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Dr. PK Muthukumar
Assistant Professor, Department of Sociology, Annamalai University, Annamalai Nagar, Tamilnadu, India

Correspondence
Dr. PK Muthukumar
Assistant Professor, Department of Sociology, Annamalai University, Annamalai Nagar, Tamilnadu, India

A sociological study on impact of climate change on Tamil Nadu agricultural productivity

Dr. PK Muthukumar

Abstract
Agriculture is very delicate to transient changes in climate and to regular, yearly and longer term varieties in climate. While supporting the yield levels, it is critical to enhance the salary, lessen soil debasement, decrease off-cultivate sources of info and adventure neighborhood showcase. An investigation was directed at Agro Climate Research Center, Tamil Nadu Agricultural University utilizing DSSAT edit reproduction model to foresee the impact of environmental change guage for 2010, 2030, 2050 and 2070 on the profitability of real products viz., Rice, Maize, Sorghum, Groundnut, Cotton and Sugarcane. The reproduction was improved the situation the six Agro Climate Zones (AEZ) of Tamil Nadu (aside from slope zone) and four seasons viz., South West Monsoon (SWM), North East Monsoon (NEM), Winter (WIN) and Summer (SUM). Independent of harvest, zones and environmental change situation the anticipated product efficiency was high in NEM pursued by winter sown harvests, where as the mid year sown yield had anticipated with lower yield. The western zone appeared with higher yield for every one of the products pursued by NWZ. The least was anticipated in Southern Zone aside from cotton and groundnut, which were anticipated with lower yield in HRZ.

Keywords: Agriculture, Climate changes, DSSAT, AEZ

Introduction
All through mankind's history, the atmosphere has been known to change; notwithstanding, the change has been progressively apparent as of late. The Intergovernmental Panel on Climate Change (IPCC) characterizes environmental change as any adjustment in atmosphere after some time because of normal atmosphere inconstancy or because of human action. Environmental change, sustenance security and loss of hereditary assets are drawing in worldwide concern today. As in, man's life is incomprehensible without the regular habitat to supple him with his essential needs, for example, air to inhale, water to drink, sustenance to eat, strong minerals, plants and creatures. Man has specifically or in a roundabout way perpetrated significant harm in nature either by development, brushing, mining or by deforestation and pollution of amphibian living space (Jane O. Munonye 2017) [1].

Agriculture is especially affected by the overall climate and is exceedingly delicate to transient changes in climate and to regular, yearly and longer term varieties in atmosphere. The populace increment is 2.1 percent in India, which requests a deliberate evaluation of climatic and soil assets to recast a compelling area use plan. Frequently, the objective is to acquire higher yields from the products, while supporting the yield levels it is essential to I) Substantially enhance the pay, ii) Reduce soil corruption, iii) Reduce reliance on off-cultivate sources of info and iv) Exploit nearby market openings. Climate based yield reenactment models are one of the basic and direct instrument for accomplishing the above prerequisites.

Worldwide environmental change has significant effect on the harvests, soils, animals and bugs. Over the most recent 100 years the mean yearly surface air temperature of India has expanded by 0.4-0.6°C (Rupakumar, 2002). Annamalai (2010) [4] revealed diminishing precipitation inclination in both southwest and upper east storm seasons in many parts of focal and northern India. Future atmosphere projections through the CMIP5-based model troupe extends a warming of 2.8°C and 4.3°C over India under the RCP6.0 and RCP8.5 situations individually, for 2080s contrasted with the 1970s pattern (Rajiv Kumar *et al*., 2012; Gupta *et al*., 2017) [5, 2].

Effect of environmental change on farming will be one of the real main variables impacting the future sustenance security of humanity on earth. Horticulture is one part which is quickly influenced by environmental change, however it is normal that the effect on worldwide agrarian creation might be little. In this paper focused on Agro Climate Research Center, Tamil Nadu Agricultural University utilizing DSSAT trim reproduction model to foresee the impact of environmental change gauge for 2010, 2030, 2050 and 2070 on the profitability of

real yields viz., Rice, Maize, Sorghum, Groundnut, Cotton and Sugarcane.

Materials and Methods

With this foundation an examination was led at Agro Climate Research Center, Tamil Nadu Agricultural University utilizing DSSAT trim reproduction model to anticipate the impact of environmental change gauge for 2010, 2030, 2050 and 2070 on the efficiency and water prerequisite of real yields viz., I) Rice ii) Maize iii) Sorghum iv) Groundnut v) Cotton and vi) sugarcane. The reproduction was improved the situation all the seven agro atmosphere zones of Tamil Nadu and four seasons viz., South West Monsoon (SWM), North East Monsoon (NEM), Winter (WIN) and Summer (SUM). The 30 years climate information from 1976 to 2006 of agent stations of seven Agro climatic Zones of Tamil Nadu (Table 1) were utilized in the model as data sources. The climates records made and were changed over into DSSAT climate document arrange utilizing Weatherman.

Table 1: Station for seven Agro Climatic zone of Tamil Nadu

S.No	Agro Climatic zone	Short name
1.	Cauvery Delta Zone	CDZ
2.	High Rainfall Zone	HRZ
3.	Hilly Zone*	HZ
4.	North Eastern Zone	NEZ
5.	North Western Zone	NWZ
6.	Western Zone	WZ
7.	Southern Zone	SZ

In light of the IPCC (Intergovernmental Panel on Climate change) IV evaluation report, the climate change situations were made by giving vital addition in the climate information of year 2000, which is kept as base year and deciphered in the model. The impact of CO2 fertilization was additionally incorporated into the examination by giving CO2 augment over the investigation time frame.

Results and Discussion

Rice: When all is said in done, from 2010 to 2070, the most elevated yield was anticipated in WZ pursued by CDZ, NWZ, NEZ, HRZ and least in SZ. Considering the environmental change situation, there was some variety seen between zone in yield. Every single other zone had anticipated with expanded yield upto 2030 than 2010, aside from CDZ where the yield was diminishing pattern after 2010. The SZ got some more increment in yield upto 2050. The variety in anticipated yield between zones was additionally amid starting time of study, however the variety end up least amid 2070.

Maize: When all is said in done, amid the examination time frame the most noteworthy yield was anticipated in WZ pursued by CDZ, NWZ, HRZ, NEZ and least in SZ. Considering the environmental change situation, in maize additionally yield variety was seen between zones. All zones had indicated decline slant in yield from 2010 towards 2070, with the exception of CDZ and HRZ where the yield was expanding up to 2030.

Sorghum: As a rule, amid the investigation time frame most elevated yield was anticipated in WZ pursued by NWZ, HRZ, CDZ, NEZ and least in SZ. The yield drift was anticipated with diminishing pattern in HRZ however in every single other zone slight increment in sorghum yield was seen amid 2050 than 2030.

Groundnut: All in all, amid the investigation time frame most noteworthy yield was anticipated in NEZ, trailed by WZ, CDZ, NWZ, SZ and least in HRZ. In every one of the zones the yield was diminished from 2010 to 2070. The variety in anticipated yield between zones was all the more amid introductory time of study, however the variety wind up least amid 2070. In HRZ, the effect of progress in atmosphere on yield was least. There was sharp decline in groundnut yield with increment in temperature and CO2.

Cotton: When all is said in done, amid the examination time frame most elevated yield was anticipated in NEZ, trailed by WZ, SZ, CDZ, NWZ and least in HRZ. There was slight increment yield from 2010 to 2030 and after that diminished amid 2050 and 2070 in all zones aside from CDZ where anticipated with decline in from 2010 itself. As opposed to different harvests, the normal cotton yield of Tamil Nadu was anticipated with higher in 2030 and 2050 than 2010.

Sugarcane: all in all, amid the investigation time frame most elevated yield was anticipated in WZ pursued by NWZ, NEZ, CDZ, HRZ and least in SZ. The NE and NW zones had anticipated with expanded yield at 2030 than 2010 yet different zones demonstrated the diminishing pattern from 2010. The SZ got some more increment in yield up to 2050.

Conclusion

By and large, the harvest yield was diminished with increment in temperature more than 2ºC and CO2 level over 470 ppm. Regardless of harvest, zones and environmental change situation the anticipated yield profitability was high in NEM pursued by winter sown products, where as the midyear sown yield had anticipated with lower yield. The western zone had seen with higher yield of the considerable number of harvests pursued by NWZ. The least was anticipated in Southern Zone aside from cotton and groundnut, which were anticipated with lower yield in HRZ. Among the products sorghum alone not impact much with increment in temperature and Co2. This study shows that climate change is a major role in agricultural productivity.

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