

Transforming Food Agriculture to Feed the People and Save the Planet

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The theme of Tropentag 2021 is 'Towards shifting paradigms in agriculture for a healthy and sustainable future'. I have taken the liberty of interpreting agriculture as 'food agriculture' and I will confine my remarks on 'the future' to developing countries where both opportunities and challenges for agricultural transformation are significant.

Demand for food is driven by three main drivers – human population size, income and demographics. Robust modelling of population growth, incomes and demographics show that demand for food will likely plateau in the 2050s, but by then between 60–70 % more food will be needed than is currently produced. However, food supply is less predictable, as it is influenced by many more variables such as crop, livestock and fish productivity, increasing resource constraints (land and water in particular), climate change and variability, and global as well as local economic and political conditions. Our quest must be about both food and nutritional security – along with addressing the current and future food demand sustainably – environmentally, socially and economically.

To respond to this challenge in developing countries three paradigm shifts are proposed: (a) Agriculture must become a growth pole with equity, including for women and youth; (b) Research and innovation must respond to the needs of the agricultural population who are mostly small and medium scale farmers and entrepreneurs; (c) shorten and professionalise agriculture supply chains to reflect a focus on local and regional markets instead of export orientation.

Should these paradigm shifts take place, the food agriculture sector would respond to meeting future food and nutritional needs sustainably, contribute to gainful and equitable employment, as well as to growth and development in developing countries.

Enabling Farmers to Exploit Genetic Gains for Sustainable Crop Production Systems

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Global efforts to accomplish the onerous task of a 50 percent increase, over the 2012 figures, in the production of food and other agricultural products sustainably by 2050 are confounded by the impacts of climate change and other drivers. To underscore the enormity of the constraints to attaining universal food security and nutrition by 2030, a commitment of the Sustainable Development Goals, one in every 10 persons globally or one out of every five persons in sub-Saharan Africa did not have enough nutritious food to eat in 2019. Still more worrisome, the number of the food insecure and malnourished has been increasing steadily over the last six years. With 80 % of our food being plant-based, a significant component of the solutions to these untenable conditions must be sourced from crop production systems – which produce more with fewer inputs. Towards this end, the case is made that farmers' access to the quality seeds and planting materials of the well-adapted, productive and nutritious crop varieties which are resistant to myriad biotic and abiotic stressors must be enhanced. This requires the safeguarding of the widest spectrum of plant genetic resources for food and agriculture, the use of their inherent variations in breeding progressively superior crop varieties and the agency of responsive seed systems that cater especially to resource-poor farmers of food security crops in vulnerable parts of the world. The normative and operational work of the Food and Agriculture Organisation of the United Nations and its partners in this regard is reviewed and future perspectives shared.

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Reconciling Agricultural Production with Biodiversity Conservation through Ecological Intensification and Diversification

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More than seventy percent of the land surface is transformed by humans, and 1 million species of animals and plants are threatened with extinction. Intensification of agriculture is a major driver of this dramatic biodiversity decline. Modern-industrial agriculture has spurred considerable yield increases in the second half of the 20th century, however, the current agrichemical model of agriculture undermines itself and much else besides. Hence, a paradigm change in agriculture is urgently needed. Ways forward include the (re)diversification of agriculture from field, farm to landscape scales. In addition, ecological intensification, that is, the replacement of conventional intensification practices through ecological processes to increase crop production, has been proposed. Taking examples from Colombia, South Africa and Indonesia, I illustrate potentials of agricultural diversification and ecological intensification in modern-industrial farms to promote environmental and economic sustainability. While individual methods hold great potential to reduce negative impacts, combining multiple methods of ecological intensification and diversification can create truly regenerative agricultural systems that have great potential to sustainably enhance food production and biodiversity

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Crops and cropping systems

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