



**PROCEEDINGS OF  
IV. INTERNATIONAL  
AGRICULTURAL, BIOLOGICAL  
& LIFE SCIENCE CONFERENCE  
AGBIOL 2022**

**29-31 AUGUST, 2022**

**EDIRNE, TURKEY**



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## CLIMATE CHANGE AND FOOD SECURITY

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### ABSTRACT

Food security, which means dependable access to safe, affordable, and nutritious food is completely linked with climatic conditions of ecosystems. Weather describes the behavior of the atmosphere in the short term in a particular region, while the term climate describes the long-term more general weather conditions in larger areas. While a significant part of the sun's rays reaching the earth is reflected from the earth, our atmosphere sends some of the sun rays reflected from the earth back to the earth with the help of gases such as carbon dioxide, methane and water vapor, which are also described as greenhouse gases. With the greenhouse gases that act as insulation in this way, the average temperature on earth reaches 15 °C levels, allowing humans, animals and plants to continue their lives. This natural effect of greenhouse gases is called the "greenhouse gas effect". The amount of greenhouse gases in the composition of the atmosphere started to increase after the industrial revolution, and the rate of carbon dioxide in the atmosphere increased by 40% in this process. The burning of fossil fuels, especially coal, is the main responsible for the increase in the carbon dioxide ratio in the atmosphere, and due to this proportional increase, the earth's temperature has warmed over 1 °C nowadays. Climate change negatively impacts conditions that have devastating effects on food security, livelihoods and human health. While the effects of climate change on agricultural production are increasingly felt all over the world, most of the food production systems are pushed to the breaking point at the point of adequate and balanced nutrition for people. In addition to all these, climate change also threatens global food security through reduced availability of local agricultural products, price increases, logistics problems and production cuts due to raw materials. In short, climate change puts adequate and quality food production at risk. In this context, in order to avoid the worst climate change scenarios in the future, it is imperative that we must reduce the carbon emission rate and create a world where the average global temperature rise does not exceed 2 °C.

**Keywords:** Food security, climate change, carbon emission, food safety, greenhouse gases.

### INTRODUCTION

In the 21st century, human health is under threat of climate change. Since human and animal are ecosystem's participants, climate change will affect overall food accessibility (Rocha et al., 2022). Direct and indirect effects of climate change can be observed on agriculture as decline in crop production. As a consequence, food prices and markets are affected by the extreme climatic events. Global food security is threatened by climate change, any attempt

contributing to the occurrence of climate change should be prevented by humankind and with policies accepted by global authorities.

### **Climate Change and Extreme Weather Conditions**

Weather describes the behavior of the atmosphere in the short term in a particular region, while the term climate describes the long-term more general weather conditions in larger areas. Climate change is characterized by temperature and rainfall events (Purwaningsih et al., 2022). Internationally and domestically observed effects of climate change are irregular weather conditions as extended periods of increased temperature and precipitation trends, droughts, floods, elevated sea level, retreating of global ice sheets (Abbass et al., 2022). In climate change usually changes are observed over 30 years (Birgani et al., 2022).

Climate change and global warming are important global changes of past 65 years and the effects are widely observed in the world (Abbass et al., 2022). The impact of climate change on agriculture is evidenced by decrease in crop production and directly appeared as higher food prices (Birgani et al., 2022).

### **Food Security and Climate Change Relation**

Food security, which means dependable access to safe, affordable, and nutritious food is completely linked with climatic conditions of ecosystems. According to FAO (2002), "Food security requires that 'all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'".

Climate change affects food security in 4 dimensions (Barokatuminalloh et al., 2021).

- 1) Food availability
- 2) Food Access
- 3) Food utilization
- 4) Food system stability

Globalization affected food chain. Food system is under pressure of climate change, increased population, environmental challenges and political economic difficulties (Alexandratos & Bruinsma, 2012). Climate change threatens global food security through reduced availability of local agricultural products, price increases, logistics problems and production cuts due to raw materials (Badgley&Perfecto, 2007).

Food access to agricultural products is declining due to losses in incomes, and people in low-income countries have to spend more money on food supply. This is an indication that food safety is in danger (Barokatuminalloh et al., 2021). While the effects of climate change on agricultural production are increasingly felt all over the world, most of the food production systems are pushed to the breaking point at the point of adequate and balanced nutrition for people (Challinor et al., 2015).

By the effect of climate change, food consumption will be decreased. Food prices would be increased one and a half fold as it is food prices would increase as 35% in low income countries and 23% in high-income countries. The difference in high-income and low-income countries is based on the act that presence of better fundamental conditions in high-income countries and policies followed against climate change. Drought is the most common climatic event that is responsible for higher food prices (Birgani et al., 2022).

Climate change related weather extremes stimulates crop deterioration. Falling, discoloration etc. The integrity of the ecosystem will be spoiled by climate change. Species that can tolerate environmental stress can survive. The extinction of species is also pronounced related to climate change.

**Factors affecting crop production:**

- Temperature
- Solar radiation
- Precipitation
- CO<sub>2</sub>

**Impact of Greenhouses Gases on Climate Change and Food Security**

The increasing world population leads to demand for food. Food production and consumption should be in balance for continuous supply of food (Manteghi et al., 2022). In 2021, there exist a drastic change in global foods sector and also energy demand in the world. Since world population is increasing, the demand for food also increases which brings higher energy consumption (Malliaroudaki et al., 2022).

CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and H<sub>2</sub>O are greenhouse gases exist in the atmosphere and released to the atmosphere by volcanoes, forest fires and seismic activities before industrialization. Agricultural production is the fundamental sector account for 30-40% of all greenhouse emissions so have an important effect on global warming and climate change. It is announced that the world could see a temperature rise from 1-3.7°C at the end of this century meaning that very adverse effects will be observed in crop production (Abbass et al., 2022).

Greenhouse gases are the indicators of environmental challenges faced due to climate change and global warming.

- Pollution
- Global warming
- Environmental degradation
- Loss of biodiversity
- Depletion of natural resources are the environmental challenges.

While a significant part of the sun's rays reaching the earth is reflected from the earth, our atmosphere sends some of the sun rays reflected from the earth back to the earth with the help of gases such as carbon dioxide, methane and water vapor, which are also described as greenhouse gases. (Lindsey, 2009). With the greenhouse gases that act as insulation in this way, the average temperature on earth reaches 15°C levels, allowing humans, animals and plants to continue their lives. This natural effect of greenhouse gases is called the "**greenhouse gas effect**". (IPCC, 2007).

The amount of greenhouse gases in the composition of the atmosphere started to increase after the industrial revolution, and the rate of carbon dioxide in the atmosphere increased by 40% in this process (United Nations Report, 2020). The burning of fossil fuels, especially coal, is the main responsible for the increase in the carbon dioxide ratio in the atmosphere, and due to this proportional increase, the earth's temperature has warmed over 1°C nowadays (United Nations Report, 2020). The main goal should be keeping temperature increase in 1.5°C levels that is well-below 2°C the limits of pre-industrialization (Abbass et al., 2022).

## CONCLUSIONS

Extreme weather conditions as heatwaves, drought, floods and storms are increasing and expected to continue. Changing food sources and changes in conventional food production practices lead people to become unhealthy. Environmental changes result in infectious diseases (Rocha et al., 2022). Wheat is the most common cultivated plant in the world. Researchers stated that the decrease in wheat production is related to higher temperatures; that the plant expands faster with a decrease in photosynthetic period resulting in disruption of reproductive reactions (Abbass et al., 2022).

The effects of climate change should be minimized by taking preventive actions, removal of circumstances contributing the climate change. People will have to adapt to climate change by reducing consumption of crops, by changing dietary patterns and by reducing the amounts and the quality of foods that they eat (Birgani et al., 2022). In short, climate change puts adequate and quality food production at risk. In this context, in order to avoid the worst climate change scenarios in the future, it is imperative that we must reduce the carbon emission rate and create a world where the average global temperature rise does not exceed 2°C.

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