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Towards sustainable agriculture for developing countries: options from life sciences and biotechnologies

The conference, carrying this title, organized by the Research DG of the European Union under the aegis of the European Life Sciences Group, took place in 30-31 January 2003 in Brussels. It was attended by almost 900 participants, scientists, managers, policy makers, representatives from the civil society, the farming community and industry from all around the world, most of them being from the developing („third world") countries. The proceeding was transmitted by Internet. All materials of the conference are available at its web site http://europa.eu.int/comm/research/sadc.

The aim of the conference was to stimulate open and pluralistic debate between policy-makers, scientists and civil society on seven selected issues centered around some questions of urgency of the developing world´s needs. What could life sciences do to improve the health and nutrition of the poor, to improve economic viability of food production, to make of developing countries „actors" in the genome revolution, to promote biodiversity etc.

The tone of the conference was set in by an excellent speech of Ismael Serageldin, Director of the Library of Alexandria. He outlined the present situation of the wold, with a chasm separating developed and developing countries enlarging. 800 million people in the world are starving or suffer from malnutrition. The Green Revolution must be followed by the Doubly Green Revolution, based on genetic modifications. He sees a danger in the fact that today 62% of R and D funding is due to private sector, which is motivated only by immediate profit, while this was only 30% fifteen years ago. There is a danger of a „scientific apartheid", which can only be overcome by „new partnership" between developed and developing countries. In a similar vein, Louise Fresco from FAO Agricultural Department spoke of the necessity of a „new social contract".

The tone was taken up by Florence Wambugu, Executive Director of Harvest Biotech Foundation International. She maintains that Africa, with its rapidly growing population, cannot do without genetically modified (GM) crops. Nowadays, African population is increasing by 3.5%, but food production only by 2.5%. In 10 to 15 years, the entire African continent will be growing GN crops. Europe, with so much reluctance against GM food, faces intellectual and economic isolation. If Europe were refusing the GM products of Africa, Africa would look for other trade partners.

Other speakers either elaborated the general theme, or presented concrete examples of success in implementing results of biotechnological research to large-scale agriculture in developing countries. Although Australia may not strictly belong to this category, its lesson may be the most instructive: 30% of cotton grown in the country is genetically manipulated, carrying either one or two independent genes to protect the plant against insect parasites. The speaker convincingly demonstrated how the success has been conditioned not only by efforts of scientists, but by an inseparable participation of management policy and by respecting all environmental aspects of introducing GM crops. Gratifying were also reports on genetic interventions into cattle agriculture in Africa.

I want to highlight specifically two stimuli that are pertinent to the research in our Department. First, the ambitious program of Brazil to use ethanol as an additive to or a full substitution of gasoline as a fuel has been summarized and pictured as a success (despite some previous reports of outsiders claiming its failure). Genomics has been applied to create sugar cane more appropriate for this effort that has been called „sustainable energy production". I

may recall the papers of some Brazilian yeast biologists to use yeast „petite“ mutants to enhance the efficiency of sugar fermentation. There still may be additional opportunities for yeast researchers to contribute to this commendable program.

Second, a communication on applying biotechnology to increase food production in acid soils, done by Mexican scientists, should be mentioned. In acid soils, aluminum and manganese are becoming toxic elements. Genetically manipulated plants, which exhibit overproduction of organic acids, in particular citric acid, can thrive in acid soils, because the organic acids do complex the two ions and thus detoxify them. Here, again, yeast mutants with overproduction of organic acids may be studied as model organisms to improve the procedure. In general, yeast culture media may be used to simulate chemically modified soils and yeast mutants searched for as model remedies.

I found the most impressive a talk of Huanming Yang, Director of Beijing Institute of Genomics. Starting from zero 4 years ago, China has become a giant in genome sequencing. It has the capacity of sequencing 1.5% human genome a day with a cost of 1 dollar pro 500 bases. After having accomplished sequencing of rice genome, the Institute works on sequencing the genome of chicken, pig and soybean. He pointed out that such a rapid development and high productivity is enabled by a centralized and state-directed science policy and criticized the „double moral standard“ of research in some developed countries, when some research is being prohibited in the state-controlled institutions but not in those in private hands. He insisted that China would respect universal ethical standards in her research objectives.