Asian Journal of Multidisciplinary Studies

ISSN: 2321-8819 (Online)
2348-7186 (Print)
Impact Factor: 0.92
Vol. 4, Issue 1, January 2016

Decreasing wheat Producation Due to Increasing Temperature in Rohtas District Bihar

Sandeep Kumar Singh
Punjab University, Chandigarh

ABSTRACT-*Increasing temperature enhances stress on crop particularly wheat and rice. Wheat production has been decreasing from few decades in developing countries as there is marked shortening of ripening period due to global warming.The grain weight become less as there is not plenty time for crop to be mature. .At globally or locally it may be experienced.The data collected for Rohtas District Bihar is clear evident of the validity of hypothesis.*

Keywords : Climate Change,Soil Zone, Agro-Climatic Zone,Observation,Methodology,Future Plan,Stress On Crop, Scatter Diagram,Regression Analysis

INTRODUCTION

Global wheat yields are likely to fall significantly as climate change takes hold . New research as shown the research found that wheat production would fall by 6% for every 1˚c increase in temperature. The world is now nearly certain to warm by up to 2˚c compared with pre-industrial levels, with political efforts. Concentrated on holding the potential temperature rise to no longer no higher than that limit. But some analysis suggest that if green house gas imagines continue to grow at current rates then warming of as much as 50c could be in store. In forecasting the effect on wheat production the researcher tested 30 computers models against field experiment to establish the most likely scenario. A fall of 6% in yield may not sound dramatic but as the world population grows the pressure on staple crops will increase. The global population is currently 7 billion and is forecast to rise to as least 9 billion by 2050 which will put more pressure on agricultural land and water sources. Bihar with a geographical area of about 94.2 thousand square km is divided by river Gangas into two parts, north Bihar with an area of 40.9 thousand square km. Base on soil characterization, rainfall, temperature and terrain four main agro-climatic zones in Bihar are identified. These are-

1. north alluvial plane
2. north east alluvial plane
3. south-east alluvial plane
4. south-west alluvial plane

Agro climatic zone[1] and [2] are located north of the river Gangas.
Agro-climatic zone [3] and located south of the river Gangas

Across the state, soil texture is varies from sandy loamy to heavy clayey. However the majority of the soil belongs to loam category which is good for crop production. Bihar is potentially an imp0rtant wheat growing state that contributes 5.7 % towards national production from 8% of the wheat growing area with low productivity of 1.9 ton /hectare. The yield gap between farmers fields and front line demonstration is about 1.2 ton /hectare.

BIHAR Natural precipitation- 990-1700mm

Monsoon- July- September

Location- 25-27˚c north altitude [sub-tropical area]

Middle + south Bihar-sandy loamy soil
all types of crops are cultivated in these

North Bihar- clayey soil
All types of crops are not cultivated in these areas.
Regions close to tropical cancer experiences tropical climate

Like all Indian states Bihar also reels under hot summer season, during march-may
Average temperature- 35˚c - 40˚c in summer
hottest month- April - June
in winter-5˚c-10˚c
Average rainfall-120 cm

AGRO-CLIMATIC ZONE [1]
Sivan, East and west Chaperon , Saran, Muzafferpur, Sitamarhi, Shivhar,Darbhanga, Samastipur, Vaisali, Madhubani, Gopalganj.
[north-western part]

AGRO-CLIMATIC ZONE [2]
Purina, Katihar, Saharsa, Madhepura, Supaul, Khagaria, Araria,

Kisanganj.
[North-eastern part]

AGRO-CLIMATIC ZONE [3] [A]
Shekhpura, Jamui, Munger, Banka, Lakhisaray, Bhagalpur.
[south-eastern part]

AGRO-CLIMATIC ZONE [3 (b)]
Rohtas, Bhojpur, Buxar, Bhabhua, Nalanda, Arwal, Patna, Nawada,
Aurangabad, Gaya, Jahanabad.
[south-western part]

AGRO-CLIMATIC ZONE $3^{RD\ [B]}$
This zone is the alluvial plains of river Ganga. Southern side and
the sediments are received both from river Ganga and those flowing from south having real origin in the Chhota Nagpur plaque which rise abruptly from the plains.
There is vast stretch of back waters known as Tal lands extending
from Buxar to parapet where most of the rivers and rivulets coming from the south get lost.
Rohtas- red gravelly soil
Sasaram- older alluvial soil
Gaya- older alluvial soil+ minor red gravelly soil
Aurangabad- red loamy soil+ red sandy soil+ brown-red and yellow soil
North of 3^{rd} B
Younger alluvial soil+ calcareous soil

Irrigated timily sown
Ko307, HD2824, HD2733, HP1761, PBW443, HUW468
IRRIGATED LATE SOWN
DBW14, NW2036, HW2045, NW1014, HD4643
RAINFED TIMILY SOWN

K8962, MACSW6145, K8027, HD2888

Rohtas district which is a part of Patna devision is one of the admonstrative districts of Bihar.
Sasaram is the head quarter of Rohtas.
Location of Rohtas
24˚30'- 25˚20' north
83˚14'- 83˚20' east
Total area covered by district Rohtas--- 3847.82km

The area production and productivity arranged cover 5 years are 2.1 million hectare, 4 billion ton and 1.9 ton /hectare. Bihar posses high potential for wheat in the light of favorable geo climatic and soil conditions. The major constraints in production are low seed replacement seeds, late sowing, foliar blight disease.

Suitable technological inventions are –
1. Timely sowing and harvesting.
2. Development of short and medium duration varieties.
3. Side specific nutrient management.
4. Mechanization.
5. Growing salinity alcanity tolerant varieties – KRL 19, KRL 1.
6. Resources conservation technology- zero tillage, firbs and laser land labeling.

AIMS:
1. To study different aspects of climate change and particularly temperature change.
2. To observe the increasing trend of temperature.
3. Study the progression of rabi sowing, harvesting and production.
4. To observe how wheat production is affected by temperature change.
5. To detect the level to which extent wheat production has been decreasing by increasing temperature in agro-climatic zone 3^{rd} B of state bihar and particularly district Rohtas.

OBJECTIVES-
1. To study the association between climate and agriculture.
2. Collection of data of temperature and wheat productivity of agro-climatic zone 3^{rd} B of state Bihar

HYPOTHESIS-
1. Temperature drives crop growth and duration. Increasing temperature increases the risk to yield.
2. Increasing temperature due to various factors cause decreasing trend in wheat production. Temperature increase bring long- term impact on wheat production which may be high as 25% and short- term impacts in 10 to 15 years(in the range of 4 to 6%).

NEED OF THE STUDY:

The world population has been increasing at rapid speed , so the pressure on agriculture is increasing but due to climate change includes temperature increase, rainfall variability , extreme events, water scarcity the production of crop has been minimized. Wheat is likely to be negatively impacted in rabi due to terminal affected trace. The topic is important one need to be discussed and studied the detect the level to which production is affected

METHODOLOGY-
1. Observation and experimentation.
2. Data collection regarding temperature.
3. Data collection primary and secondary both regarding wheat production.
4. Co-relation method to detect the level of extent to which wheat production is affected by temperature increase.
5. Crop model validation is used to access the effect of temperature change on yield of wheat.

OBSERVATION-

As we know Bihar experiences tropic climate and south Bihar particularly agro-climatic zone 3rd b which has sandy loamy soil experience more temperature. It is observed that air temperature has been increasing past 10 to 15 years due to green house effect and other factor. It has been observed that in the areas crop growth season encounter limitation, climate change, earth warming can late to the improvement of crop yieLds by increasing the growth season and the improvement plant flowering strength. But selected areas already have sufficient temperature that favors wheat production. The rise in temperature has been increasing the development speed of crops the experimental evidences has showed that under this condition the length of majority of seed in grains and seed plants will be reduced. Since achieving optimal performance depend on the solid material accumulation during the growth season warm on one hand and also on the existence of enough time transfer the material to the grain.

DATA ANALYSIS :

Daily data for air temperature is collected from different sources and its relation with wheat production in Rohtas district is establish

Year-	1999 [metric ton]	2000-01 [metric ton]	2001-02 [metric ton]	2002-03 [metric ton]	2003-04 [metric ton]	2004-05 [metric ton]	2005-06 [metric ton]	2006-07 [metric ton]
Zone[1]	20.07	19.78	18.50	16.51	14.72	16.00	12.02	11.00
Zone[2]	7.14	7.43	6.75	6.11	4.60	4.82	2.82	1.92
Zone [3] A	2.66	2.86	2.49	2.31	2.73	2.03	1.82	1.11
Zone [3] B	15.60	14.10	16.19	15.42	14.83	9.78	11.12	10.02
All Bihar	45.84	44.17	43.93	40.36	36.89	32.63	27.78	23.05

By analyzing with year by year. The data it is clear that wheat production declined

Oct.	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Temp.	26˚c	26.5˚c	26.6˚c	27˚c	28˚c	29˚c

Croping pattern

1.rice-wheat 2.rice- wheat-moong
3.rice-gram-rice 4.rice-potato-onion
5.rice-rai-moong 6.rice-bar-seem
7.rice-gram-moong 8.rice-lentil

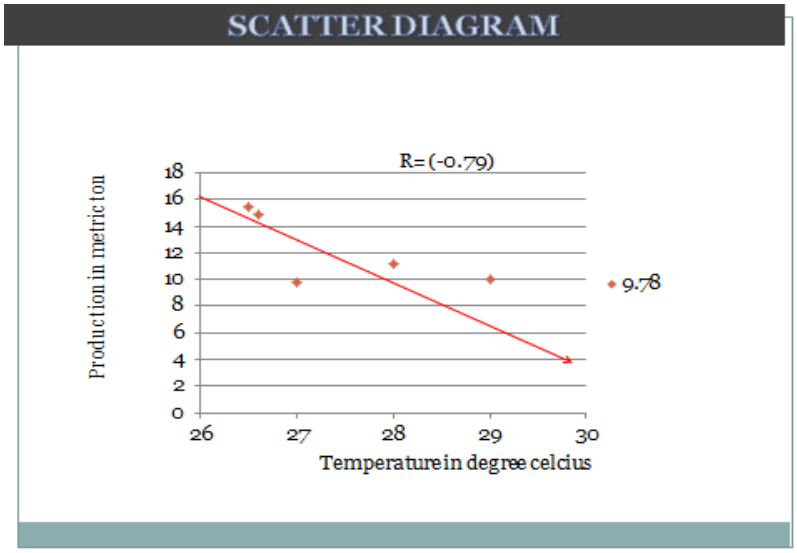
AGRO-CLIMATIC ZONE [1]
SOIL- sandy loamy soil
P.H.VALUE- 6.5 - 8.4
TOTAL RAINFALL- 1040-1450mm
TEMPERATURE- max.36.6˚c, min. 7.70˚c

AGRO-CLIMATIC ZONE [2]
SOIL-sandy soil, clayey soil
TOTAL RAINFALL-1200-1700mm
TEMPERATURE- max. 33.8˚c, min. 8.8˚c

AGRO-CLIM ATIC ZONE [3]
SOIL- sandy loamy, clayey loamy, loamy, clayey
P.H.VALUE-6.8-8.0
TOTAL RAINFALL- 990-1240mm
TEMPERATURE- max. 37.1˚c min. 7.8o˚c

IRRIGATION OF ROHTAS
Canal- 262570 hectare
Tubewell- 36037 hectare
Other sources- 32227 hectare
Total irrigated area- 330834 hectare

RESULT



This scatter diagram showing relation between wheat production and Temperature increase in agro-climatic zone 3rd B OF BIHAR
IN WHICH ===
X axis Shows temperature increase where Y axis shows production in metric ton. Hence we conclude that the wheat production get decreasing with temperature increasing. Therefore increasing temperatures affected the wheat production very badly.

X[temp.]	Y [product.]	XY	X2	Y2
26˚c	16.19	420.94	676	262.12
26.5˚c	15.42	408.63	702.25	237.78
26.6˚c	14.83	394.478	707.56	219.93
27 ˚c	9.78	264.06	729	95.65
28 ˚c	11.12	311.36	784	123.65
29˚c	10.02	290.58	841	100.40
163.1˚c	77.36	2090.048	4439.81	1039.53

$$r = \frac{n[\Sigma xy] - [\Sigma x][\Sigma y]}{\sqrt[2]{[n\Sigma x^2 - [\Sigma x]^2][n\Sigma y^2 - [\Sigma y]^2]}}$$

$$\frac{6[2090.048] - [163.1\ \ 77.36}{\sqrt{[6 \times 4439.81 - [163.1]^2[6 \times 1039.53 - [77.36]^2]}}$$

$$\frac{12540.288 - 12617.416}{\sqrt[2]{[26638.86 - 26601.61][6237.18 - 5984.5696]}}$$

$$\frac{-77.128}{\sqrt{37.25 \times 252.6104}}$$

$$\frac{-77.128}{\sqrt[2]{9409.7374}}$$

$$\frac{-77.128}{\sqrt[2]{97.00}}$$

$$= -0.79$$

CONCLUSION

Most studies on the impact of climate change on agriculture come to the same conclusions that climate change will reduce crop yield in the tropical area. According to the IPCC the next few dekets are likely to bring benefits to higher latitude through longer growing seasons but in lower latitudes even small amounts of warming will tend to decrease yields. The regional in acculating food productivity resulting from climate change will have a very great implication for global food politics. The study area selected for project work agro-climatic zone 3rd B in which Rohtas district lies commander hot tropical climate. Wheat are not capable to face even moderate warming of 10c for wheat will reduce yields significantly. The most vulnerable agriculture system are the erid, semi-erid and dry sub-humid regions of the developing world.

The project work done to detect the level of yield losses in agro-climatic zone 3rd B and particularly in Rohtas come to result that there is strong negative co-relation are there between temperature increase and wheat production as it is demonstrated by scatter diagram.

SOLUTION TO THE PROBLEM

1. To undertake basic and applied research in the agriculture zone areas.
2. To provide leadership and coordinate network research for generating location specific technologies.
3. To provide consultancy to farmers.
4. Early forecast can reduce crop losses as farmers became ready to face the problem.
5. By inventing and using strongly abled seeds which can face thev high temperature.
6. Parliamentary committee on agriculture should be act in positive manner.
7. District level contingency plan for various situations.
8. Effective of operationalisation of these contigency plan require realiable district level forecast of all types.
9. Block and village level advise these should be constituted.
10. Technology demonstration should be organise to help farmers cope with climate variability.
11. Capacity building of state builders for greater awareness and community action.
12. The emission of green house gases to be restricted to check the increasing temperature

FUTURE PLAN

1. To increase the length of cropping season by early sowing of the wheat.
   2. A knowledge intensive, rather than input intensive approach should be adopted to develop adaptation strategies.
2. 3. Traditional knowledge about the community coping strategies should be documented and used in training programme to help fine solutions to address the uncertainties of warming.
   4. A common programme should be developed to decrease emission of green house gases and conserving the genetic diversity of crops specially wheat that is more likely affected by temperature increase.
   5. The lack of data hinder in research work so at universities level it is to encourage the students to do more primary data collection.
   6. A national grid of grain storages, ranging from pusabins and grain golas at the household and community level to ultramodern silos at the district level must be established to ensure local food security

7. An early warning system should be put to place to monitor changes in pest and disease profiles.
8. Finally there needs to be further development of a network of community level seed banks which provide such seeds of wheat which are capable to face the variability of temperature

References

savindra singh, Environmental geography.

Atlas of our changing environment [2005]

United Nation Environmental Programme

Agricultural revolution-a cool look at global warming. Author- Lawson, Nigel

Economical environment list-Vaze, Prasan

Prasad Rao, G.S.H.L.V.impact of weather extremes On india food grain production.