



Prospects of Russian Agriculture development under global climate and technological changes

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Despite the great progresses of the last century in the agricultural sector and food supply, still about 820 million of people in developing countries are facing food scarcity and malnutrition. More than 180 million children are underweight.

Except in Africa, 80 percent of the production gains came from increased yields in major cereal crops. The area cultivated has actually begun to decline in some regions. From now on, however, even Africa, which has always relied on cultivation of new land for production increases, will have to count on yield gains or pay high financial and ecological costs for expansion into areas not yet cultivated.

The global scenario is changing fast. The technological, climatic and human-induced factors are creating long-lasting effects on the lives of people and on economic activities around the globe. In particular, climate change and/or variability is exacerbating rural increasing heat stress to natural habitats and human settlements, increasing climatic extremes, including drought and impacting food production.

Agriculture of any kind is strongly influenced by the availability of water. Climate change will modify rainfall, evaporation, runoff, and soil moisture storage. Changes in total seasonal precipitation or in its pattern of variability are both important. The occurrence of moisture stress during flowering, pollination, and grain-filling is harmful to most crops and particularly so to corn, soybeans, and wheat. Increased evaporation from the soil and accelerated transpiration in the plants themselves will cause moisture stress; as a result there will be a need to develop crop varieties with greater drought tolerance. These climate change effects are particularly harmful in tropical regions of South America, Africa and South East Asia where food production is feeding a large part of world countries and poses serious risks to global food security in the future.

Despite global projected climate change will affect a general decline of crop yields (about 20% in a decade, IPCC 2014), some regions in the world, particularly boreal ones, will benefit from temperature warming due to an increasing of growing season length and mild climate conditions. Several crops not usually suited for growing in northern latitude region will find here favorable conditions and potentially new economic opportunities will rise. Under new climate scenarios we discuss the potential for Russia to expand its agro-food sector and becoming a new important player of future global food supply. We analyze regional climate scenarios at high spatial resolution (8km) and project in the current century the new distribution of agro-ecological zones with the implication of new crops expansion. We also discuss limitation of water supply which may derive from increased evapotranspiration and water demands for irrigation. A final discussion is about the technological challenges and transformation needed in the Russian agricultural sector to take this opportunity. The question is about available technologies, barriers to implement innovation, financial instruments to prevent climate risks and moreover the required agriculture transformation to prevent environmental impacts of agriculture intensification.