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A GEOGRAPHICAL STUDY OF ASSOCIATION BETWEEN RAINFALLAND CROP YIELD IN PUNE DISTRICT DURING 2001 TO 2010 (USING RS & GIS APPLICATION)

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Abstract:

India is predominantly an agriculture dependent nation and the southwest monsoon plays an important role in its economy. Onset of the monsoon and its progress command all agricultural operations from sowing of crops till harvest. Under rainfed agriculture, the phenology of the crops is greatly influenced by its antecedent rainfall. Though the total amount of rainfall received during the season is normal for the region, some parts are affected by drought due to uneven distribution of rainfall both spatially and temporally. Besides improved techniques for the development of agriculture and higher agriculture production, timely and sufficient rainfall and weather conditions are also crucial factors. In this context it is imperative to study the rainfall variation and its effect on vegetation. The present study attempts to study agricultural regionalization at micro level or village level using 2001 to 2010 rainfall and crop data for the Pune district in Maharashtra.

Introduction:

There are significant intra-regional differences in rainfall amount, variability and trend. Annual rainfall varies from about 500 mm in the eastern part to more than 1200 mm in the western part of the district. Showing decreasing trend

in annual and seasonal rainfall, the district experienced very less rainfall activity during the two drought years of 2002 and 2009 and this affected the production of different crops suggesting that rainfall is the common yield-limiting factor. During the ten year period the crop combination was tremendously changed, mostly due to adoption of new techniques in agriculture operation. So farmers trend to cultivate many types of crops which percolate soil fertility. So some time eight to nine crop combination is observed in six talukas of the district. This clearly indicates that the farmers of district are very much aware about the environment condition, soil fertility and favorable cropping pattern.

Study Region

Pune is the second largest district of Maharashtra State in respect of its geographical area 15642 sq.km, which is about 5% of the total area of State. It comes under Krishna valley. It is situated in the western part of the State and lies between north latitude 17°54′ and 19°24′ and east longitudes 73°29′ and 75°10′ and falls in parts of Survey of India degree sheets 47-E, 47-F, 47-I, 47-J, 47-K, 47-N and 47-O. It is bounded in the north and east by Ahmadnagar district, Satara and Solapur districts in south and south east respectively; in the northwest and west Thane and Raigarh districts respectively (see Fig.1).
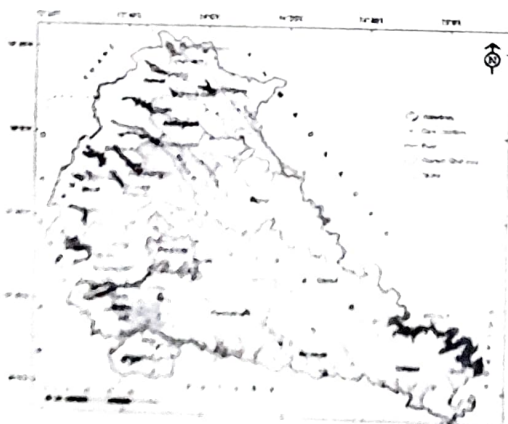
Fig.1 District map of Pune showing Talukas and major River systems

Methodology:

On the basis of all the available daily rainfall data, a homogeneous set of rainfall data was prepared excluding all the outliers. This data formed the data base for further analysis. Using this data, mean monthly, seasonal and annual rainfall for all the talukas of the Pune district were calculated. Similarly wet and dry days during the twelve year period were also worked out. Although the data period is for 30 years, there were lots of missing data in the years. Therefore, to make a uniform set of data for the comparative study of rainfall and crop yield, in the present study a homogeneous data for the period of 2001 to 2010 for both the parameters viz. rainfall and crop have been used for further analysis.

Cropping Patterns in Pune

In order to determine agricultural regions, rainfall, temperature, altitude, soil types and crops are taken into consideration. A systematic appraisal of soil and climatic resources is a pre-requisite for formulating effective land use plan. Mapping of various agro-ecological regions have helped in identifying suitable cropping patterns for a particular region. The cropping system is an important component of any farming system. One finds a great deal of difference in the cropping systems from the west to the east in the district. This is mostly due to the variation in the rainfall which is the most important factor in determining the cropping pattern of a particular place and accordingly Pune District can be divided into three zones (see Fig.2), viz.,

Fig.2 : Broad Rainfall zones in Pune district

i) **the western zone** getting plenty of assured rainfall - comprises the talukas of Mawal,Mulshi, Velhe and Bhor, and the western parts of the talukas of Haveli, Purandar,Junnar, Khed and Ambegaon.

ii) **the transition zone** having fairly secure rainfall of about 100-110 mm – comprisesthe eastern parts of the talukas of Junnar, Khed, Ambegaon, Haveli and Purandar andthe western part of Shirur.

iii) **the eastern zone** facing scarcity of rain which amounts to 70-80 mm - comprises thetalukas of Baramati, Indapur and Daund and the eastern part of Shirur and theeasternmost part of Purandar.

Agricultural seasons and crops

The systems of cropping are much the same in a particular zone but differconsiderably from zone to zone. Pune district is represented by two distinct seasons: a Kharipseason (rainy season) from May end to Mid-October and a Rabi season (dry season) fromOctober to Mid-February (Fig.3).Cropping systems of a region are decided by and large, by a type of soil and climaticparameters which determines overall agro-ecological setting for nourishment andappropriateness of a crop or set of crops for cultivation. Nevertheless, at farmers' level, potential productivity and monetary benefits act as guiding principles while opting for aparticular crop/cropping system. The general cropping systems in the three zones are –i) **Western Zone** - Paddy is the main crop and is grown year after year, except on low lyingareas where val or gram is sown in the Rabi season. On light and slope soils ragi (nachani) orniger is grown for two years and land is kept fallow for two or three years. Towards theeastern part of this zone wheat is sown on good retentive soils which are usually kept fallowin the kharip season or sometimes cropped with bajra if early rains are favorable.
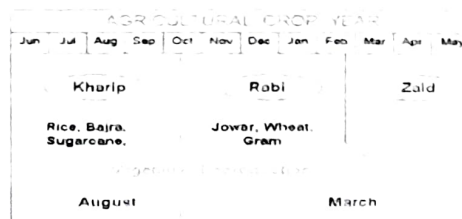

Fig.3 : Crop Calendar of Pune district during Kharip and Rabi season

ii) **Transition Zone** - The major crops of the zone are bajra and jowar for fodder. Such bajraor jowar is taken in the Kharip season and land is kept fallow for the Rabi season. If moistureconditions allow, gram may be sown in the Rabi season. Sometimes if bajra is sown andharvested early, the same land is put under Rabi jowar or wheat. In some parts groundnut istaken in the Kharip and jowar or wheat in the Rabi season. Junnar, Khed and Ambegaongrow potatoes and the cultivators in that part of the district usually take bajra in the Kharipseason and potatoes in the Rabi season. Sometimes potatoes are taken in the Kharip seasonand grain the Rabi season.

iii) **Eastern Zone or scarcity zone** - Rabi jowar is the main crop of this part and is sown yearafter year. This zone has got good irrigation facilities from the Nira Left Bank Canal. Thereare also a few tanks like Shetphal, Matoba and Shirsuphal which command about 79,000acres. The rotation followed on eight months irrigation blocks is paddy or bajra in the Kharipseason and wheat, jowar or gram in the Rabi season. In perennial irrigation blocks, rotationsare more elaborate and usually extend to three or four years. The sugarcane is planted in themonth of January and harvested during the same month of the next year. The land isploughed and kept fallow in the next Kharip season and jowar is grown in the Rabi season.Sometimes a bajra crop or Sann green manuring precedes this rotation, and, before cottongrowing was banned, cotton was also taken instead of Rabi jowar in this rotation.

Association between Rainfall and Crop Yield

On the basis of the above zonal classification, cropping system in different talukas ofPune district has been studied with reference to rainfall during Kharip and Rabi seasons (seeFigs.4). It is seen from these figures that:

a) **During Kharip season (Jun-Sept)**, in the heavy rainfall zones (Maval, Mulshi, Velhe, Bhor) rice is the major cultivated crop showing positive correlation coefficient. In the central parts of the district Bajra and towards the eastern end sugarcane is the dominant crop. In rest of the talukas, crops, viz. Bajra, groundnut, sugarcane are cultivated in high percent, but there is negative correlation with the rainfall received in these talukas . This shows that these crops are grown not only on rain water but water stored in different water bodies located in these areas, available ground water through wells, lake, etc, reservoirs has also been used. Sugarcane which is another dominant crop of Ambegaon, Baramati, Bhore, Daund, Haveli, Indapur, Junnartalukas, CV was very less than that of talukas of Maval, Mulshi, Velhe, Bhor.

b) **During Rabi season (Oct-Jan)**, Jawar is a monoculture dominant crop in all the talukas and next to it wheat, maize and gram are the most frequently cultivated crops. Correlation coefficient varied between -0.1 (Taluka : Haveli) to 0.7 (Taluka : Junnar) for the Jowar crop with less variation (i.e. less CV).in semiarid region than in heavy rainfall regions.
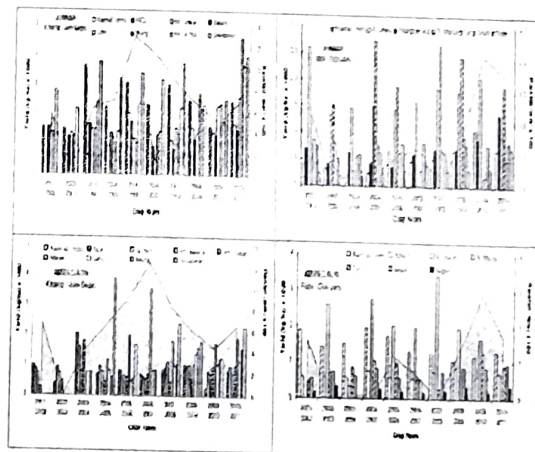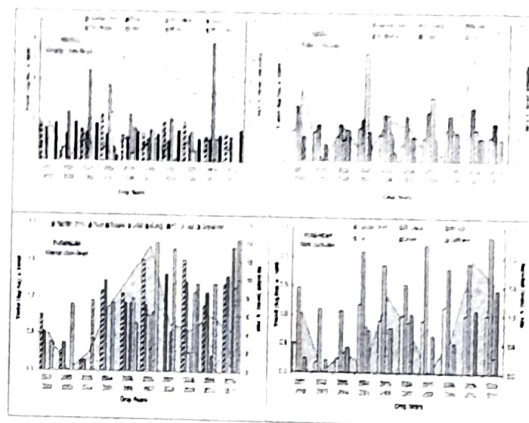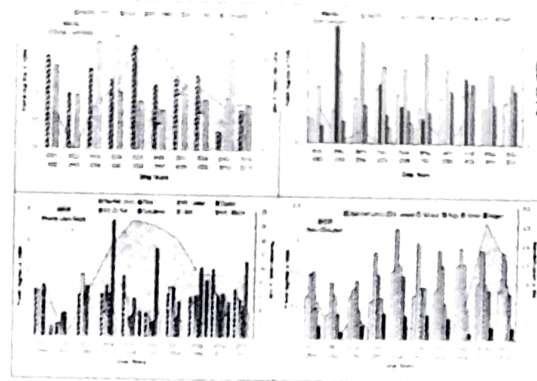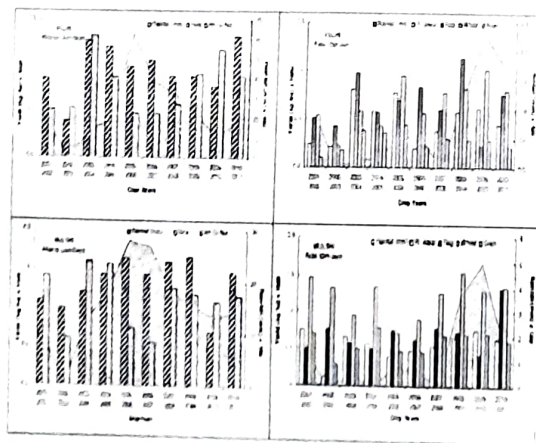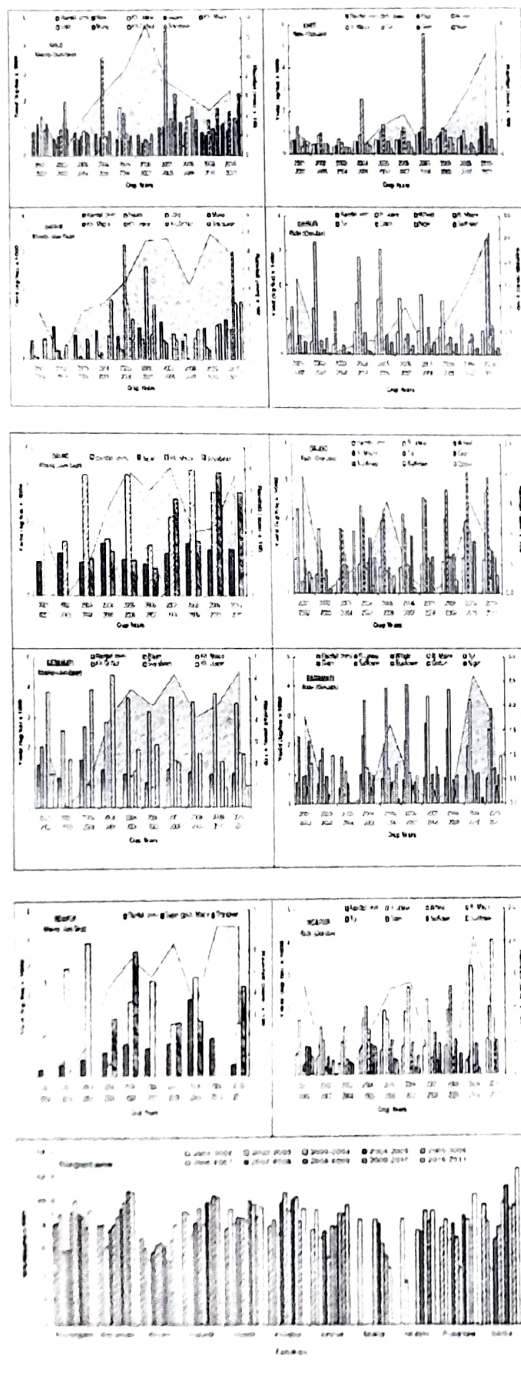
Fig.3 :Districtwise average rainfall and cropping pattern during Kharip and Rabi season

CONCLUSION

This study has presented analyses of recent rainfall behavior and relationships between rainfall variability and fluctuations in crop production in the semi-arid to arid regionsof Pune district. The findings of the study show that—

1. There are significant intra-regional differences in rainfall amount, variability and trend.Annual rainfall varies from about 500 mm in the eastern part to more than 1200 mm inthe western part of the district.

2. Rainfall amount is higher and its variability is lower in the western part of the region thanin the eastern.

3. Rainfall has shown decreasing trend in annual and seasonal rainfall. During the twodrought years of 2002 and 2009 the district experienced very less rainfall activity and thisaffected in the production of different crops. Although 2009 was a severe drought year,the heavy rainspell during northeast monsoon season caused increase in some of the cropproduction.

4. Inter-annual and seasonal variability of rainfall is a major cause of fluctuations in theproduction of cereals in the district. Bajra, which is cultivated during both Kharip as wellRabi season shows the largest year-to-year variability as it is mostly cultivated in semiaridand arid parts of the district where rainfall variability is high.

5. Productions of the crops also showed statistically significant correlations with rainfall andyield, suggesting that rainfall is the common yield-limiting factor as use of chemicalfertilizers and other agricultural inputs are limited.

6. Crops are cultivated both during the Kharip and Rabi season. During the Kharip season, Rice, Ground Nut, Sugarcane, Bajra are the dominant crops and during the Rabi seasonJowar, Wheat, Ragi, Maize are the predominantly cultivated crops.

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EMERGING TRENDS OF E-LEARNING IN INDIA

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EMERGING TRENDS OF E-LEARNING IN INDIA

ABSTRACT:
E-Learning is playing very important role in present education system. E-learning can be a very powerful weapon for the intellectual growth of the individual and helps in producing intellectual society. India is a first largest democratic country in the world. In such countries e-learning is a boon and plays a critical role for the producing intellectual think tanks that can be used by entire world for uniform development of all countries on earth. This study analysis the various trends of e-learning in India.
Keywords: E-learning, Information and Communication Technology, Distance Education.

INTRODUCTION:

E-learning or Online education helps people get access to a world-class learning experience when traditional higher education may not be possible due to financial, personal or any other constraints. Information and Communication Technology has opened a new sky for the experiments on teaching-learning methods to make education more interesting, flexible and broader. It is a broad term including various types of teaching-learning methods based on