



Consequences of Climate Change on Agriculture Sector

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ABSTRACT

Agriculture, in general, is science as well as the practice of farming plants, crops, or livestock. The agriculture sector is growing rapidly all over the world due to technological advancement. The farmers are adopting new methods and technologies for improving crop production rates to meet the specific requirement of the foodstuff as the population has increased dramatically across the globe during the last decade. Several factors are affecting the overall production rate of cultivation but climate change is becoming more dangerous and affecting overall agriculture productivity all over the world which is a huge challenge. There has been extensive research conducted on climate change's impact on the agriculture sector and how it is becoming more dangerous day by day. In this paper, the author conducted a detailed overview of the consequences of the rapid climate changes on the agriculture sector. Although there has been done extensive research in this field to find out the key elements that are affecting the climate and how they are harmful to agriculture production there is a pragmatic scope for more research in this domain to find out pragmatic solutions to the existing issues.

KEYWORDS: Agriculture, Climate Change, Crop, Global Warming, Pollution, Environmental Issues.

Received 12.04.2022

Revised 18.06.2022

Accepted 27.07.2022

INTRODUCTION

The climate is changing globally which poses a very serious danger to the globe's foodstuffs and nutritional security. Because of greenhouse gases, pollution levels in the environment are rising dramatically and the temperature of the environment is also rising. The overall average temperature (Global) has steadily risen and is anticipated to increase up to 2 degrees Celsius by 2100, resulting in significant economic losses across the globe[1]. The overall CO₂ concentration is increasing rapidly across the globe which is the vast quantity of greenhouse gases and is becoming more dangerous for people as well as other species' health. Climate change has become one of the major issues nowadays as it directly affects the overall growth of the crop and plants which is reducing the crop production rate[2]. There has been conducted numerous research by several researchers on how climate is changing dramatically and what are its dangers. The rapidly changing climate is just not affect the farming sector but also affects the microbial population as well as corresponding enzymatic actions inside soils[2].

This article evaluates recent data gathered from the publications on environmental issues, several contributing factors, their near-term projections, their effect upon this cultivation sector as a result of its effect on crop normal metabolic processes, as well as probable or recorded consequences for soil fertility, insect pests, and prevention measures[4]. Cultivation contributes significantly to boosting the growth of crops while also being responsible for a large portion of the national GDP. About the population is employed in any capacity. Numerous companies, including chocolate, fabrics, sugar cane, meals as well as dairy handling, and many others, rely on crop output for raw material needs[5]. Cultivation productivity has a ripple impact on the whole market because of strong links to several major industries. Changing climate is now posing an issue to agriculture's long-term viability. Such danger is exacerbated by anthropogenically created carbon emissions in the environment, which is the result of increasing industrial activities as well as development and increased usage of vehicles etc.[6].

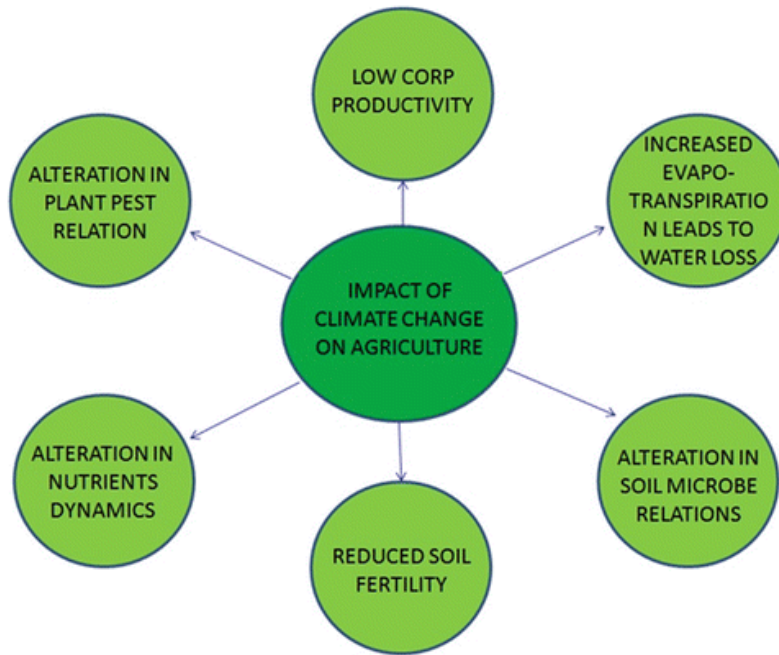


Figure 1: Illustrates the effect of climate change on farming. Climate change is becoming a serious concern across the globe[7].

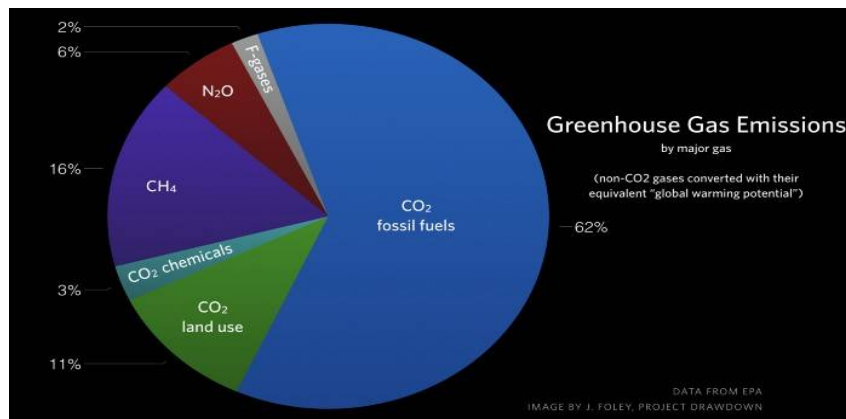


Figure 2: Illustrates the major causes of the rapid climate changes that are becoming very dangerous [GlobalEcoGuy].

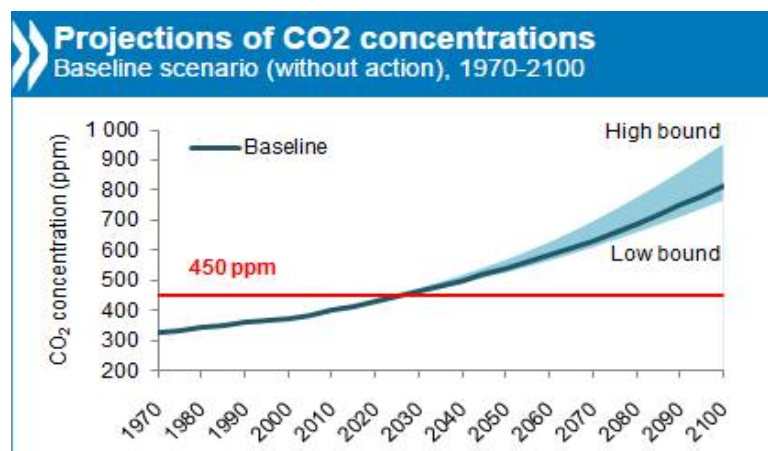


Figure 3: Illustrates the projections of the Carbon dioxide (CO2) concentration. This is the baseline set-up (deprived of the action), report 1970 to 2100 [OECD].

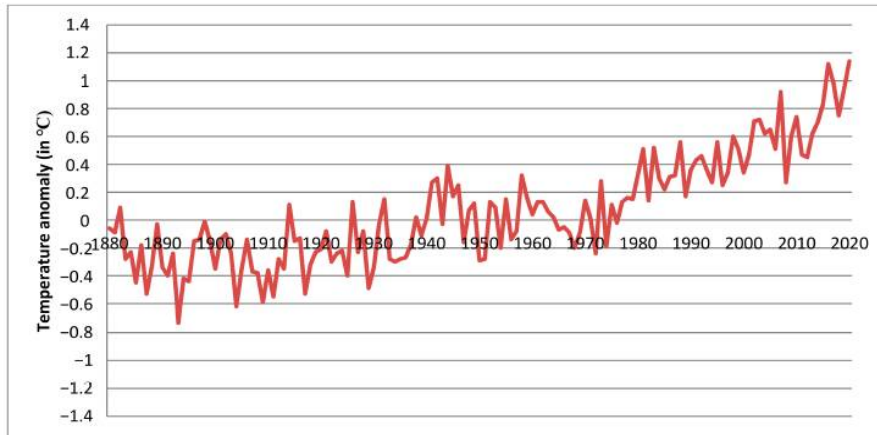


Figure 4: Illustrates global land as well as marine temp. anomalies on base period[8].

Cultivation is vital for maintaining foodstuff and nutrition safety, so it's critical as this field adapts to growing atmospheric instability as well as transition. In case of intense weather events, a robust crop output mechanism is needed to maintain profitability[9]. While landowners have developed numerous ways of coping through the period, individuals have lost sight of an immediate solution policy in battling with frequent and serious types of catastrophic weather on one side, as well as incremental variation in the climate variables such as rising surface temps, intense storms, increasing evapotranspiration values, or deteriorating soil water content on the other side[10]. Figure 1 shows the effect of climate change on farming. Climate change is becoming a serious concern across the globe. Figure 2 shows the major causes of the rapid climate changes that are becoming very dangerous. Figure 3 shows the projections of the Carbon dioxide (CO2) concentration[11]. This is the baseline set-up (deprived of the action), report 1970 to 2100. Figure 4 shows global land as well as marine temperature anomalies during the base period. Figure 5 shows how various factors such as gas release, utilization of chemicals, and transportation are contributing to climate change[12].

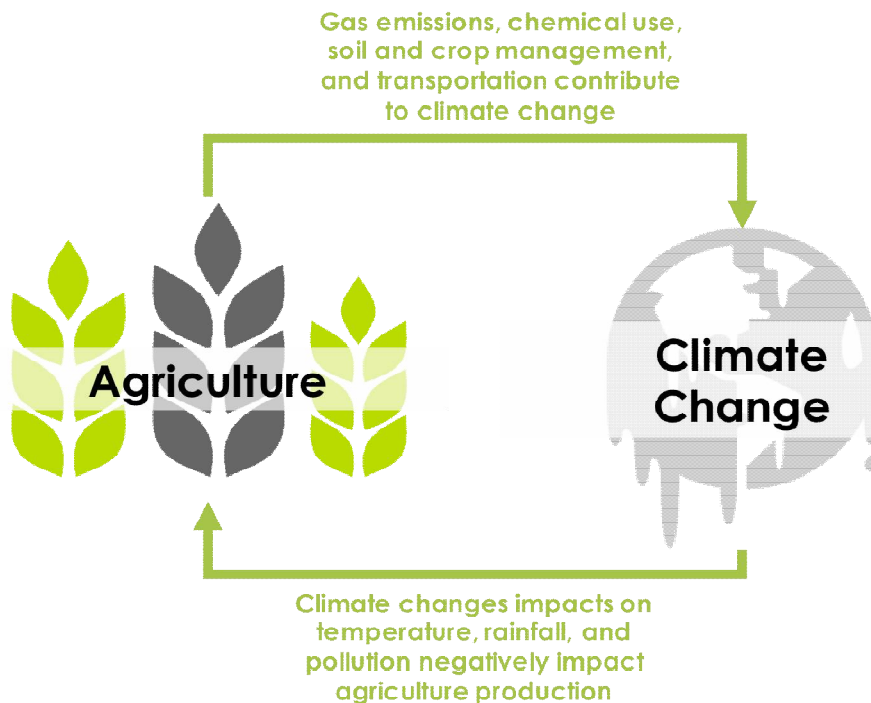


Figure 5: Illustrates how various factors such as gas release, utilization of chemicals, and transportation are contributing the climate change [HBS Digital Initiative].

Climate change may be described as statistical fluctuations in characteristics of the climate system over a period, namely alteration in universal temp, rainfall, and so forth, caused by industrial vehicles and others[13]. Climate change has the potential to radically alter the allocation or consistency of

environmental assets, putting people's lives at very high risk[14]. Vehicles use is drastically increasing across the globe which leads to huge air pollution and contributes the climate change all over the world[15]. Vehicles are playing a key role in the transportation sector to provide ease to people for traveling from one place to another in a very minimal time duration but these vehicles are producing an excess amount of pollution that is very harmful to the health of the people and species or other animals as well[16]. Figure 6 shows how climate change is directly affecting agriculture and soil fertility dramatically. Figure 7 shows networks among climate alteration as well as agricultural productivity[17].

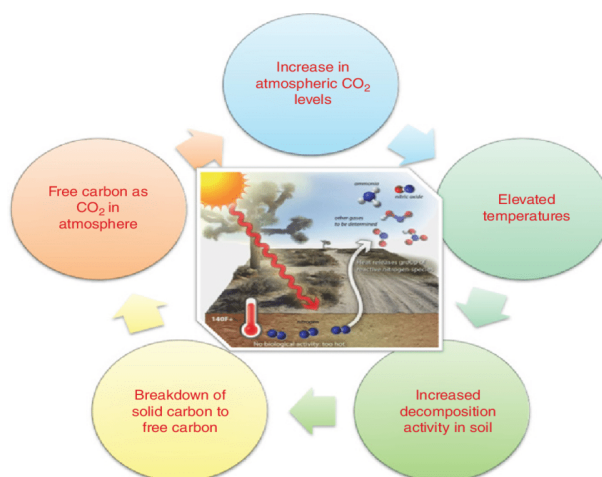


Figure 6: Illustrates how climate change is directly affecting agriculture and soil fertility dramatically[18].



Figure 7: Illustrates networks among climate alteration as well as agricultural productivity [IAMO].

Environmental Degradation and Cultivation

Environmental degradation and cultivation are two interconnected phenomena that occur on a global level, including environmental change's negative impacts, influencing cultivation, both actively and implicitly. Variations in temperature, pollution, and weather patterns (for instance, heat waves), increases in pathogenic fungi, increases in ambient CO₂ and surface temperature, and variations in the nutritional content of certain plants[19]. Pollution is becoming more dangerous worldwide as the number of vehicles and industries is increasing day by day that are contributing to the rapid increment in global warming[20]. The agriculture sector has been facing various issues due to global warming such as insufficient and low rainfall in certain regions where air pollution is in high quantity, high temperature of the farming land, and many more that directly affect the production rate of the crop[21]. Figure 8 shows the worldwide greenhouse gas release recognized in diverse economic subdivisions.

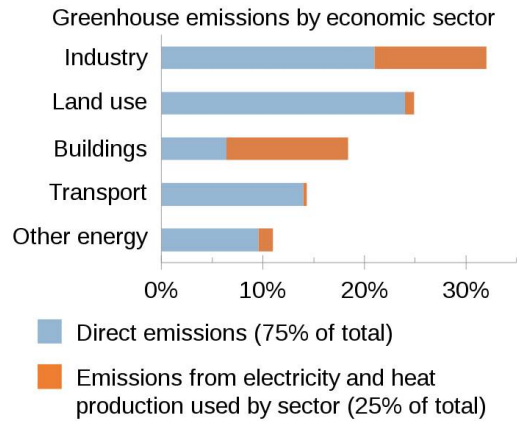


Figure 8: Illustrates the worldwide greenhouse gas release recognized by diverse economic subdivisions [Wikipedia].

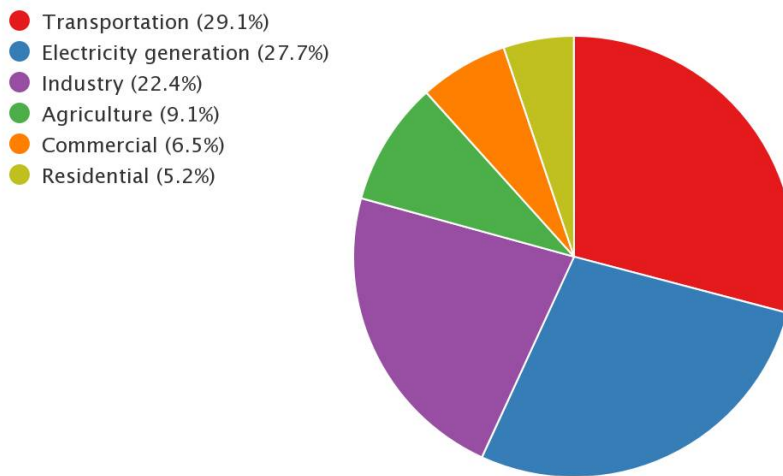


Figure 9: Illustrates the distribution of greenhouse gas release by economic division in the United States (US), in the year 2017 [Wikipedia].

Global warming already changed agriculture in a range of aspects. Plants increase their development rapidly and generate less food because of global warming, which reduces production above some ambient temp. High heat can make it difficult for plants to acquire proper water[22]. Evaporation from the soil grows because of warm temperatures and plants boost oxygenation or water losses by plants[23]. The agriculture sector is demanding new ways to maintain soil fertility and less effect of global warming on the crop production rate as the demand for foodstuff is continuously increasing globally day by day due to the rapid increment in the world population[24].

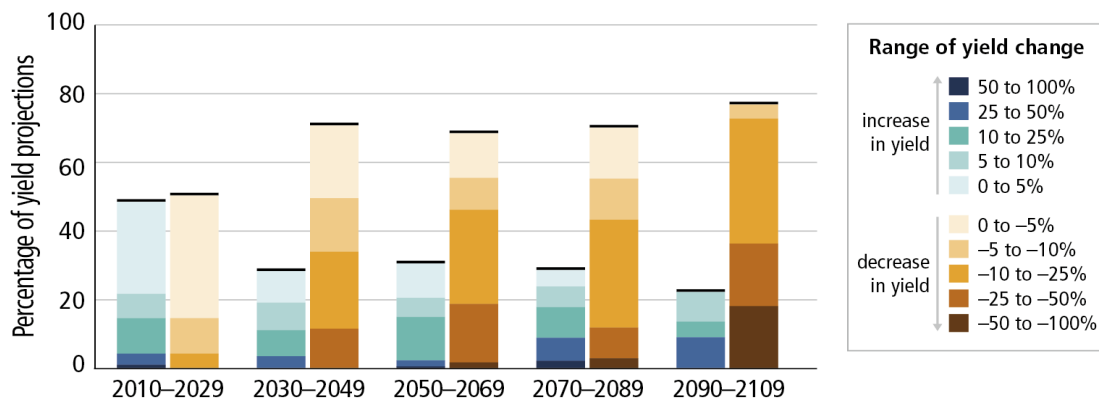


Figure 10: Illustrates the synopsis of projected variations in the harvest produces because of changing climate over the 21st era [Future Learn].

The rapid variation in climate is increasing day by day due to global warming and this directly affects the hydrology of reservoirs, namely groundwater levels, relative humidity, rainfall, as well as the quality of the air. This is due to changes in rainfall, evapotranspiration, and rainfall intensity[25]. Climate change is increasing rainfall sometimes in some regions, which contributes to a growth in discharge, however, climate changes condensation, which leads to a decline in output[26]. Figure 9 shows the distribution of greenhouse gas released by economic division in the United States (US), in the year 2017. Figure 10 shows the synopsis of projected variations in the harvest produces because of changing climate over the 21st era[27]. The rapidly changing climate has become a primary concern nowadays across the globe as it directly impacts crop growth in a precise manner and reduces the overall production rate of the crop[28]. Although, global warming a continuous process over the earth in the ancient time but it is increasing in the last century constantly due to excess air pollution and many more[29]. Figure 11 shows the positive and negative impact of changes in the cultivation environment.

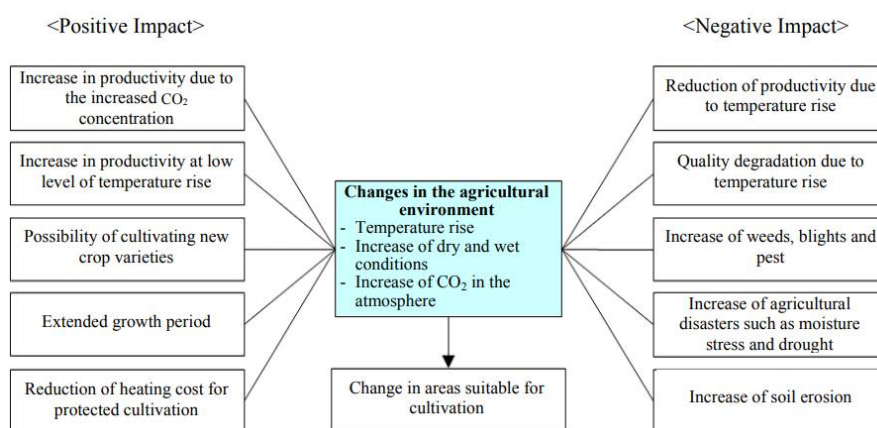


Figure 11: Illustrates the positive and negative impact of changes in the cultivation environment[30].

CONCLUSION AND IMPLICATION

The agriculture sector is facing several issues nowadays due to climate change such as faster growth of the plants due to increasing temperature of the atmosphere that reduces the overall productivity of the crop as demanded nowadays. The cost of farming assets is increasing constantly and due to that farmers are not getting the required crop yields that are a serious issue. The alteration in climate change is a serious issue and demands more attention in the modern world to effectively reduce the increasing temperature to improve the production rate of the crop efficiently by investigating several novel methods and techniques. This paper provides a detailed analysis of the current issues and challenges in the agriculture sector due to the rapid changes in the climate. Although there has been investigated several methods during the last decade to resolve the issues of climate change due to the rapid increment in global warming, there is a need to conduct more research to effectively determine pragmatic methods and techniques.

ACKNOWLEDGEMENT

The authors acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript. The authors are also grateful to the authors/editors/publishers of all those articles, journals, and books from where the literature for this article has been reviewed and discussed.

CONFLICT OF INTEREST

The authors have no conflict of interest

AUTHOR CONTRIBUTIONS

Dr.Meenakshi Devi, and Dr.Rohit Kumar conducted the research, analyzed the data, proposed the methodology, and wrote the initial draft; Dr. N. K. Tiwari and Dr. Arvind Singh, modified and supervised the initial draft, Dr.Umesh Kumar Tripathi supervised the research and written the final version of the manuscript. All authors had approved the final version.

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CITATION OF THIS ARTICLE

Meenakshi D, Rohit K, N. K. Tiwari, Arvind S, Umesh K T. Consequences of Climate Change on Agriculture Sector. *Bull. Env.Pharmacol. Life Sci.*, Vol 11 [8] July 2022 :177-184