta absoluta (Tomato ebola pest) Africa Union – WACCI Project

Dr. Hortense Mafouasson Apala, Director, Crop Production Division, Institute of Agricultural Research for Development (IRAD), Cameroun
Ph.D. in Plant Breeding, WACCI, 2015.
2 maize varieties, US$ 730,000, 19 publications
Regional seed expert

Dr. Priscilla Francisco Ribeiro, Research Scientist & Maize Breeder with CSIR- Crops Research Institute (CRI), Ghana
Ph.D. in Plant Breeding, WACCI, 2016
6 maize varieties, US$ 135,900, and 36 publications
Leader STMA (Ghana) project, best breeding award in 2017.
Extension and Community Engagement

- Envirodome Greenhouse Technology Workshop for Farmers
- Demand-Led Variety Design in Plant Breeding for WACCI Alumni
- Training of Agricultural Extension Agents (AEAs) and Farmers
- Communicating Modern Technologies to Farmers and Opinion Leaders
- WACCI International Conference on Food and Nutrition Security
Leadership role of the African Plant Breeders Association (APBA)

- 3 WACCI Faculty on Executive Committee of the APBA (President, Treasurer & an Ex-Officio member)
- APBA Secretariat established at WACCI
- WACCI Co-hosted the APBA 2021 Conference in Kigali, Oct 25-29, 2021

The Launch of the APBA and Maiden International Conference, Oct 23-25, 2019
Farm Renovation Project

Section of UG field

Developing a phenotyping platform

Case IH Agriculture and Kanu Equipment Donate Tractor and Implements to WACCI, June 28, 2022

Dream Field
Global Recognitions

WACCI Model acknowledged by the Chicago Council on Global Affairs as a model for replication in SSA - 2009, 2013 reports

WACCI: “Star Gift” award from AGRA - 2016 (6 out of over 250 grantees acknowledged)

WACCI Director: Distinguished award for meritorious service, University of Ghana, 2013

WACCI Director: Outstanding Agribusiness Academic / Research Leadership Award, 2019 – Chamber of Agribusiness (CAG), Ghana

WACCI Director: GCHERA World Agriculture Prize Laureate, 2018

WACCI Director: 2022 Africa Food Prize Laureate
Working with strategic partners, we can improve the human condition through plant science

3rd African Plant Breeders Association Conference 2023
October 23 - 29, 2023, Mohammed VI Polytechnic University
Thank You

www.wacci.ug.edu.gh;
edanquah@wacci.ug.edu.gh