

## Training for the future of food security



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Today, about 1 billion people globally lack access to adequate food. Food insecurity and economic crises have drawn attention to the urgent need and potential for developing sustainable agricultural systems. By 2050, the global population will reach 9 billion and the demand for food is expected to double.<sup>1</sup> At the same time, the world's agricultural systems will be increasingly challenged by changing climates. In sub-Saharan Africa, dramatic advances are required in food production (up to 100 per cent increases and possibly more in yields of food crops) to address food needs.<sup>2</sup> This will require the integration of conventional plant breeding and biotechnology approaches to develop new crop varieties for sub-Saharan Africa, where yields of food crops are the lowest in the world and increased productivity is a necessary condition for food security.<sup>3</sup>

West and Central Africa (WCA) together with the Horn of Africa are perhaps the most food-insecure regions in sub-Saharan Africa. Agriculture has long been

identified as the engine for economic growth and development in this region but the impact to date has been far from satisfactory. Unlike the successes of the Green Revolution, achieving widespread impact with a few new crop varieties has a very low probability of success in WCA as the context is so different from that of Asia and Latin America. In WCA, 95 per cent of the food is grown as rain-fed agriculture. Crop production is therefore subjected to the vagaries of the weather together with biotic (e.g. pests and diseases) and abiotic (e.g. radiation, temperature and water) stress challenges. The diverse agro-ecologies make crop breeding challenging in an African context. This is complicated by the structure of African farming systems: the diversity within and between countries demands a variety of locally adapted staple crops often cultivated by predominantly small-scale farmers.

WCA faces a major challenge in feeding close to half a billion people. Furthermore, the forecast from the United Nations is that the population there will more than triple in the next decade, and WCA will become one of the most vulnerable places in the world unless action is taken now. Ensuring food security in WCA calls for concerted regional and international effort to increase farm productivity. This requires the political will to provide improved rural infrastructure, access to more effective inputs, storage of farm produce to minimise post-harvest losses, transportation, processing and access to markets. Effecting such transformational changes will entail local entrepreneurship to drive innovation across the agribusiness sector.

The development of new and improved crop varieties with in-built resilience to climate change coupled with resistance to pests and diseases

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is required. Given the crucial role that genetic improvement through plant breeding can play to provide vital inputs in boosting crop productivity, the need for a critical mass of scientists trained in plant breeding with conventional and molecular expertise to develop superior varieties is urgent. The dearth of plant breeders with such skills in WCA is well documented. Given that the majority of practising plant breeders will retire in the next decade, there is an urgent need to train more plant breeders. A way of estimating the current needs for plant breeders is to assume that there should be at least one trained breeder for each crop in every agro-ecological zone in each country in WCA.

#### The promise: WACCI – a network of locally trained plant breeders

The West Africa Centre for Crop Improvement (WACCI) was established in June 2007 at the University of Ghana to train plant breeders for Burkina Faso, Cameroon, Ghana, Mali, Niger and Nigeria. For the six countries approximately 324 plant breeders are needed for the nine major crops. It is estimated that about 50 breeders are active in these countries. WACCI has 54 students doing their PhDs in plant breeding who will enter the profession in the next six years, leaving a deficit of some 220 breeders. One way forward is to establish partnerships, exchanges and collaborations with major institutions and departments in the more developed countries.

At WACCI, the students undertake thesis research on staple crops in home institutions after two years of coursework at the university. The students engage

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farmers in discussions in a pre-research phase and incorporate farmers' challenges into their research. The core concept of the programme is farmer-driven with students embedded in the key

agro-ecological zones in their home countries for their research. The expected outputs are qualified, competent and motivated plant breeders applying the full scope of breeding methodologies to address local crop constraints. The result will be enhanced food security through the delivery of superior crop varieties that meet the needs of farmers and a high retention rate of breeders in Africa.

The WACCI concept has been recognised by the West and Central African Council for Agricultural Research and Development (CORAF/WECARD) and the Chicago Council on Global Affairs. It has been adopted by the Agricultural Research Council of Nigeria to be implemented at the Centre for Crop and Animal Improvement to be located at the Ahmadu Bello University in Nigeria.

The training of a new generation of plant breeders at WACCI will build human capacity and in the long term contribute to food security in sub-Saharan Africa. The urgent need to sustain WACCI as a Regional Centre of Innovation to train plant breeders beyond 2017 is more pressing than ever. The financial obligations are enormous but the potential benefits to present and future generations far outweigh the investments.

The African Centre for Crop Improvement (ACCI), founded on a similar concept at the University of KwaZulu-Natal five years before WACCI, has graduated plant breeders who continued their research after graduating and released varieties which have been adopted by farmers in Eastern Africa. Graduates have already released 23 new improved clones, cultivars and hybrids in Uganda, Kenya, Malawi, Zambia, Mozambique and Burkina Faso. For example, annual yields of cassava have been doubled while reducing the time to maturity from 18 months to 7 months and dry bean varieties totally resistant to weevils have been released. The Alliance for a Green Revolution in Africa

(AGRA) is commended for the audacity to fully fund PhD programmes in Africa. WACCI has guaranteed funding until 2017.

An endowment fund is urgently needed to sustain WACCI and hence train plant breeders required to develop superior genetic varieties for West and Central Africa.

### References

- 1 *FAO (2010) The State of Food Insecurity in the World: Addressing Food Insecurity in Protracted Crises*. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.
- 2 The Montpellier Panel (2012) *Growth with Resilience: Opportunities in African Agriculture*. London: Agriculture for Impact.
- 3 Conway G., Waage J. (2010) *Science and Innovation for Development*. London: UK Collaborative on Development Sciences.

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