

Climatic Changes Affecting Cash Crops in India

Durga Vatsala^{1,*}

Abstract

A cash crop is any plant that a farmer raises with the intention of selling it for a profit rather than using it themselves. The largest component of modern agriculture is cash crops. Agriculture has become global phenomenon, all around the world cash crops has grown and exported. Some cash crops like cotton are used for clothing and some other crops are grown for pharmacological value, are used to produce drugs example opium. Based on climatic conditions different types of cash crops grow in different part of the world. The most important reason for growing cash crops in developing countries is to improve income for farmers, to improve job opportunities, to generate revenue for the government, to increase economic stability and to meet with the GDP growth of the country. India is one of the leading producers of cash crops like cotton, jute, sugarcane, tea etc. These cash crops are majorly depended on the high temperature and annual rainfalls of India. Climatic conditions play major role is cash crop production. Although India is a signatory to both the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC), no specific climate change legislation or act has yet to be passed in India. Acts like The Environmental Protection Act 1986, The Air Prevention and Control of Pollution Act 1981, The National Green Tribunal Act 2010, The Energy Conservation Act 2001, The Forest Conservation Act 1980, The Water Prevention and Control of Pollution Act 1977, The Wildlife Protection Act 2002, and The Biological Diversity Act 2002 of India. These acts only give diminutive view of climatic changes in India. Still India is listed under non-Annex parties to the UNFCCC because of its low-income. It is high time to enact detailed separate legislation or act related to climatic changes in India. It will incredibly help us to reach real GDP level and to achieve sustainable agriculture in India.

Keywords: Cash crops, profit, climatic changes, developing countries, revenue of the government, GDP growth, UNFCCC, Kyoto protocol, non-annex parties and separate legislation

INTRODUCTION

Cash crops are those agricultural crops grown with the intention of being sold on the market or exported to generate a profit. These crops are contrary to crops grown for farmer's self-supplies like feeding livestock and food for family. Cereals, oilseeds, cotton, coco, sugarcane, peanuts, tobacco etc and medicinal crops like opium, coca are commonly produced cash crops. These are the examples of common food and non-food income crops. Developing nations produce large-scale production of cash crops. Farmers' incomes are dependent on the price of main cash crops [1]. This would be helpful in

*Author for Correspondence

Durga Vatsala

E-mail: durgavinayagamoorthy11@gmail.com

Student, Faculty of Law, The Tamil Nadu Dr. Ambedkar Law University School of Excellence in Law, Chennai, India

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attaining the existent GDP level and to pull off sustainable agriculture in developing country like India, but climate change is the major pitfall in cash crop productions. In this article we are going to discuss how climatic change affects cash crop production in India, what are the challenges faced by developing country like India in agricultural production due to climate change, what are the measures can be taken by India to get listed under Annex I party of UNFCCC, how much it is important to enact separate climate change national legislation in India.

CASH CROPS FARMING IN INDIA

Definitions of Cash Crops

In simple terms, the definition of “cash crops” is that the crop is grown primarily for cash sale [2]. A crop that is grown for direct sale rather than for subsistence food is known as a cash crop. The wider context of cash cropping is a process of agricultural commercialisation. Cash crops are distinguished into two types, non-food crops and food crops. Former crops that are planted solely for commercial purposes, such as cotton, coffee, chocolate, or tea, as well as crops that are not used as food. The second category is “marketable surplus” crops, which includes both fruits and vegetables as well as food crops like rice and maize that can be sold in markets or consumed by the household. A cash crop classified as an export crop is one that is ultimately shipped to foreign markets [3]. “Cash crops” are defined in different ways, they are:

- i. all marketed surpluses.
- ii. nonstable agriculture.
- iii. non-food agriculture.
- iv. export agriculture.

In all cases, the term “crop” includes both livestock and forest products. A common-sense definition of “cash crop” would be a crop that is sold for cash [4].

Cash Crop Farming India

In Indian economy agriculture plays major role nearly 60 percent of the population is dependent on agriculture sectors, and it contributes 18 percent to GDP. Contrary to the development of staple foods, cash crops are primarily grown for commercial gain and are traded on national and worldwide markets. Crops grown for food, money, plantations, and horticulture are all classified as farming in India. One of the world's top agricultural nations is India. Nearly 700 metric tons of cotton are exported from India, one of the top producers. The government aids and provides incentives for certain cash crops, when there is an increase in productivity, example sugar. ITC Limited collaborates closely with tobacco farmers. Majorly cropping patterns are influenced by rainfall, soil conditions, farmer’s economic conditions and climate change. Frequent temperature variations, lack of employees and high cost for raw materials, which are all caused by climate change its major impact on crop cultivation. This leads to huge drop in income [5].

CLIMATE CHANGE AND ITS IMPACT AND CHALLENGES ON CASH CROP PRODUCTION IN INDIA

Definitions of Climate Change

The Un's Definition of Climate Change States

“Deep-rooted” changes in temperature and weather patterns are referred to as climate change. Corresponding climate fluctuations may be brought on by significant volcanic eruptions or variations in the sun's activity. But the human activities have been the primary reason for climate change. Since 1800 the combustion of fossil fuels like coal, oil, and natural gas have been the foremost cause of climate change. Greenhouse gas emissions produced by combustion of fossil fuels, which forms a blanket around the planet, that captures high temperature from the sun and cause increase in temperatures. Carbon dioxide and methane are the predominant greenhouse gases, which are responsible for climate change. These are produced, for instance, while burning petrol and diesel fuel for vehicles or carbon to heat a building. Carbon dioxide can also be released when we hack down trees and woodlands. The main sources of methane emissions are oil and gas running and farming. The key industries that contribute to greenhouse gas emissions include energy, industry, constructions, transportation, framing, and land use.” [6].

Nasa's Definition of Climate Change is as Follows

“a global event that are mostly brought on by flaming non- renewable energy sources, in a wide range, that enrich atmosphere with heat capturing gases. These phenomena embrace changes like rise

in ocean- level, mass losses of ice in the artic, antarctica, Greenland and other glacial mass around the world. It also includes switches in efflorescence of flower and plants and inhospitable weather events like global warming” [7].

Climate Change Impacts on Agriculture

Climate change can be caused by both natural and artificial factors like volcano eruptions, solar activity, deforestation, mining, greenhouse gas etc., it affects earth’s environmental conditions like change in temperature, rainfall patterns etc. Due to industrialization and its growing demand in India, crop production and agriculture has been affected both directly and indirectly. As a result of which most of the forests were converted into farming lands, it majorly impacts on climate change on biodiversity it leads to extinction of many species of animals and plants. It has created abnormal change in temperature in weather patterns. Climate change has badly affected crop yield in India [8]. Averagely cotton cultivation require high temperature between 21degree Celsius to 30 degree Celsius and moderate rainfall between 50cm to 75cm, for sugarcane cultivation it requires hot and humid climate throughout 10-18 months, it grows best in area with 20 degree Celsius to 26 degree Celsius temperature, it will fatal when the temperature is 40 degree Celsius and below 15 degree Celsius and 100-150cm of rainfall is must, for nicotiana cultivation, we need temperature of 16-40C and moderate to heavy rainfall of 50cm-100 cm [9].As a result of climate change, FCV tobacco production was rapidly decreased in India, from a high of 316 million kg in 2013–14 to 189 million kg in 2021–22, resulting in an estimated 35 million man-days of job losses in the nation's tobacco-growing regions ascribed to climate change [10]. India’s cotton production is at a 14-year low and exports are at a 19-year low India has the highest area under cultivation in the world and is the largest producer The country has one of the lowest yields in the world Poor performance is on account of multiple reasons including changing weather patterns, pest infestation, etc. [11] In India, rainfed rice yields are anticipated to decrease by 20% in 2050 and by 47% in 2080 scenarios in the absence of adaptation measures, whilst irrigated rice yields are anticipated to decrease by 3.5% in 2050 and 5% in 2080 scenarios. With large regional and temporal variability, it is predicted that climate change will cut wheat yield by 19.3% in 2050 and by 40% in 2080 scenarios by the end of the century. According to projections for the years 2050 and 2080, the kharif maize yields will decline by 18 and 23%, respectively [12].

Tools of Measures Taken to Reduce and Control Climate Change at National and International Level

Due to climate change, there was huge drop in agricultural sector and decline in food production in recent years. Therefore, it is imperative that we more strictly use the climate-resilient agriculture (CRA) strategy to our farming practices.

Climate-Resilient Agriculture (CRA)

Sustainable farming techniques are a part of climate-resilient agricultural systems, which are designed to increase farm income and deep-rooted productivity despite climate volatility. With this strategy, special importance can be given to raising crops and cattle, by viable use of the planet's natural resources. Farmers can anticipate, plan for, and react to dangerous events, trends, or upheaval linked to climate change by implementing CRA.

Farmers should use climate-smart agriculture (CSA) practices to effectively manage their cropland, cattle, and landscapes, including local forests, groves, and biodiversity. CSA technologies use a sustainable strategy to address the correlated problems of food security and climate change.

Three pillars serve as the foundation for climate-smart agriculture technologies are, raising productivity and incomes. enhancing livelihoods and environmental resilience and reducing or even eliminating greenhouse gas emissions [13].

Following Climate-Smart Agriculture Practices is possible in the following areas

Managing the Soil

Soil management is nothing but shielding soil, according to the nature of the soil. For example, Fertile topsoil may be washed away by heavy rains, particularly in areas with slopes. Planting ground cover is beneficial in drought-prone areas because it helps the soil retain moisture and holds dirt in place after heavy rains. A major objective of climate-smart agriculture is to increase soil productivity, which can be achieved by any technology that can enhance the soil's quality and structure. Generally, soil management is used to prevent soil erosion and promote soil stabilization by engaging in soil conservation practices, including suitable soil preparation techniques [14]. To safeguard and conserve the resources found in soil, specific soil management techniques are required. To reduce climate change, specific interposes is to increase soil carbon content [15].

Pest Control

Farmers that use climate-smart agricultural practices have the knowledge they need to use the right amount of pesticide at the right time of year to combat pests that have recently multiplied. Seedlings that are resistant to pests can also be helpful. the implementation of practical and cheap good agricultural practices with the goal of causing the least amount of disruption to the environment and eco system to reduce pest populations below the economic threshold level [16]. IPM, or integrated pest management, is a technique you can employ to deal with pest issues while reducing dangers to both people and the environment. Pests of every kind can be managed by IPM in any setting, including urban, agricultural, and natural or wildland regions [17].

Management of Crops

The collection of agricultural techniques used to enhance the growth, development, and production of crops is known as crop management. Preparing the seedbed, planting the seeds, and crop upkeep are the first steps. Crop harvesting, storage, and commercialization are the last [18]. Once the implications and dangers of climate change have been evaluated, you can introduce climate-smart solutions in a particular area, farming community, or even a single farm. By keeping an eye on changes in climatic conditions, soil characteristics, soil moisture, and other factors, smart agriculture solves a few crop-related issues [19].

International Level Measure

Climate Ambition Summit

On 20 September 2023, Climate Ambition Summit, was called by the United nation secretary general at United Nations Headquarters in New York. to encourage greater action by governments, business, finance, local governments, and civil society and to hear from "first movers and doers." The Summit is a crucial political turning point in showing that there is widespread support for accelerating the pace and scope of a just transition to a more equitable global economy based on renewable energy and climate resilience.

The Intergovernmental Panel on Climate Change's most recent scientific report has once again emphasized the importance of taking an action. The effects of the climate crisis are already severe, and global greenhouse gas emissions continue to be at all-time highs. To keep global warming to 1.5°C Over pre-industrial levels and avert the worst effects, the world needs to reduce emissions drastically and immediately both now and over the course of the next three decades. While this is happening, the most vulnerable groups are already feeling the effects of the climate crisis and require immediate assistance to adapt and repair their losses and damages. Governments and international financial institutions need to take quick action on this issue of equality and climate justice [20].

Intergovernmental Panel on Climate Change

Name of the Panel: The Intergovernmental Panel on Climate Change (IPCC).

Year of Establishment: 1988

Purpose of the panel: the purpose of the intergovernmental panel on climate change is to track the development of the climate change phenomenon and its effects.

Aim of the panel: the aim of the panel is to gain a worldwide perspective on this issue, it accumulated hundreds of scientists, technologist including climatologists like storm chaser, weather forecaster, earth scientist, marine ecologist, marine scientist, oceanologist, marine biologist, and biologists, natural historians as well as business analyst, financial expert, population scientist, psephologist, architect, designer, developer, and other experts in other sectors.

Working groups of the panel: The three working groups that make up the IPCC are,

- i. The first group investigates the phenomenon of climate change, concentrating on the process and its magnitude,
- ii. The second group focuses on the effects of climate change; they are concerned with how societies and ecosystems are vulnerable to these changes as well as how the planet responds and adapts to them.
- iii. Studying methods to combat climate change is the responsibility of the third and final group.

The main activity of the panel: The preparation of reports evaluating the state of knowledge regarding climate change is the IPCC's primary activity [21].

Types of IPCC report: there are three types of report in the Intergovernmental panel on climate change. They are, of methodological reports, special reports, and assessment reports.

The first IPCC report: The IPCC produced its first report in 1990, and it continued to produce new ones on a regular basis until it released.

About the report: This report, which was created in an effort to speak more directly to policymakers, focuses on the effects of a temperature increase of 1.5°C above pre-industrial levels and its GHG emission pathways. In these reports, the scientific community of the IPCC develops predictive models to examine the causes of climate change as well as its effects on ecosystems and society. Governments, businesses, and other organizations utilize these models and forecasts to help them develop plans for preventing or adapting to climate change. The IPCC holds meetings of its government representatives, convening as plenary sessions of the Panel or IPCC Working Groups to approve, adopt, and accept reports, in order to carry out this work programme. The IPCC's plenary sessions also decide on other matters, such as the organization's budget and report outlines. With regard to the scientific and technical facets of the Panel's work, the IPCC Bureau meets frequently. To develop reports, the IPCC hosts lead author meetings as well as expert scoping sessions. To assist with its mission, it arranges expert gatherings and workshops on many subjects. To develop reports, the IPCC hosts lead author meetings as well as expert scoping sessions. To support its work program, it arranges expert meetings and workshops on diverse subjects, and it publishes the meeting's proceedings. The IPCC participates in outreach events it sponsors or hosts and sends speakers to other conferences to share its research and provide an explanation of its work. The Documentation section contains more details about IPCC meetings, its Working Groups, and the Bureau [22].

IPCC'S Sixth Assessment Report

On 9th August 2021, the working group One contribution was made public.

On 28th February 2022, the working group two contribution was made public.

On 4th April 2022, the working group three contribution was made public.

On 20th March 2023, the synthesis group report was made public.

Working group, I contribution: climate change 2021: the physical science basis

Working group II contribution: climate change 2022: Impacts, adaptation, and vulnerability

Working group III contribution: climate change 2022: mitigation of climate change

Synthesis group: climate change 2023: synthesis report

"To prepare the global assessment for the United Nations Framework Convention on Climate Change's 2023 stocktake" [23].

National Level Measure

The Indian government is aware of how climate change is affecting agriculture and farmer livelihoods. The network centres spread around the nation conducted extensive field and simulation investigations in agriculture. Using crop simulation models and the expected climates for 2050 and 2080, the impact of climate change was assessed. Agricultural outputs are decreased by climate change, and product is of under nutritional quality. Lack of rain and inundation are one utmost event that has an influence on food and nutrient intake, and this has greater aftermath on farmers. The Indian government has developed programs and initiatives to strengthen agriculture's resistance to climate change.

Name of the mission: the National Mission for Sustainable Agriculture (NMSA), this mission is one of the parts of The National Action Plan on Climate Change (NAPCC).

Purpose of the mission: The mission is to develop and put into practice techniques that will increase Indian agriculture's adaptability to climate change.

Name of the mission: In 2011 National Innovations in Climate Resilient Agriculture (NICRA), a flagship network research project of the Indian Council of Agricultural Research (ICAR), launched by Ministry of Agriculture and Farmers Welfare, Government of India.

Purpose of the research: The main purpose of this research is to address the challenges of keeping alive domestic food production even in the face of climate change.

Aim of the project: Aims of the project is to enlarge and elevate climate resilient technologies in the field of agriculture. The project's results will make it easier for the districts and regions of the most vulnerable areas to cope up with, intense and severe events like lack of water, dry spell, inundation, rime ice and torridity.

Research projects on adaptation and mitigation including framing, arboriculture, cattle, fish farms, and barnyard fowl have been undertaken throughout the short and long terms from a national outlook. The key emphasis areas covered are identifying the most susceptible districts and regions, developing crop varieties and management methods for adaptation and mitigation, evaluating the effects of climate change on livestock, fisheries, and poultry, and coming up with adaption solutions. In addition to 68 location-specific climate resilient technologies, 1888 climate resilient cultivars have been created since 2014 for use by farming communities to deal with Impact of Climate Change on Agriculture, This is Posted On: 21 MAR 2023 6:10PM by PIB Delhi, by The Union Minister for Agriculture and Farmers Welfare, Shri Narendra Singh, provided this information [24].

CONCLUSION

Raising in food price and lowering in food output will be the worst part in future. This unanticipated Climate unquestionably going to result in food poverty. Climate change in India could be head of sustainable agriculture methods. It is high time to implement smart agricultural technologies and a successful climate-resilient agriculture (CRA) methodologies in India to cope up with unforeseen weather patterns. India must conduct awareness program with the help of NGOs in rural area about technologies and innovative methodologies. Government should aid farmers in implementing smart agricultural technologies. It should enact its own law on climate change and should implement preventive measures and punishments for who violates it. In international level net zero, renewable energy, sustainable development goals, climate ambition submit 2023, climate conferences are taking place, India should participate in and sign treaties already it's been high time.

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