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Effects of Climate Change on Food Production

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Abstract

Food production has been adversely influenced through unstable switch in climate conditions, there is currently rise in the requirement of food as a result of higher global population. One of the important factors that influence the occurrence of greenhouse gas to weather condition swift is carbon dioxide (CO_2), there is overall clear outcome on crops development. when carbon dioxide level rises, also the level of photosynthesis and carbon absorption rise and this process is termed as carbon dioxide enrichment, and this situation leads to various environmental issues that affects food production. Accessibility to moisture, atmospheric contamination and soil potency have tremendous effects on agricultural production. An unstable rapid change in climate conditions in the face of global food insecurity that occurred through extreme adverse climate condition which have influence on food production, several food systems have been influenced negatively, and hereby, putting the food production system at risk. Yield of several crops have been dwindling and low output recovered in some nations as a result of drought, heat wave, livestock and fisheries are likewise tremendously affected in terms of disease outbreak, low productivity in yield. Food availability and accessibility is the major and essential climatic -linked issues, due to the fact that global poverty is increasing day by day and food would become scarce and unaffordable. The way to prevent shortage in food production is to mitigate the effects of climate change and also to adopt techniques and approach to sideline its impacts and enhance food productivity.

Keywords: Climate change, carbon dioxide, crop yield, food production, food security, livestock yield.

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INTRODUCTION

Food production has been adversely influenced though the unstable switch in climate conditions (Arunanondchai et al., 2018). there is currently rise in the requirement of food as a result of higher global populace. Accessibility to moisture, atmospheric contamination and soil potency has tremendous effects on agricultural production (Noya et al., 2018). When there is a rapid switch in climate conditions. There is always an increased adverse effects with high magnitude as a result of intentional and unintentional impacts of non-living stress which occurred from the constant desertification and over- used of fossil fuel, Carbon dioxide level has risen higher to 280 μmol^{-1} to 400 μmol^{-1} in the air. There is projection that carbon dioxide shall rise to double, meaning up to 800 μmol^{-1} towards the ending of the centenary. farming is tremendously determined by temperature and precipitation. One of the important factors that influence the occurrence of greenhouse gas to weather condition swift is CO_2 (Masson-Delmotte et al., 2018).

Increasing the necessary studies and measures to minimize the emissions of carbon emissions should be taken all over the world and measures that will minimize the greenhouse gas effect will play an important role in reducing the effects of global warming (Bağdatlı and Arıkan, 2020).

There is overall clear outcome on crops development. when carbon dioxide level rises, also the level of photosynthesis and carbon absorption rises and this process is termed as carbon dioxide enrichment (Wang et al., 2020).

Photosynthesis is tremendously responsive to environmental pressure like drought, increased hot climate, isothermal layer, as a result of suspension that occur to photosynthesis heat transmission from their effect, and this action negatively influenced photosynthesis metabolism procedures, and this occurrence resulted in destruction of thylakoid, covering layer and organelle system (Ainsworth et al., 2012; Sieber et al., 2016).

Switch or changes in climatic situation could result in higher outputs of few produced in few areas. However, in order to achieve these values, there are some factors that should be available such as quantity of the nutrient in the soil, ground precipitation, accessibility of aqua. The swifts in the prevalence and intensity of dryness and surge have capacity to constitute problems to the farm producers and husbandman and this situation invariably pose a threat to food security (Ziska et al., 2016).

EFFECTS of DROUGHT and TEMPERATURE on CROPS

Climate change has become the focus of constant attention of living things and civilizations take into account the climatic parameters determined their lifestyles. Climate increasing or decreasing in changes affect living things negatively. Decrease in productivity, especially in agricultural production causes (İstanbulluoğlu et al., 2013)**.**

World effects of global warming caused by changes in the climate system of the highest peaks, ocean depths, is felt throughout much of the world from the equator to the poles. The polar ice caps are melting, sea level is rising and soil losses are experienced in coastal areas. Sea level due to melting of glaciers Increasing the temperature rose from 10 to 20centimeters (Bağdatlı and Bellitürk, 2016).

As a matter of facts, rise in level of hot climate in the atmosphere could decrease outputs of produce within 6 -25%, though this is determined by the area or location of planting such produce (Sieber et al., 2016; Zhao et al., 2017). Nonetheless, dryness in the air is one of the main environmental pressure which hinder plant produce (Lesk et al., 2016; Zipper et al., 2016) as a result of photosynthesis restraints enforced through pore and non-pore procedure (Dahal et al., 2014).Dryness in the air has been predicted to negatively influenced losses of 1820 million tons of wheat or grain produced over the past four decennary (Lesk et al., 2016).The incidence and harshness of dryness in the air was predicted to increase, expanding the hazard of produce wastage for about 24% of soya bean, 21%corn, 18%rice, and 20%grain (Leng and Hall 2019). Global climate change affects the world negatively day by day and reveals negative results in agricultural product yield. In particular, it is inevitable to evaluate the regional temperatures and to review the product pattern in parallel with the increasing global climate change (Bağdatlı et al., 2014).

Farming is always affected by the unstable atmospheric condition, nevertheless, a prompt switch in atmospheric condition subject farming activities to be sensitive in few zone or locations, a temperate hot atmosphere could cause produce outcome to be high. Generally, the effects of atmospheric condition switch on farming are projected to be adverse which leads to decrease in food productions and thereby, increase food costs (Nelson et al., 2009).

Some countries are currently experiencing difficulty that occurred as a result of increased level of faming also some areas in sub-Sahara Africa and southern part of Asia, was forecasted that there will be tremendous reduction in food yields (Nelson et al., 2009; Gornall et al., 2010). High concentrations of air carbon dioxide was likewise predicted to decrease to low percentage of zinc, iron, and more essential minerals in produce (Dietterich et al., 2014).

The unstable switch in precipitations order subjected crops producer to experience double risks arising out of floods and air dryness. This two environmental conditions could damage grains. When floods occur manure and productive soils are washed out, this productive soil are assumed by the crop producer to help higher yields of crops, thereafter, air dryness dried it up, it becomes easy to be carried out by wind. Increased hot atmospheric conditions cause increment of grains moisture requirement, which then subject the crops to be susceptible when there is season of dryness (Nelson et al., 2009).

Some groups of plants, arthropods, and many pests derived gain from increased hot atmospheric condition and elated carbon dioxide, raising their ability to destroy grains and causes difficulty in finance of the crop growers. switch or change in atmospheric condition likewise contributes to the spread of pests to farmland that are yet to be cultivated. Increased atmospheric condition also caused the global glaciers to diminish which leads to negative effects on the crop growers that relied on the frozen moisture to dissolve into liquid and be applied for watering crops (Field and Barros, 2014).

Elevated oceans height, at the same time, elated flooding poses threat on the seaside farmland, also leads to heightened marine interference into the seaside which resulted into salt water and makes it impossible to be applied for watering of the crops (Backlund et al., 2008).

Switch atmospheric condition likewise are projected to influence environment and the functions they rendered for farming activities, like propagation and regulation of pest through nature carnivores. Most of the trees genus in their natural habitat are incorporated for the purpose of fertilization, and this wild animal experience risks of destruction (Jarvis et al., 2008).

EFFECTS of CLIMATE CHANGE on DIFFERENT CROP YIELD

Crop anatomy are tremendously affected through climate instability in many ways. Ecological excesses and atmospheric instability improve the possibility of many pressures on crops (Thornton et al., 2014). As the soil temperature decreases, plants that are not suitable for climatic conditions and resistant to cold will be affected by root and cause drying. As a result, a constantly increasing soil temperature will adversely affect plant life. It will decrease the efficiency (Bağdatlı and Ballı, 2020).

There are three major ways switch atmospheric condition impacts cultivation of grains which are as follows direct, indirect and socio-economic impacts. The work of Boyer revealed that atmospheric conditions caused decrease in the output of plant yield of about 70% from over three decades (Boyer, 1982). Based on the report of (Van Velthuizen, 2007).

They reported that every farmland where farming had been carried out globally experienced the impacts of climate switch, except 3.5% of regions are free from ecological barriers. The pressures from non-living holds tangible impacts on grains produce, though, this is greatly determined based on the depth of loss to overall regions that are been utilized for planting crops (Tebaldi and Lobell, 2018; Bonan and Doney, 2018).

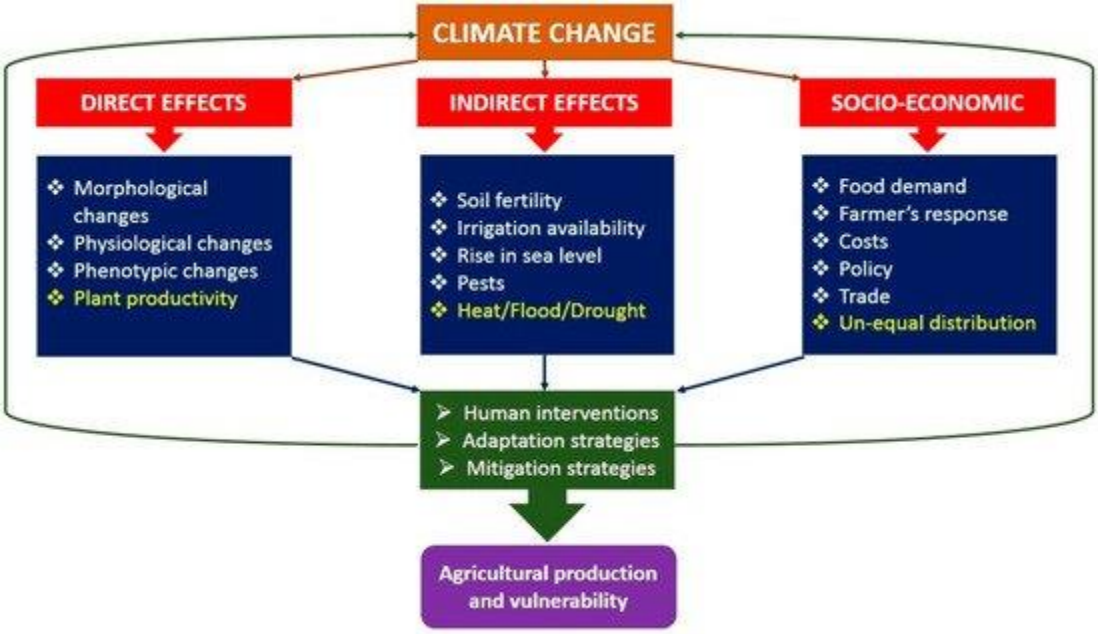

Figure 1. Direct, indirect and socio-economic impacts of climate change on food production (Raza et al., 2019).

Grain yield is extremely impacted through high temperature that occurred as a result of switch in atmospheric condition in more regions and could decrease produce output for about 6% representing an increase in degree of the temperature (Winkel et al., 1997). Dryness (drought) also increased temperature and are the major pressure elements with the highest effects on grains output. The inner enzyme of photosynthetic experienced limitations when the temperature rises from 35%^{o}C and cause alteration on the procedure that involves photosynthesis. A contradictory impact from heat waves on enzymes available in Zea mays (Gong et al., 1997).

The dual influence of heat and dryness leads to pressure on grains output was analyzed in sorghum, maize and barley. Observation on the dual impacts of heat and drought pressure was identified as self- pressure. as a result of switch in atmospheric conditions, precipitation shortfall and adverse hotness affects the propagation stage of crop development. There was record that the flowering and boom are adversely influenced due to the lack of precipitation in grains cultivation,

Likewise, a rise in temperature to around 30^{O}C while the process of boom growth set in, this lack of precipitation could lead to infertility in grains (Saini and Aspinall, 1982).

When grains, such as rice, and wheat are undergoing cell division, they deteriorate of about 35-75% because of moisture loss (Saini and Aspinall, 1982; Saini and Aspinall, 1981). Dryness tremendously affect rice during the procedure of propagation and efflorescence as a result of precipitation shortfall the yield rate is decreased to 60% (Garrity and O'Toole, 1994).

The production of Cocoa output was potentially decreased through the main dryness period in West Africa when there was occurrence of El Niño period (Hellin et al., 2014). The soybean produce was greatly affected as a result of dry period and there was 42% decreased in the soybean output when the phase of dressing was carried out (Maleki et al., 2013).

EFFECTS of CLIMATE CHANGE on ANIMAL PRODUCTIVITY

Animal production is important supply of nourishment for consumption of growing global populace. Livestock produce such as milk, yoghurts, eggs, milk, fabric, and feathers are greatly relied on by people. Animals produce are tremendously negatively influenced through several excesses of atmospheric situations (Koirala and Bhandari, 2019).

The influence of climatic switch is obvious and greatly felt on animals in several forms. Climatic switch is anticipated to results in rising in atmospheric linked phenomenal dangers and excessive climatic situations, like dryness, heat, deforestation, insect's occurrence (Khanal, 2010). Climate condition that persist for several years could influence later years livestock such as seas creature, ranches, parks, and deserts (Khanal, 2011).

Changing climate conditions will be an important factor in the current situation and the problems that may arise in the coming years. For this reason, solutions are needed for global warming and reduction of greenhouse gases that cause climate change (Bağdatlı and Arslan, 2020).

Warm and wet atmospheric conditions, as a result of climatic switch could leads to rise in the threat and incidence of livestock infections, some specific groups of animals are known as disease carriers, like insects that bites and tick, have the ability to live throughout the year. Several infections are posed as threat when the weather is hot. climatic switch through which the ecological conditions are susceptible for infections to develop and multiply like bacterial and viruses and the carrier of the virus or bacteria would be vulnerable with ease (Koirala and Bhandari, 2019).

High Temperature could leads to heat pressure in land and water animal, which results in decreased development, reduced yield and decreased immunity of livestock, When the weather is hot, livestock are likely to decrease their forage consumptions and the level at which their feeds are converted becomes lower and this conditions leads to projection to provide warmth or cooler environment for the livestock when the climatic condition is at the climax, and this results in addition in the expenses incurred in production. Significant climatic switch and instability like increase in temperature, humidity and unstable down pour of rain order has resulted to death of larger quantity of animal and invariably increased the cost of production, also influenced food safety negatively. Climatic switch also affects development of foraging crops and how animals graze (Koirala and Bhandari, 2019).

Heat waves also resulted in the reduction of yield and constituents of milk production. And this could lead to a swift dwindling in the milk output of about 40%. The stresses that occur as a result of heat cause a surge in the temperature of animal and attack the fatty composite of ductless gland and constituents such as fatty portion (%), solid-non-fatty, protein, casein and lactose constituents are affected. The occurrence of heat waves in cattle that are used for milk production leads to surge in the udder temperature and result in breast disease called mastitis (Pragna et al., 2017).

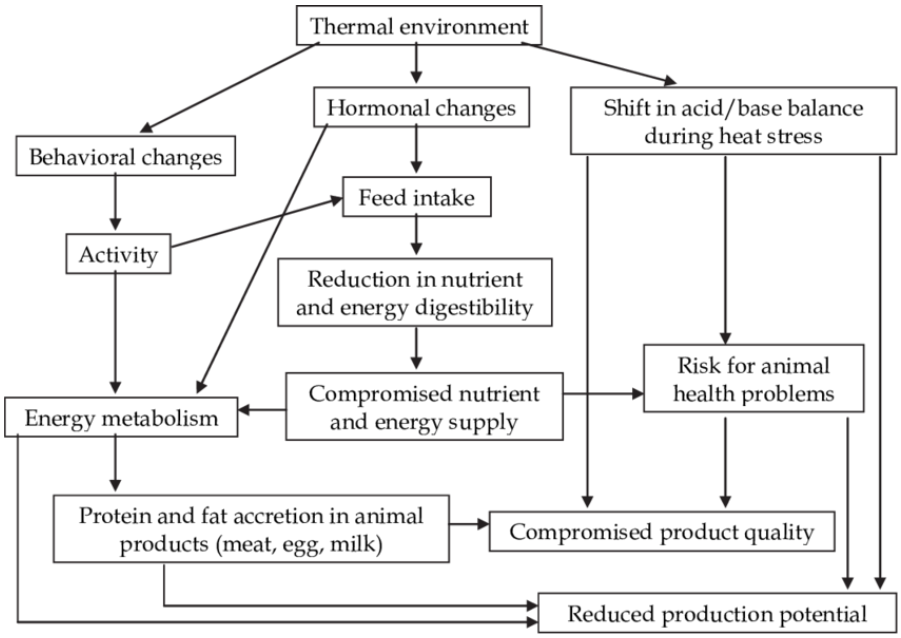

Figure 2. Schematic representation of the possible activities of inconvenient thermal surrounding on the production ability and products qualities of animals (Babinszky et al., 2011).

EFFECTS OF CLIMATE CHANGE ON FISHERIES PRODUCTIVITY

When climatic switch occur some groups of fish and shellfish migrate from warm location to cooler water part of the seas. Nonetheless, this movement from warm water part to cooler part poses threat to the group of fish and shellfish and both migrated fish and other group begins to compete for food. Switch in climatic condition was found to be in association with many seafoods infection eruption, Also, the warmth in the Arctic during cold period has influence on the infections in salmon in Bering oceans and this leads to dwindling in salmon quantity. Also, warm temperature has led to surge in infections in corals, eelgrass, and abalone (Ziska et al., 2016; Doney et al., 2014).

The decrease over time of the changes in the surface of the water is noticeable. This also shows itself as the effect of disorder in the vaporization and current precipitation regime in the water sources dependent on climate change (Albut at al., 2018).

Alterations in temperature and periods could influence the time of breeding and movement. several activities inside the water with organism life span are regulated through switch in climatic conditions. For instance, warm oceans temperatures could alter the life span of salmon and extend the possibility of infections. Coupled alongside of climatic influences, and this alteration is expected to result in more dwindling in salmon populace (Melillo et al., 2014).

Also, the seas acidity level steadily becomes high as a result of rise in the concentration of carbon dioxide in the atmosphere. when there is rise in acid level of the oceans, the high acid can endanger the crustacean through causing weakness in their carapace, this occur through elimination of calcium from marine body. Acidification pose threats to the water system of marine that are responsive, and many fisheries produce depend on them (Melillo et al., 2014).

Many shellfish are excessively susceptible to seas acidification, when there influence of climate change as a result of excess carbon dioxide. These mollusks are projected to have adverse effects on the finance of a nation, for instance, annually, United State of America reserves mollusks such as oysters, clams, and scallops of around 170 million pound of Seafood that worth $400 million.

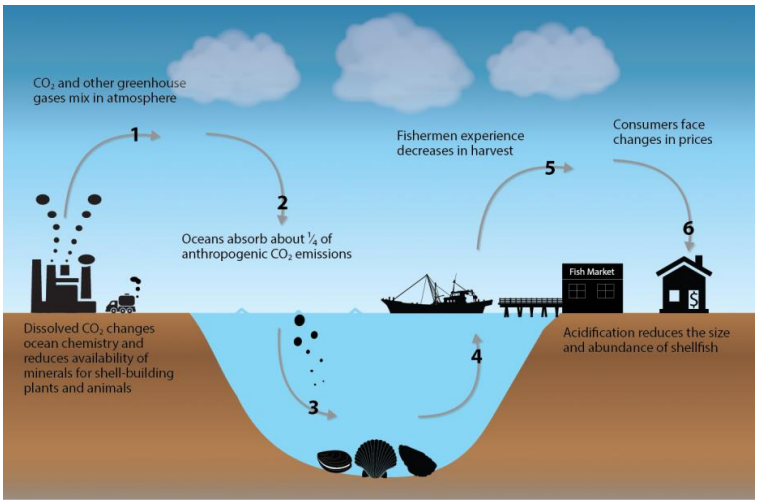

Figure 3. Ocean Acidification Impact Pathway for Shellfish (The diagram represented the influence pathway of carbon dioxide emissions on the shellfish market (US Environmental Protection Agency, 2015).

CONCLUSION

Gradually decreasing rainfalls due to climate changes endanger the living habitat. As a precaution, precise solutions are needed to reduce carbon dioxide in the air and slow down global warming and eventually end it. In this way, greenhouse effect and global warming can be prevented (Bağdatlı and Can, 2019). Climate change generally controls all activities of food production, from planting to processing. It will invariably affects regions and communities which relied on fishing for their source of income and survival as this will be interrupted by climate change, Also the effects of heat waves renders animal infertile and likewise subject them to infections, cattle are also affected by heat waves and all this will lead to low production in milk from dairy cattle.

The change in atmospheric conditions would affect the development of economy, threaten many nations food security and more impoverishment, Food availability and accessibility is the major and essential climatic -linked issues, due to the fact that global poverty is increasing day by day and food would become scarce and unaffordable. The way to prevent shortage in food supply is to mitigate the effects of climate change and also to adopt techniques to sideline its impacts for instance in aspect of drought, low precipitation, lack of rainfall, Irrigation can be employed.

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