

## **Panel Discussion – Biotechnology Research: Application and Uses in Cotton**

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### **Biotechnologies in Benin**

#### *Introduction*

Nowadays, biotechnologies are an incontrovertible engine of world-wide agricultural growth and development. In Benin, unfortunately, this type of research is still in an embryonic stage and is basically limited to experiments with in vitro plants and a few genetic traits of certain cultivated species. As far as we know, there is still no biotechnology research work being conducted on cotton.

#### *Major biotechnology research activities in Benin*

In Benin, the few biotechnology research activities currently underway are being conducted by the following entities:

- The Biochemistry and Molecular Biology Department of the Abomey-Calavi University School of Science and Technology (FAST-UAC): Antibody research for the control of malaria and AIDS;
- The FAST-UAC genetics laboratory: Characterization of yams, sorghum and fonio; in vitro cultivation of yams and cassava;
- The Abomey-Calavi University School of Agricultural Sciences (FSA-UAC): Food biotechnology and artificial insemination trials.

The moratorium on genetically modified organisms (GMOs) ordered by Benin from March of 2002 to March of 2007, extended through March of 2009, has seriously undermined research work on GMOs. However, the Agricultural Research Center of Benin – Cotton and Fiber (CRA-CF) attached to the National Agricultural Research Institute of Benin (INRAB) has begun testing the efficacy of Bt toxins on *Helicoverpa A.* (cotton bollworms).

#### *Main constraints to biotechnology research in Benin*

In addition to the moratorium, there are institutional, physical and financial constraints impeding biotechnology research in Benin.

As far as institutional constraints are concerned, Benin still does not have biosafety regulations. However, the moratorium has given it a national consultation framework for biosafety with the establishment of a national biosafety commission. However, it still needs to develop a national policy with respect to biotechnology.

As far as know-how is concerned, Benin has very little expertise in this area. There are virtually no training and retraining programs and the few existing experts in biotechnology are rarely called on.

In terms of information, the public has not been adequately informed and familiarized with biotech products and is regularly subject to misinformation campaigns against GMOs.

As far as physical constraints are concerned:

Investments in biotechnology are relatively costly and rarely affordable for small-scale laboratories in developing countries like Benin.

Reagents and laboratory supplies and equipment are often lacking. Inadequate electric power and water supplies for small-scale laboratories are another serious problem.

Access to national (which is virtually nonexistent) and international literature is limited.

The consequences of these deficiencies are as follows, both for researchers and at the country level:

- A failure to make use of biotechnology at the nationwide level for the selection of elite varieties and (animal) breeds (disease resistance, molecular diagnoses of different diseases, vaccine production, drought resistance, yields, etc.) in virtually all agricultural sectors;
- A lack of information on biotechnology research work (methods, outputs, ongoing projects, institutions) conducted by laboratories within the subregion and around the world;
- A lack of programs for the application of in vitro cultivation techniques (creation of variability by callogenesis, sanitation, somaclonal variants) in variety selection and mass seed production (in vitro plants);
- Inadequacy or lack (depending on the industry in question) of artificial insemination and adaptability tests for cryoconservation of seeds;
- Unfamiliarity with strains of pathogens (viruses, fungi, etc.) specific to different types of crops;

- Shortage of inoculum isolation, characterization and production programs: nitrogen fixation (rhizobium), food fermentation (high-potential local yeasts);
- Inadequate technical capacity to control the types of products imported into Benin;
- Unfamiliarity with the local plant or animal gene pool;
- Lack or shortages of plant and animal genetic resource collections and characterization programs (resistance/tolerance to diseases, parasites and predators; genetic distances; prediction, genetic diversity).

### ***Outlook***

There are causes for optimism, in that officials at all levels have come to recognize the problem. In fact, the Dassa workshop held in October of 2006 crafted a biotechnology project which was submitted to the government. This project put special emphasis on training, investment, laboratory equipment and, in particular on the urgent need for regulations in this area. The training opportunities for researchers afforded by WACIP and the recent decision by ECOWAS to allow research centers to conduct biotechnology research are two examples of these causes for optimism.

Having been left standing at the station by the so-called “green revolution train,” Africa cannot afford to miss the biotechnology train.