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A STUDY OF CROP CONBINATION IN KAVATHE MAHANKAL TEHSIL, DISTRICT SANGL MAHARASHTRA (INDIA): A GEOGRAPHICAL ANALYSIS

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ABSTRACT:

Agriculture being a basic activity plays a vital role in Indian economy, but it gambles with the monsoon, causes high fluctuations in production. Inadequate rainfall of Monsoon and frequent drought conditions hampered the development of agriculture, particularly, in drought prone area of Maharashtra.

In this paper, the tahsil Kavathe Mahankal (Dist. Sangli) is selected for study which falls in droughtprone area of Maharashtra. The major objective of this paper is to study & analyses the cropping pattern, as a sample study of drought prone area. Generally, Natural, Socio-economic and other technological factors affects the cropping pattern of any area.

To understand the cropping pattern, the crop combinations have been identified by using Rafiulhas techniques, which is known as 'Maximum positive deviation method' and analysis have been attempted. The very low and inadequate rainfall in the droughtprone area affects the cropping pattern, causes the three crop combination, where, generally the rainfeed crops are the major crops of this area as Bajara, Kh-Jowar, Rabbi Jower & Pulses which is specific cropping pattern of the droughtprone area. If the irrigation facilities to be provided to such area, the total scenario of cropping pattern can be change.

INTRODUCTION:

In Indian context, agricultural is a basic activity which accounts one fourth of the National income & provides employment to 65% of working population, and still Indian agriculture gambles with the monsoon as about 40% area is irrigated by inadequate water resources. The Indian agricultural is

totally depends upon the S. West monsoon which is uncertain, causes high fluctuations in the agricultural production.

Though the state of Maharashtra is known as a most urbanized & having remarkable development in industrial sector, yet the agricultural activity remains fundamental one. However inadequate rainfall of monsoon & frequent drought conditions hampered the development of agriculture, particularly in the droughtprone areas of Maharashtra.

The tahsil Kavathe Mahankal of Sangli district falls in rain shadow zone of the Maharashtra, where agriculture as well as animal life is mostly affected by the frequent occurrence of the droughts.

The tahsil Kavathe Mahankal lies in the eastern part of the Sangli district. Agriculture is the main economic activity in this region,about 54427ha of land is under cultivated.and the tehsil Kavathe Mahankal enjoyes the average rainfall beiow 50cm anualy. So the major objective of this paper is to study & analyse the cropping pattern of Kavathe Mahankal Tahsil as a sample study of droughtprone area of Maharashtra. Cropping pattern simply means the proportion of the area under different crops. It is related to the ecological situation, socio-economic condition and other technological factors. In case of irrigated crops the choices are directly governed by the specific purpose for which the irrigated crops are to be grown and these are also conditioned by the geographical factors and modified by the emergent social and economic circumstances (Mamoria 1979).

STUDY AREA:

The Tahsil Kavathe Mahankal of Sangli district (Maharashtra) is selected for the study. However, as agricultural is a basic activity, it is highly affected by the droughtprone conditions and the scarcity of water for agriculture is a major problem in this area. The study region lies between 16^0,55' North to 17^0,16' North latitude and 74^0,45' East to 75^0,16' East longitudes and altitude is 750 mts from sea level. The Kavathe Mahankal tehsil comprises an area about 732.2 sq.km. and supports population 144596 according to census 2016-2017. (See Fig. No. 1)

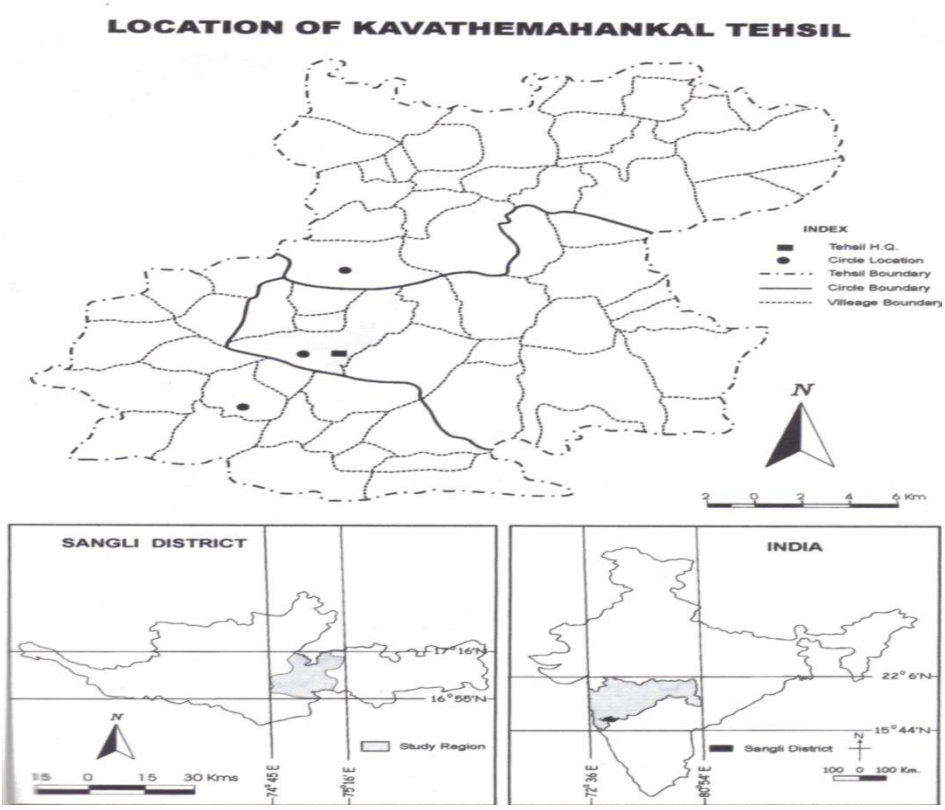

Fig. No. 1

DATA SOURCE:

The data of different kinds have been collected from the primary and secondary sources. The primary data is collected through interviews and discussions and secondary data from published and unpublished report and abstracts such as socio-economic review, Agricultural office, Tehsildar office, Kavathe Mahankal circle or Block Office, Kuchi, Kavathe Mahankal and Deshing.

Other necessary information is collected by farmers, social workers and knowledgeable persons in droughtprone areas of Kavathe Mahankal Tahsil.

OBJECTIVE:

1. To study the factors affecting on cropping pattern.
2. To study the crop combination in Kavathe Mahankal tehsil.
3. To analyse the effect of various irrigation projects with are going to be completed.

METHODOLOGY:

As the entire study is based on the data collected by various sources, interviews and discussions with the knowledgeable persons the following methodology is adopted.

i) The revenue circle is considered an area unit of study area and percentage of area under various crops in both *Kharif* and *Rubbi* season in considered.
ii) Agricultural landuse information on cadastral map, land record and field notes are also used for the study.
iii) To understand the crop combination of the study area, the technique of Raffiulhas has been used.
iv) Information and results are presented through Tables and suitable Diagrams.

THE RAFIULHAS TECHNIQUE:

Rafiulhas developed a technique in 1965 and used for the functional classification of towns in his work "A new approach to the functional classification of towns". This technique is very barely used here for the crop combination and analysis has been attempted for the Tahasil Kavathe Mahankal. Many geographers used this method in the study or cropping pattern of the region known as "Maximum Positive Deviation Method"

The technique developed by Rafiulhas can be expressed by following equation.

$$d = \sqrt{\frac{\sum Dp^2 - Dn^2}{N^2}}$$

Where

d = deviation

Dp = is the positive differences

Dn = is the negative differences from the median value of the theoretical curve value

n = No. of crops or functions.

In the maximum positive deviation method, unlike the standard deviation method, the differences of actual values are calculated from the middle value of the theoretical standard and thus this method also gives the desired critical combination.

Circle is considered as a study unit in the area; where variety of crops are cultivated. The circlewise percent area under various crops in both *Kharip* and *Rubbi* seasons are presented in Table No. 1 and obtained results by using the Rafiulhas method are also presented in Table 2, 3 and 4.

The Kavathe Mahankal tehsil is divided into three revenue circles namely Kavathe Mahankal, Kuchi and Deshing circle. Farmers are various crops cultivated in this region.

The following abbreviations are used for the crop names in the Table …

Bj – Bajara Rj – Rubbi Jowar Kj – Kharif Jowar P – Pulses O – Other

Table No. 1 Kavathe Mahankal Tehsil % of Area under various crops (2016-2017)

Sr. No.	Name of Circle	Crops	% of Area
1	Kavathe Mahankal	A – Bajara	43
		B – Rabi Jowar	22
		C – Kharif Jowar	18
		D – Pulses	12
		E- Maize,Wheat Sugarcane,Spices,	5
2	Kuchi	A – Bajara	42
		B – Rabi Jowar	21
		C – Kharif Jowar	19
		D – Pulses	13
		E- Maize,Wheat Sugarcane,Spices,	5
3	Deshing	A – Kharif Jowar	44
		B – Bajara	20
		C – Rabi	18
		D – Pulses	13
		E- Maize,Wheat Sugarcane,Spices,	5

Source: Tehsil office Kavathe Mahankal.

RAFIULLHAS MAXIMUM POSITIVE DEVIATION METHOD (Circlewise Analysis):

Table No. 2: Circlewise Crop Combination - Kavathe Mahankal Circle

	Mono culture (Bj)	**Two crop region (Bj, Rj)**		**Three crop region (Bj, Rj, Kj)**			**Four crop region (Bj, Rj, Kj, P)**			
Theoretical base curve	50	25	25	16.7	16.7	16.7	12.5	12.5	12.5	12.5
Strength of the element	43	43	22	43	22	18	43	22	18	12
Deviation	7	-18	3	-26.3	-22	-18	-30.5	-9.5	-5.5	-0.5
$(Dp - Dn)^2$	**49**	**315**		**721.47**			**1050.75**			
$\frac{(Dp - Dn)^2}{n^2}$	**49**	**78.17**		**80.16**			**65.67**			

Table No. 3: Circlewise Crop Combination - Kuchi Circle

	Mono culture (Bj)	**Two crop region (Bj, Rj)**		**Three crop region (Bj, Rj, Kj)**			**Four crop region (Bj, Rj, Kj, P)**			
Theoretical base curve	50	25	25	16.7	16.7	16.7	12.5	12.5	12.5	12.5
Strength of the element	42	42	21	42	21	19	42	21	19	13
Deviation	8	-17	4	-25.3	-4.3	-2.3	-29.5	-8.5	-6.5	-0.5
$(Dp - Dn)^2$	**64**	**273**		**663.87**			**985**			
$\frac{(Dp - Dn)^2}{n^2}$	**64**	**68.25**		**73.76**			**61.56**			

Table No. 4: Circlewise Crop Combination - Deshing Circle

	Mono culture (Bj)	**Two crop region (Bj, Rj)**		**Three crop region (Bj, Rj, Kj)**			**Four crop region (Bj, Rj, Kj, P)**			
Theoretical base curve	50	25	25	16.7	16.7	16.7	12.5	12.5	12.5	12.5
Strength of the element	44	44	20	44	20	18	44	20	18	13
Deviation	6	-19	5	-27.3	-3.3	-31.5	-31.5	-7.5	-5.5	-0.5
$(Dp - Dn)^2$	**36**	**336**		**757.87**			**10.79**			
$\frac{(Dp - Dn)^2}{n^2}$	**36**	**84**		**84.20**			**67.43**			

ANALYSIS:

The study area Kavathe Mahankal Tahsil as a whole, divided into three revenue units for the study purpose and the analysis have been attempted.(see Fig No. 2)

The circle Kavathe Mahankal having the 46424 hq. of cultivated land which accounts 47.40% of the total geographical agea. In the Kharif season Bajara is a dominant crop which covers 43% area followed by Karif Jowar (18%) and Pulses (12%). In Rubby season mostly, Rubby Jowar is cultivated which accounts the 22 % area to total.

The Kuchi revenue circle having 7466 hectares of cultivated land and it comes 25.29% of the total area. The crop Bajara as a major crop covers 42% area, followed by Kharif Jowar (19%) and Pulses (13%) in the Kharif season. However Rubbi Jowar is only a main crop in Rubby season by covering 21% area of the total.

The third one that is Deshing circle possess 10537 hectares of cultivated land which is 37.1% of the total area of the study area. In circle Deshing Kharif Jowar is the major or first ranking crop accounts 44% area followed by Bajara (20) and Pulses (13%) in the Kharif season. In Rubbi season, Rubbi Jowar is remains important crop by covering 18% area.

The crop like Maiz'Sugar Cane, Spices,Vegetable,Fruits,Oil Seeds, and other minor crops are showing equally percentage{5%} of area in all the three circles of Kavathe Mahankal tehsil and they are showing very low percentage area in comparison with the other crops.

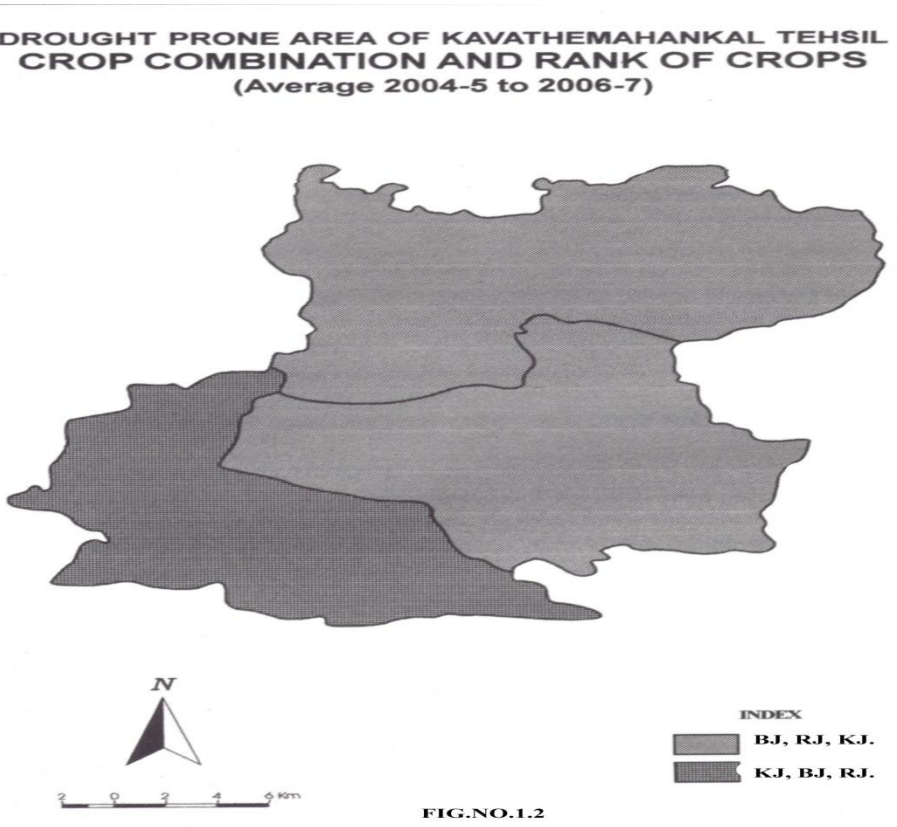

FIG.NO.1.2

The crop combination in the general cropping of the study area is depicted in following Table No. 5

Sr. No.	Name of circle	No. of circle	No. of crop combination	Crop order
1	K. Mahankal	1	Three crop	Bj, Rj, Kj,
2	Kuchi	1	Three crop	Bj, Rj, Kj,
3	Deshing	1	Three crop	Kj, Bj, Rj,

Abbreviations - Bj = Bajara, Rj = Rabi Jowar, Kj = Kharif Jowar,O = Other

After the application of Rafiulhas maximum positive deviation method for understanding cropping pattern of the region it comes to know that all the three revenue circles of the study area identified for "Three crop combinations". The circle Kavathe Mahankal and Kuchi having the same crop combination where Bajara is a first ranking and dominant crop which is followed by Rubbi Jowar, Kharif Jowar and Puses in Kharif season, accordingly to crop order resulted by Rafiulhas method. However, in Deshing revenue circle Kharif Jowar is identified

as a dominant crop associated with Bajara Rubbi Jowar and Pulses in Kharif and Rubbi season.

Lastly it can be concluded that, in Kavathe Mahankal and Kuchi revenue circle, the crop Bajara and Kharif Jowar in Deshing circle arrived as the first ranking dominant crops. The dominant crop at all the circles is associated with the remaining three identified crops i.e. Rubbi Jowar, Kharif Jowar and Pulses. The entire study area possesses three crop combination as a result of the droughtprone conditions of the study area.

The Govt of Maharashtra had been taken three irrigation project namely Mahisal,Takari and Tembu lift irrigation of sangli and solapur district. Through these three irrigation project,The irrigation will be provided to 168999ha of land in Kavathe Mahankal tehsil.All these project are complited partially and remaining work is in progressive stage.The complition of these projects will affect positively on cropping pattern of this area.

CONCLUSIONS:

1. Natural, socio-economic and other technological factors affects on the cropping pattern of any area.
2. The Tahsil Kavathe Mahankal falls in droughtprone area which affects the cropping pattern in resulting the three crop combination.
3. Generally, the rainfed crops are the major crops of this area for i.e. Bajara, Kharif Jowar, and Rubbi Jowar.
4. The cropping pattern of this area hampered frequently through the frequent drought conditions.
5. Very low percent of the cultivated land is under irrigation by means of wells, tubewells and tank irrigation in the study area which can not replaced the specific cropping pattern of the droughtprone area.
6. Various projects which are taken by the Govt. of Maharashtra specifically for the droughtprone area named Mahishal, Takari and Tembu are in the progressive stage. After the completation of three projects water is supplied to the agriculture by Canals then and then the total scenario of the existing cropping pattern may be changed in the droughtprone areas in near future.

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