Development of a Science-Based, Advanced Tropical Agriculture in Brazil

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Brazil is one of the largest countries in the world, with an extensive surface of continuous land, a large supply of fresh water, abundant solar energy, and a rich biodiversity. The wide range of climatic conditions, from temperate to tropical, together with advanced capacity in technology development, allowed considerable diversification of agricultural systems, making Brazil one of the world's largest producers of food, feed, fibers and renewable fuels. The country is today the acknowledged world leader in generation and implementation of modern, tropical agricultural technology. Responding to increasing concerns over agriculture´s footprint on its natural resource base, the agricultural research system in Brazil has taken important leaps, in a short period of time, towards development of innovations for increasingly safer and sustainable agricultural systems. The country is a leader in crop management based on minimum and no tillage systems, which significantly helps decrease erosion and improve general soil quality and groundwater recharge. Biological nitrogen use, through inoculation techniques with nitrogen fixing bacteria, has led to a significant decrease in the amount of chemical fertilizers applied to crops such as soybean. This, in turn, has significantly reduced environmental impacts such as water resources contamination with nitrates or other harmful elements. Biological control, regularly used in a number of crops such as soybean, sugarcane, cotton and fruit crops, has also reduced the need for chemical pest and disease control in several management systems, which have a positive impact on the environment, rural workers' quality of life and product safety and quality. Over the last decades, plant breeding programs have alloweddevelopment of cropping systems to a wide variety of environmental conditions in the country. This has been achieved by incorporating adaptation to different latitudes, tolerance to acid soils–especially to toxic aluminum, increased efficiency in nutrient use (like phosphorus and nitrogen), as well as resistance and tolerance to biotic factors, that are especially severe in tropical regions. These and many other innovations incorporated by Brazilian agriculture allowed increased resource use efficiency, higher productivity and intensified use of land, reducing drastically the environmental costs of farming. These technological advances have made Brazil a leader in production of agricultural goods and one of the largest producers and users of green energy. A striking example of the country´s success in energy security is the ethanol production chain. The production and use of ethanol from sugarcane in Brazil is a global model for bioenergy production, distribution, and use, and is recognized as one of the most efficient in the world. Like ethanol, biodiesel is also receiving increased attention in Brazil, with development of new source materials, production and industrial technologies. This presentation will review in detail thepathways of agricultural development in Brazil in the past decades, as well as prospects, key drivers and expected developments in coming years.