

Chapter 3

Population and Global Food Security: Issues Related to Climate Change

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ABSTRACT

Global food security is one of the major issues that needs utmost attention of the scientific community in near future. The growing food demand of the society is putting enormous pressure on the resources over which the food supply of the civilization depends. The two major components affecting the global food security are population and global climate change. The rate at which the population of the World is increasing, the food production needs to be doubled to meet the growing requirements. Consequences of global climate change not only reduce the productivity of major staple crops, but also cause destruction of the arable land that can be used for agricultural purposes. The present chapter discusses the effects of population increase and climate change upon food production, which will play a significant role in food security around the globe in near future.

INTRODUCTION

Climate change and population growth have emerged as important issues of concern among the environmentalists/agronomists in the last few decades. Both these factors play a significant role as far as the food security is concerned, both at the regional as well as the global scale (Sinha et al., 1988). With the current trends of population growth, the world food production will have to be doubled to feed the total population by 2025 (How to Feed the World, 2009). As the arable land is limited and cannot be

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expanded beyond a certain limit, increasing population imposes huge pressure upon the food production. In addition to this, climate change too, is playing a negative role in threatening the global food security. All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability.

Food security is closely linked with the growth rate of human population. Of the seven billion people that populate the planet, more than one in seven does not have access to sufficient food and nutrition. Increasing population pose grave threats like increased demand for food and land required for agriculture. Food availability of any area depends on three factors: availability of arable land, accessible water and population pressures (Sadik, n.p.). Overpopulation, especially in poor countries limits the amounts of land, water and other necessary resources required to meet basic needs of the people. If basic needs cannot be met, development stalls and economies begin to unravel. In some poor countries, attempts to increase food production and consumption are undermined by rapid population growth; migration from rural to urban areas; unequal land distribution; shrinking landholdings; deepening rural poverty; and widespread land degradation.

In recent decades efforts are being taken all over the world to increase food production. This is achieved through the development of improved, disease-resistant varieties of staple crops; the increased use of chemical fertilizers and pesticides; and the expansion of irrigated cropland. However, these efforts did not seem to be quite fruitful as the rate of population growth in certain areas was much higher and their increased food production could not cope with the increasing population pressure. Studies have shown that per capita food production actually declined in 51 developing countries while rising in only 43 between 1979-1981 and 1986-1987 (UNFPA, 1990). The excessive population growth rate is the main reason for the existing food crisis in spite of all the efforts taken to improve the crop productivity.

Climate change is another important factor threatening global food security in the 21st century. Despite technological advances, such as improved varieties, genetically modified organisms, and irrigation systems, weather is still a key factor in agricultural productivity. The effect of climate on agriculture is more dependent upon the local climatic conditions rather than the global climate patterns. The significant consequences of climate change that affects the food production of any area are temperature and precipitation (Harris, 2009). Due to the unexpected changes in these two variables, owing to the global climate change, in many places, growing seasons are changing, ecological niches are shifting, and rainfall is becoming more unpredictable and unreliable both in its timing and its volume. These changes do not coincide with the life cycle pattern of the important staple crops grown in the respective areas leading to serious threats to global food security (Harris, 2009; Rotter et al., 2011; Palosuo et al., 2011). Beside these, climate change also has some indirect effects on plant productivity. The increase in concentration of greenhouse gases like CO₂ and O₃ have an effect on the plant physiology bringing about changes in the plant metabolic responses which may influence the plant productivity (Embersen et al., 2009; Krishnan et al., 2007). The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013), concluded that the poorest countries would be the hardest hit, with reductions in crop yields in most tropical and sub-tropical regions due to decreased water availability, and new or changed insect pest incidence. In Africa and Latin America many rain fed crops are near their maximum temperature tolerance, so that yields are likely to fall sharply for even small climate changes; falls in agricultural productivity of up to 30% over the 21st century is projected (IPCC, 2013).

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