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ANNUAL RAINFALL AND ITS VARIABILITY IN EASTERN DISTRICTS OF UTTAR PRADESH (FROM 1961 to 1991)

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Abstract: ***Rainfall is the most important source of soil and ground water. The Rainfall Variability is Mean deviation of 35 or above years rainfall data observation. The Mean of possible years or months low or high in per cent called variability. The degree to which rainfall amounts vary across an area or through time is an important characteristic of the climate of an area. Although the changes of rainfall variation effect on every mode of life but its play an important role in agriculture for several reasons. The plant growth and development depends- upon a continuaous process of cell division, On the progressive initiation of tissues and organs primordial and on the differentiation and expansion of the component cells. Crop are greatly depend on whether particularly rainfall during the period of growth and particularly in the critical phase likes- germination, flowering, seed setting and maturing. The rainfall variability excessed of 20% implies a great risk to forming. The Eastern Uttar Pradesh extends between 230 45' N to 280 30' N latitudes and 810 45' E to 840 30' E longitudes over an area of 85,845 sq km with a total population of 79,742,097 persons according to census 2011. The study is based on secondary data obtained from Indian Meteorological Department (IMD) Pune and Indian Agricultural statistics, New Delhi. The districts wise rainfall data provided by IMD for the last thirty years (1961-62 to 1919-2020).***

Key Words: Rainfall, Variability,Relationship, Paddy, Intensity, secondary data, Meteorological .

Rainfall is the most important source of soil and ground water. The Rainfall Variability is Mean deviation of 35 or above years rainfall data observation. The Mean of possible years or months low or high in per cent called variability. The degree to which rainfall amounts vary across an area or through time is an important characteristic of the climate of an area. This subject area in meteorology/ climatology is called "Rainfall Variability." There are two types (or components) of rainfall variability, areal and temporal. The Areal variation of rainfall amounts at various locations across a region for a specific time interval (Time does not vary). The variation of rainfall amounts at a given location across a time interval (Area does not vary). Temporal Variability The variation of rainfall amounts at a given location across a time interval (Area does not vary.). The low ratio of rainfall variability is the symbol of highly dependability and its high ratio of per cent irresponsible and irregular mode of rainfall.

Although the changes of rainfall variation effect on every mode of life but its play an important role in agriculture for several reasons. The plant growth and development depends- upon a continuaous process of cell division, On the progressive initiation of tissues and organs primordial and on the differentiation and expansion of the component cells. Crop are greatly depend on whether particularly rainfall during the period of growth and particularly in the critical phase likes- germination, flowering, seed setting and maturing. The rainfall variability excessed of 20% implies a great risk to forming.It has been observed that rainfall and rainy weather, particularly Post-harvest period of Kharif season crop Activities that is harvesting, threshing hampers. It has been also be noted that the rainfall deficiency are excess on the critical stages of the plant life hampers the supply of moisture, damage the plants, turning tillers as no production and reduced the Yield. The present research paper attempt has been made to examine the changes of Annual rainfall and its variability in Eastern districts of Uttar Pradesh.

AREA PROFLES- The Eastern Uttar Pradesh extends between 230 45' N to 280 30' N latitudes and 810 45' E to 840 30' E longitudes over an area of 85,845 sq km with a total population of 79,742,097 persons according to census 2011. Thus, its covers 35.6 percent of the total geographical area and 40.07 percent of the total population

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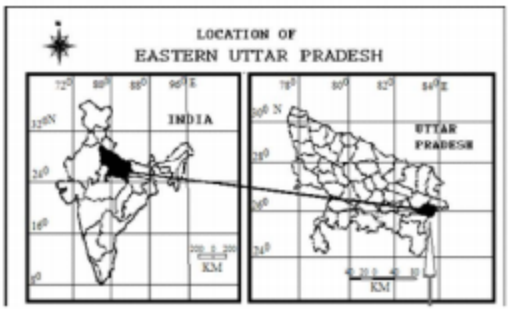
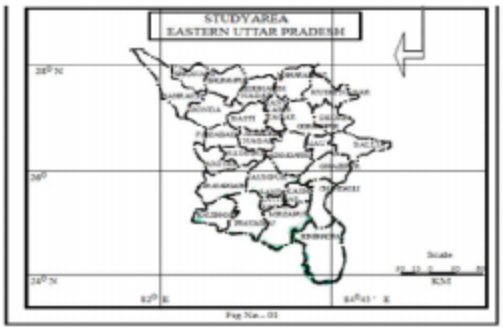
of the state of Uttar Pradesh. It's has been Nepal on its north, Champaran, Saran, Bhojpur and Palamau districts of Bihar on its East, Sarguja, Sindhi, Rewa District of Madhya Pradesh on its south and Lakhimpur, Sitapur, Barabanki, Fatehpur and Banda districts of Uttar Pradesh on its West. This Agricultural region of Eastern Uttar Pradesh comprises Prayagraj, Shrawasti, Balrampur, Sant kabir Nagar, Sidharth Nagar, Maharajganj, Kushi Nagar, Ambedkar Nagar, Amethi, Kaushambi, Sant Ravidas Nagar, Bahraich, Ballia, Basti, Deoria, Ayodhaya, Ghazipur, Gonda, Gorakhpur, Jaunpur, Mirzapur, Sonbhadra, Chandouli, Mau, Pratapgarh, Sultanpur, Varanasi districts. The study area as a part of vast Ganga plain and lies in the well-known climatic region which is famous for its Climatic variation. The annual rainfall average 958.6mm. About 88.23% of the annual rainfall is generally accounted for by the four summer months- June to September. The main occupation of 83.4 per cent of people is agriculture and agricultural activity. Fig.No-01.

OBJECTIVES-

1. To estimate the Annual Rainfall and Annual Rainfall Variability at macro and micro levels in the study Area.
2. To Identify the minimum and Maximum risk covering Area.
3. To prepare maps charts and diagrams for observation correlation and Co-efficient of variation for the policy formations.





PERSENT STAGE OF KNOWLEDGE- The amount of soil-water available to crops depends on rainfall onset, length, and cessation which influence the success/failure of a cropping season. It thus emerges that, understanding climatic parameters, rainfall in particular, can aid in developing optimal strattegies of improving the socio-economic well-being of small holder farmers. This is particularly important in sub-Saharan Africa (SSA),where agricultural productivity is principally rain-fed yet highly variable. Drier parts of Kenya's central high lands, eastern Kenya, continue to experience high unpredictable rainfall patterns, persistent dry-spells/ droughts coupled with high evapo-transpiration (2000-2300mm year?1). Generally, the total amount of rain water is enough, however, it has been reported to be poorly redistributed over time with 25% of the annual rain often falling within a couple of rain storms, as a result crops suffer from water stress, often leading to complete crop failure. Recha et al. noted that most studies do not provide information on the much-needed character of within-season variability despite its critical influence on soil-water distribution and productivity.

Weather crop relationship is complex and much work would be have to be done to arrive at dependable relationships in quantitative form between these factors and area of crops. Such studies are being actively pursued in many countries. In the USA crop area studies are made using regression technique, both linear and curvilinear. In addition to weather factors technological trend in used both its linear and quadratic forms. In USSR crop Area forecasts using curvilinear techniques. Besides, weather parameters, soil moisture, stage of Crop development, soil type and evapo- transpiration are also considered. Boyko has studies in 1955 on climate, eco-climatic, hydrological influence on vegetation. Breazeale and Georgehas studies in 1953 impact of atmospheric humidity on roots growths. Gardener in 1955 Klugesin 1958, and Whitheck in 1932 are study on climate and plants.

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Understanding the average amount of rain per rainy day and the mean duration between successive rain events aids in understanding long-term variability and patterns. Nonetheless, meteorological stations in the region which are sole sources of climatic data are only limited to single locations spatially. In sub-Saharan Africa, the predominant setbacks in analyzing hydro-meteorological events are occasioned by lacking, inadequate, or inconsistent meteorological data. Like in most other places, the rainfall data within in the drier parts of Embu county and the neighbouring stations are scarce with missing data making their utilization quite intricate.

In India data collected under the All India coordinates crop weather scheme, introduced in 1945 has been statatically analysed using the techniques of regression. Fisher's response curve, fitting of probability distribution of meterological factors and Ezekief's curvilinear techniques. The study has brought out of relatively large dependence of crop growth and yield on rainfall and its distribution in various phases compared to the other meterological parameters. The Indian Institute of Agricultural Research, New Delhi, has carried out linear regression analysis with area as a dependent variable. Total rainfall during the five growth phase of crops-flowering and grain formation period is more important and effective as comprised to rainfall in other period. Jasbir Singh, Vijay Kumar and Gupta in 1993, Williamson in 1925 has been study on rainfall and area of crop. Choubey, Sanjeev in 2011 has made the study on crop area relationship. The present study- Annual rainfall and its variability in Eastern Uttar Pradesh, is sequence of these research and an attempt to minimize the risk factors of production of agriculture in study area.

DATA BASE AND METHODOLOGY- The study is based on secondary data obtained from Indian Meteorological Department (IMD) Pune and Indian Agricultural statistics, New Delhi. The districts wise rainfall data provided by IMD for the last thirty years (1961-1991) On the basis of provided data for the past years and it's percentage where workout in the districts under reference and present in tables. The tables made by the estimating Mean and co-efficient of variation. The correlation and co-efficient of variation (CV) are calculated using following formula- For- Co-efficient of Variation- C V =SD/M x 100 Where, S D=Standard Deviation M= Mean

DETAIL STUDY- Mean Annual Rainfall; Table 1 gives the rainfall statistics for the Eastern districts of Uttar Pradesh for the Annual Rainfall. show the spatial pattern of these statistics. There are Two types of Mean annual rainfalls recorded- First is Very High Annual Rainfall (900>) and second is High Annual Rainfall (700-900) Fig.2 shows the trends of rainfall in district over eastern Uttar Pradesh.

Very High Annual Rainfall (900mm >) :

It can be seen that Gorakhpur receives the highest rainfall (1298.49mm) over other districts during all the Annual season. respectively. mean annual Rainfall received over Bahraich (1156.97mm), Deoria (1109.65), Faizabad (1062.51), Gonda (1185.53), Mirzapur (1043.72), Jaunpur (1002.9), Sultanpur (987.88), Azamgarh (979.25), Ghazipur (925.59), Pratapgarh (914.07) and Varanasi (907.08) also very high . All of these District are sichuated in northern and southern part of the study area. In all the 15 Districts of study area there are 13 found very high mean annual rainfall.

High Annual Rainfall (700mm-900mm) : Going through table no.1 It can be seen that The mean annual rainfall are found between 700 mm to 900 mm rainfall in the districts of Allahabad (836.54mm) and Ballia (800.48mm). These districts are situated in the Western and Eastern part of the study area.

Co-efficient of variation ; Table 1 gives the rainfall statistics for the Eastern districts of Uttar Pradesh for the coefficient of Annual Rainfall variation. show the spatial pattern of these statistics. There are two types of Mean annual rainfalls recorded- First is Very Low Variation of Annual Rainfall (<30%), and second is Low Variation of Annual Rainfall (30-60%). Fig.3.

Very Low Variation of Rainfall (<30%) : Very low variation in the rainfall are found in the area where the coefficient of variation is less than 30mm. Going to the table number 01 the coefficient variation in all the 15

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Districts of study area there are 14 are found very low mean annual rainfall variability. These districts are Bahraich (22.65%), Deoria (29.30), Faizabad (23.33), Gonda (27.0), Mirzapur (15.52), Jaunpur (19.89), Sultanpur (29.88), Azamgarh (24.24), Ghazipur (24.41), Pratapgarh (24.66), Ballia (26.45) and Varanasi (21.45).

Low Variation of Annual Rainfall (30-60%) : Going through table no.1 It can be seen that The coefficient of variation in rainfall over districts are found between 30mm to 60mm Low Variation of Annual Rainfall in the only one districts Allahabad (31.56) in all districts of the study area. Allahabad situated in the western part of the study area.

Conclusion; Going through table no.1 and Fig.2, 3 shows the trends of rainfall in districts over Eastern Uttar Pradesh. The mean annual rainfall are very high in most of the districts. Only two district Allahabad and Ballia are high mean annual rainfall. The coefficient of variation from mean annual rainfall there are 14 districts from all of 15 are found of very low variation in annual rainfall. The coefficient of variation from mean annual rainfall are found 31.56mm in only one district Allahabad. The result found that the distribution of mean annual rainfall are very highly and constantly in the study area.

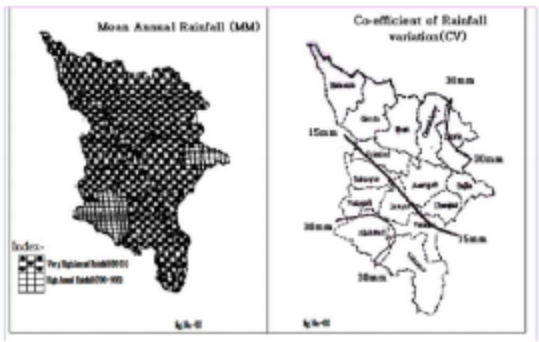
REFERENCES

1. Basu, G.C.1981 "A study of monsoon rainfall and variability, over Damodar Valley catchment area", vaya mandal-11,3&4,pp 52-54.International J. of Climatology, 28: 1453-1469.
2. Biswas, B. and Gupta,k.,1993,' Variability of South West Monsson Rainfall over west Bengal", Mausam-44,pp353-358.
3. Guhathakurta P, Sreejith O P and Menon P A, 2011 "Impact of climate changes on rainfall events and flood risk in India", J. Earth System Science. 120, No. 3.
4. Guhathakurta P and Rajeevan M, 2008 "Trends in rainfall pattern over India", International J. of Climatology.
5. Chaubey, S.K. and Pathak, G.K., 2007 "Rainfall Variability, Intensity and Distribution in Eastern Uttar Pradesh", SamvikashSandesh, Journal of Eco-Development,Gorakhpur.
6. P.Guhathakurta, Sudeep kumar B L, Preetha Menon,Ashwini Kumar Prasad, S.T. Sable and S C Advani, 2020 "Observed Rainfall Variability and Changes Over Uttar Pradesh State", GOVERNMENT OF INDIA MINISTRY OF EARTH SCIENCES, INDIA METEOROLOGICAL DEPARTMENT, PUNE.

Table 1

Mean Annual Rainfall and Its coefficient of variation

DISTRICTS	MEAN	CV
ALLAHABAD	836.54	31.56
AZAMGARH	979.25	24.24
BAHRAICH	1156.97	22.65
BALLIA	800.48	26.45
BASTI	1224.26	23.48
DEORIA	1109.65	29.3
FAIZABAD	1062.51	23.33
GHAZIPUR	925.59	24.41
GONDA	1186.53	27.00
GORAKHPUR	1298.49	17.6
JAUNPUR	1002.9	19.89
MIRZAPUR	1043.72	15.52
PRATAPGARH	914.07	24.66
SULTANPUR	987.88	29.88
VARANASI	907.08	21.45



Source-IMD.calculeted from years (1961- 1991).

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