



International Workshop on Tropical  
Agriculture Development

Workshop Internacional sobre  
Desenvolvimento da Agricultura Tropical

**Transforming Tropical Agriculture:**  
An Assessment of Major Technological,  
Institutional, and Policy Innovations

July 17-19, 2006  
Quality Hotel & Suites Lakeside  
Brasília, Brazil

**Transformando a Agricultura Tropical:**  
Uma Avaliação das Principais Inovações  
Tecnológicas, Institucionais e Políticas

17 a 19 de julho de 2006  
Quality Hotel & Suites Lakeside  
Brasília, Brasil

## Factors Affecting Production and Productivity of Cereals in Brazil During the Last Decades

Antonio Fernandino de Castro Bahia Filho  
*Monsenhor Messias Educational Foundation*  
*antoniobahia@uai.com.br*

João Carlos Garcia  
*Embrapa Maize and Sorghum*  
*garcia@cnpms.embrapa.br*

Benami Bacaltchuck  
*Embrapa Wheat*  
*benami@cnpt.embrapa.br*

Sidney Neto Parentoni  
*Embrapa Maize and Sorghum*  
*sidney@cnpms.embrapa.br*

Emílio da Maia de Castro  
*Embrapa Maize and Sorghum*  
*emilio@cnpms.embrapa.br*

Derli Prudente Santana  
*Embrapa Maize and Sorghum*  
*derli@cnpms.embrapa.br*

The crop production of maize, rice and wheat in Brazil from the period 1990/92 to 2002/2004 increased 67% for maize, 27% for rice and 71% for wheat. The key reasons for this varies for each crop. In the case of maize and rice, a reduction in planted area was observed during this period of time (2% and 21%, respectively). For wheat, an area expansion of 12% occurred in the same period. In all three cases, large increases in crop productivity were observed. For maize yields the increment was 71% during this period, for rice it increased by 60% and for wheat this increment was 53%. A number of factors had contributed for the increase in crop size and productivity along this time. Some of these factors happened during the timeline mentioned above and others started before the period considered but had created impacts that extended until the years under analysis. We attempt to group

these factors in three main classes such as: organizational environment; technological innovations and market interventions/changes.

In the organizational environment, it should be mentioned the following points: a) the governmental program called "Polocentro", which allow farmers in the Cerrado areas to have access to credit for improving agricultural infra-structure, for implementing available soil correction technology and to have access to technical assistance. This program was implemented in the seventies but still today it has impacted in production areas of the Southeast, Central-west and new agricultural areas of the Northeast and North of Brazil; b) the creation of the Brazilian Agriculture Research Company - EMBRAPA and the establishment of the National System of Agriculture Research in Brazil; c) three classes of industry who experienced a tremendous modernization process in the country had impacted grain agriculture. These segments included the fertilizer industry, the agriculture machinery industry (mainly related to make available to farmers improved planting machines) and the seed industry which was able to develop and deliver to farmers new cultivars with higher and more stable yields; d) the migration of farmers from the South of the country to the new agriculture areas in Central Brazil. These group of farmers brought with them the expertise in mechanical use, their tradition in associative business and its willingness to adopt technology innovations.

As part of the technological innovations which were crucial to the incorporation of the new agriculture areas with severe soil fertility problems into production and also to increase productivity in traditional areas, it should be listed: a) the increase and diversification of the genetic basis of the breeding programs in the country (with emphasis in the role of CIMMYT, CIAT, IRRI, Embrapa, universities and private sector); b) the development of expertise in appropriate soil correction and fertilizer use for the new areas of the "Cerrado", and a better understanding of the climate limitations. This knowledge allows to develop better strategies of "stress escape or stress overcome" and also the development of new production systems. This was a joint work of a number of public institutions, including universities, state organizations and national organizations such as EMBRAPA; c) the production of superior cultivars by both private and public sector, associating high yield potential, with the ability to respond to the improvement of the environment and also able to face biotic and abiotic stresses, and with better processing characteristics; d) the establishment of a innovative arrangement for cultivar licensing and seed transfer from public to private sector, which allows the survival and creation of a group of national seed companies leading to an increase in the competitiveness and capillary of the seed market; e) the existence of a network of technology diffusion including public extension services, and private sector technical assistance, both direct towards the delivering of technology to farmers.

As part of the market component, it should be listed the following items: a) the development of a number of credit instruments which made possible the implementation of projects of soil correction, and investments in infrastructure and machinery in rural properties; b) the existence of federal and state programs for improving grain storage and transportation infrastructure; c) the governmental support to minimum prices of the commodities during the initial period of implementation of commercial oriented farms; d) the development in the country of a competitive sector of poultry and swine meat processing for both domestic consumption and exportation. The establishment of this sector was made possible by the large availability within the country of grains such as maize and soybeans at competitive and relatively low prices. In another way this sector worked in the direction of maintaining reasonable internal prices of these commodities; e) the establishment of adequate national currency exchange rates during this period made Brazilian agriculture products more competitive in international markets (and in domestic market, in the case of wheat).