The Pharma Innovation Journal 2020; 9(6): 259-261

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5. 03
TPI 2020; 9(6): 259-261

www.thepharmajournal.com
Received: 16-04-2020
Accepted: 18-05-2020

Chitrasena Padhy
Assistant Professor, PhD Student, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Kalee Prasanna Pattanayak
Assistant Professor, PhD Student, School of Management, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Corresponding Author:
Chitrasena Padhy
Assistant Professor, PhD Student, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Global warming and its effect on agriculture

Chitrasena Padhy and Kalee Prasanna Pattanayak

Abstract
There are some terrible consequences on the environment due to climate change. Among the ill effects of climate change are melting ice caps, rise in sea levels, erratic weather and warmer oceans. It results in a warning to global food production due to greater risks for crops and vulnerability of livestock. Agriculture can be affected by climate in a variety of ways. After a certain range of temperatures, warming tends to reduce yields producing less grain in this way. Higher temperatures interfere with the ability of plants to get and use moisture. A powerful super cyclone Amphan made landfall over India's West Bengal and Bangladesh. Leading experts claimed that climate change was having on increasing extreme weather events. Due to climate change, global temperatures increase. So, it becomes risk of more regular powerful super cyclones like Amphan.

Keywords: Climate change, erratic weather, food production, super cyclone

1. Introduction
Global warming is an increase in the global average temperature due to high concentrations of CO2 and other gases and other gases linked to human activity. The global increase in carbon dioxide is mainly caused by fossil fuels burning to produce energy that is responsible for 75. 2 percent of greenhouse gas emissions. This energy is used to meet the electricity and heating consumptions and for transport industry. The increase in methane and nitrous oxide is mainly linked to the farming industry. Deforestation contributes to the increase in carbon dioxide in the atmosphere forests mainly tropical forests absorb and retain CO2. Their destruction and preventing absorbing CO2 releases more carbon dioxide which was previously naturally stored. Deforestation led to a 15-25 percent increase in CO2 since the early 1990s. Due to emissions from agriculture and consequent deforestation it is 21% of the total CO2 emitted into the atmosphere between 2000 and 2010 equal to 44 billion tones (Tommaso Perrone, 2017) [1].

2. Impact of Global warming in world
By 2050 the world population is expected to grow to almost 10 billion by 2050. With 3. 4 billion more mouths to feed and to meet the demand of middle class for meat and dairy in developing countries, global demand for food could increase between 59 and 98%. For this reason, agriculture around the world needs to step up production and increase yields. Scientists find that the impacts of climate such as extreme weather, higher temperature, increase in levels of carbon dioxide, and rise in sea level threaten to decrease the quantity and threaten the quality of our food supplies. As per a recent study, if greenhouse gas emissions continue on their present trajectory, yields could fall by 35% by 2100 due to increased salinity, water scarcity and ozone (Renee Cho, 2018) [2].
Several scholars evaluated the effect of climate change with consideration given only to the changes in the production of specific crops mainly rice, maize, cotton and soybean by crop simulation models. These models limit the investigation to crop physiology, stimulate and compare crop productivity for different climatic conditions (Eitzinger *et al.*, 2003; Torriani *et al*, 2007a) [3, 4].
The agricultural productivity, farm incomes and food security are significantly affected by higher growing season temperatures (Battisti 7& Naylor, 2009) [5].
Climate change can affect different agricultural dimensions, losses in productivity, profitability and employment. Food security is threatened by climate change (Sanchez, 2000; Siwar *et al*, 2013) [6, 7], due to the instability of crop production, induced changes in markets, food prices and supply chain infrastructure.
Study by Khan (2008) [8] predicted that climate variability and droughts in Australia according

to historical climate data and suggested some possible approaches to deal with extreme climate change variability, such as to adjust water allocations of surface and ground water using prediction models to improve water use efficiency in agriculture and to build a legal national framework to manage water resources in accordance with anticipated climate change impacts on water resources.

The suitability and productivity of crops in mid and high latitudes are projected to increase and extend northwards, mainly for cereals and cool season seed crops (Maracchi *et al*, 2005, Tuck *et al*. 2006; Olesen, *et al*, 2007) [9, 10, 11].

Water is vital for plant growth. So varying precipitation patterns have a significant impact on agriculture. As more than 80 percent of total agriculture is rainfed, projections of future precipitation changes often influence the magnitude and direction of climate impacts on crop production (Olesen & Bindi 2002, Tubiello *et al*, 2002; Reilley *et al*, 2003) [12, 13, 14].

All over the world climate change would be one of the affecting parameter. IPCC predicted that many of the observed changes due to climate change are unprecedented (DG Huber *et al* 2011) [15]. It is predicted that global sea level would rise between 0. 17 -0. 41 m in the year 2050 (Brown *et al* 2015) [16]. The rate of rising sea level has been larger than the mean rate during the previous two millennia, till the mid-19th century (Kemp *et al*, 2011) [17]. As per IPCC report (Kitoh *et al*, 2016) [18]. changes in precipitation will be non-uniform and its extreme events over most of the mid-latitude and wet tropical regions will become more intense and frequent. It has been found greater risks of flooding at regional scale due to increasing trends in extreme precipitation (Kundzewicz *et al*, 2015) [19].

Southern Africa could lose more than 30% of its main crop maize by 2030 and in South Asia many regional staples such as rice, millet and maize could top 10% (BBC News, 2008) [20].

Agriculture can be affected by climate in a variety of ways. After a certain range of temperatures, warming tends to reduce yields producing less grain in this way. Higher temperatures interfere with the ability of plants to get and use moisture (Cline, 2007) [21].

3. Impact of global warming in India

India experienced extreme weather events which lead to change the climate. In India global warming is one of the major affecting parameter to change the climate. As per observation the annual mean temperature has increased at the rate of 0. 42 degree centigrade (Arora *et al*, 2009) [22]. In India almost 80% of precipitation comes from south-west monsoon. Any uncertainties and fluctuations in long range rainfall pattern may affect the agriculture sector and leads to floods and droughts at the regional level (Jain *et al*, 2012) [23]. There was reported a significant increasing trend in rainfall along the west coast, north Andhra Pradesh and North West India (Koteswaram *et al*, 1969 and Jagannathan *et al*, 1973) [24, 25]. There was a significant decreasing trend over parts of Gujarat, Madhya Pradesh, Kerala and north east India (Krishnakumar *et al*, 2009) [26]. Western dusturbancs affected the north western region of India at small scale as it had impact on Rabi production only for not more than 20-30 days (Chand *et al*, 2015) [27].

Several climatic factors such as heat waves, high temperatures affect agricultural productivity(Ciais *et al*, 2005, Van der Valde *et al*, 2012) [28, 29] along with heavy and prolonged precipitation(Rosenzweig *et al*, 2002, Pathak *et al*, 2011, Thakur *et al*, 2010) [30, 31, 32]. These factors have positive and negative effects on crop production.

The former director at International Central Research Institute for Dryland Agriculture (CRIDA), B. Venkateshwarlu said at the national summit by the Sri Sri Institute of Agricultural Sciences and Technology Trust in Bengaluru from May 9 -10, 2017 that climate change affects three aspects of food security; availability, access and absorption. The poor are mostly affected by the climate change. They do not have any income to buy the food. It has effect on their health (Subhojit Goswami, 2017) [33]. Climate change has about 4-9 percent impact on agriculture each year. Climate change apparently causes about 1. 5% loss in GDP as agriculture contributes about 15 percent to India's GDP.

A powerful super cyclone Amphan made landfall over India's West Bengal and Bangladesh. Leading experts claimed that climate change was having on increasing extreme weather events. Due to climate change, global temperatures increase. So it becomes risk of more regular powerful super cyclones like Amphan according to Prof Mark Howden, IPCC vice-chair and director of the Climate Institute at the Australian National University (Jack Board, 2020) [34].

There are some terrible consequences on the environment due to climate change. Among the ill effects of climate change are melting ice caps, rise in sea levels, erratic weather and warmer oceans. It results in a warning to global food production due to greater risks for crops and vulnerability of livestock. Droughts for a long period decrease the productivity of crops and livestock including fruit crops and milk yields. High temperature and humidity are favourable conditions for plant based pests to survive and reproduce more quickly. These cause greater damage to crops and reduce overall yield (Times of India, 2019) [35].

4. Conclusion

Associated with climate change, food security is one of the leading concerns (Praduman *et al*, 2009) [36]. Biophysical and social vulnerabilities determine the net impact of climate change according to the Food and Agriculture Organization (2016) [36]. Organic farming is a better alternative to contemporary agricultural practices and would actually contribute more to climate pollution than other available mediums as per a study by Nature Communications. They suggested that organic farming is considered as a better alternative. It is to successfully bridge the gap between advanced agricultural productions and sharing the information with the farmers for reducing the negative impact of climate change. The farmers should be aware of the researched knowledge (Lilly Paul, 2019) [37].

Reference

1. Perrone Tommaso, 2017. https://www. lifegate. com/people/news/what-is-climate-change.
2. Cho Renee, 2018. https://blogs. ei. columbia. edu/2018/07/25/climate-change-food-agriculture/
3. Eitzinger J, Stastna M, Zalud Z, Dubrovski M. A simulation study of the effect of soil water balance and water stress on winter wheat production under different climate change scenarios. Agric. Water Man. 2003; 61:195–217.
4. Torriani D, Calanca P, Schmid S, Beniston, M. Fuhrer J.

Potential effects of changes in mean climate and climate variability on the yield of winter and spring crops in Switzerland. Clim. Res. 2007; 34:59-69.
5. Battisti DS, Naylor RL. Historical warnings of future food insecurity with unprecedented seasonal heat. Science. 2009; 323:240-244. (doi:10. 1126/science. 1164363).
6. Sanchez PA. Linking climate change research with food security and poverty reduction in the tropics Agriculture. Econ. Environ. 2000; 82(1-3):371-383.
7. Siwar C, Ahmed F, Begum RA. Climate change, agriculture and food security issues: Malaysian perspective. J. Food Agric. Environ. 2013; 11(2):1118-1123.
8. Khan S. Managing climate risks in Australia: options for water policy and irrigation management Aust J Exp Agric. 2008; 48:265-273.
9. Maracchi G, Sirotenko O, Bindi M. Impacts of present and future climate variability on agriculture and forestry in the temperate regions: Europe. Clim. Change. 2005; 70:117-135. (doi:10. 1007/s10584-005-5939-7).
10. Tuck G, Glendining MJ, Smith P, House JI. Wattenbach, M. The potential distribution of bioenergy crops in Europe under present and future climate. Biomass Bioenergy. 2006; 30:183-197. (doi:10. 1016/j. biombioe. 2005. 11. 019).
11. Olesen, JE *et al*. Uncertainties in projected impacts of climate change on European agriculture and terrestrial ecosystems based on scenarios from regional climate models. Clim. Change. 2007; 81:123-143. (doi:10. 1007/s10584-006-9216-1).
12. Olesen JE. & Bindi M. Consequences of climate change for European agricultural productivity, land use and policy. Eur. J. Agron. 2002; 16:239-262. (doi:10. 1016/ S1161-0301(02)00004-7).
13. Tubiello FN, Rosenzweig C, Goldberg RA, Jagtap, S, Jones JW. Effects of climate change on US crop production: simulation results using two different GCM scenarios. Part I: wheat, potato, maize, and citrus. Clim. Res. 2002; 20:259-270.
14. Reilly J *et al*. US agriculture and climate change: new results. Clim. Change. 2003; 57:43-69.
15. Huber DG, Gulledge J. Extreme Weather and Climate change: Understanding the link and managing the risk. Center for Climate and Energy Solutions, 2011.
16. Brown S, Lincke D, Nicholls RJ, Hinkel J. The impacts of sea-level rise on European coasts in a 2°C world. Results and analysis of task 6. 5 prepared as part of IMPACT2C: quantifying project impacts under 2°C warming. Southampton, GB, University of Southampton, 2015.
17. Kemp AC, Horton BP, Donnelly JP, Mann ME, Vermeer M *et al*. Climate related sea-level variations over the past two millennia. Proceedings of the National Academy of Sciences of United States of America, 2011, 108.
18. Kitoh A, Endo H. Changes in precipitation extremes projected by a 20-km mesh global atmospheric model. Weather Climate Extremes. 2016; 11:41-52.
19. Kundzewicz ZW, Matczak P. Hydrological extremes and security. Proc. IAHS, 2015.
20. Climate 'could devastate crops'". BBC News. 31 January, 2008.
http://news. bbc. co. uk/2/hi/science/nature/7220807. stm
21. Cline William R. Global warming and Agriculture, https://www. imf. org/external/pubs/ft/fandd/2008/03/ pdf /cline.pdf.
22. Arora M, Goel NK, Singh P. Evaluation of temperature trends over India. Hydrol Sci J, 2009, 50.
23. Jain SK, Kumar V. Trend analysis of rainfall and temperature data for India. Current Sci. 2012; 102:37-49.
24. Koteswaram P, Alvi SMA. Trends and periodicities in rainfall at west coast stations in India. Curr Sci. 1969; 38:229-231.
25. Jagannathan P, Parthasarathy B. Trends and Periodicities of Rainfall Over India. Indian Institute of Tropical Meteorology, 1973, 101.
26. Krishnakumar KN, Rao GSLHVP, Gopakumar CS, Rainfall trend in twentieth century over Kerala, India. Atmos Environ, 2009; 43:1940-1944.
27. Chand R, Singh C. Movements of western disturbance and associated cloud convection. J Indian Geophy Union. 2015; 19:62-70.
28. Ciais P, Reichstein M, Viovy N, Granier A, Ogee J *et al*. Europewide reduction in primary productivity caused by the heat and drought in 2003. Nature. 2005; 437:529-533.
29. Van der Velde M, Tubiello FN, Vrieling A, Bouraoui F. Impacts of extreme weather on wheat and maize in France: evaluating regional crop simulations against observed data. Clim Change. 2012; 113:751-765.
30. Rosenzweig C, Tubiello FN, Goldberg R, Mills E, Bloomfield J. Increased crop damage in the U. S. from excess precipitation under climate change. Glob Environ Change. 2002; 12:197-202.
31. Pathak H, Byjesh K, Chakrabarti B, Aggarwal PK Potential and cost of carbon sequestration in Indian agriculture: Estimates from longterm field experiments. Field Crops Res. 2011; 120:102-111.
32. Thakur P, Kumar S, Malik JA, Berger JD, Nayyar H. Cold stress effects on reproductive development in grain crops: An overview. Environ Exp Bot. 2010; 67:429-443.
33. Goswami Subhojit, Climate change impact on agriculture leads to 1. 5% loss in India's GDP, 2017. https://www. downtoearth. org. in/news/agriculture/climate-change-causes-about-1-5-per-cent-loss-in-india-s-gdp-57883.
34. Board Jack. Climate change supercharging extreme events. Scientists say, as 'super cyclone' Amphan hits Bangladesh and India, 2020.
https://www. channelnewsasia. com/news/asia/climate-change-supercharging-extreme-events-12753090.
35. Times of India. How climate change is affecting food production, 2019.
https://timesofindia. indiatimes. com/life-style/food-news/how-climate-change-is-affecting-food-production/photostory/71939943. cms.
36. Praduman Kumar PK, Joshi, Pratap S. Birthal, ''Demand projections for Food grains in India'', Agricultural Economics Research Review. 2009; 22:237.
37. Paul Lilly. ''Is India ready to tackle the impact of climate change on its farmers'', https://www. youthkiawaaz. com/2019/10/is-india-ready-to-tackle-the-impact-of-climate-change-on-its-farmers/