CHAPTER - II

PHYSICAL PROPERTIES OF SOIL

1. Soil texture
2. Slope
3. Soil depth
4. Soil erosion
5. Soil drainage
6. Soil gravels
7. Soil colour

Summary

References

Soil means the upper layer of earth surface which may be dug, ploughed and excavated. Specifically, it is the loose material of the earth's surface in which plants grow. The physical properties of soil need careful study because soil is a natural medium for the plant growth and gives mechanical support to plants (Vaidya and Sahastrabudhe,1979).

Physical properties of soil are important for the land capability classification. They are soil texture, slope, soil depth, soil erosion, soil drainage, soil gravel and soil colour Each property of soil is identified and mapped for the land capability classification in the area under study.

1. SOIL TEXTURE :

Soil texture depends upon the size of soil particles (Table 1). It relates to the relative proportions of sand, silt and clay that are present in the soil. The proportion of clay, silt and sand particles in relation to each other is called the texture of soil (Lorentz C. Pearsons,1966). The large amount of sand is called as coarse soil and less amount is called sandy or sandy loam. If silt is in large quantities it is called as silt loam or loam. Large amount of clay in soils makes it sticky and it termed as clay or clay loam. The texture of soil can be also classified as coarse textural, medium textural or fine textural.

In the region the texture of soil is observed as clay, clay loam, sandy clay, sandy loam, sandy-clay-loam and sandy.

The clay textural class area is only 10% of the taluka. This type of textural class is found in villages of Bavada, Nigave Dumal, Vadanage, Varnage, Padali-Budruk, Waliwade, Chinchawad, Padali-Khu and Donavade (Fig.1.1). 23% land of the taluka is covered by the clay loam textural class. This type of textural class is observed on the banks of the river the Panchaganga and its tributaries, such as Kumbi, Kasari, Bhogavati, Tulsi and Dudhganga. The percentage of sandy clay textural class is 21% of the total land of the taluka (Table 2-A). This type of textural soil is found mostly in south-western part and some eastern and northern part of the taluka (Fig.2.1-A).

Table 1 : Textural classification system.

Sr.No.	Name	Size range in mm.	Symbol
1	Clay	less than 0.002	C
2	Silt	0.002 - 0.02	S
3	Fine sand	0.02 - 0.20	FS
4	Coarse sand	0.20 - 2.00	CS
5	Gravel	more than 2.0 - 20	G

SOURCE : The Nature & Properties Of Soil, Buckman & Brady (1967).

Sandy loam soil has covered about 20% land in the south-central and some south-western part of the taluka. Only 2% land

of the taluka has been acquired by the sandy clay loam textural class at Shiye village in the area under study. The proportion of sandy soil is noted only 18%, mostly in the eastern & south-western parts and also a small patch in the north has been occupied by this type of textural class.

2. SLOPE :

Slope determines the soil erosion intensity as it increases with the steepness of slope. Thus, slope causes soil erosion and due to erosion the fertility of soil is reduced, and it affects the crop growth and production.

The slope of the land of taluka is measured and three slope catagories, namely, very gentle slope, gently sloping and moderately sloping are demarcated. Most part of the Karveer taluka has been acquired by very gentle slope i.e. 1-3% (Fig. 2.1-B) and its areal extent is about 65%. Gently sloping land records 20% and only 9% land is covered by moderately sloping land category (Table 2-B).

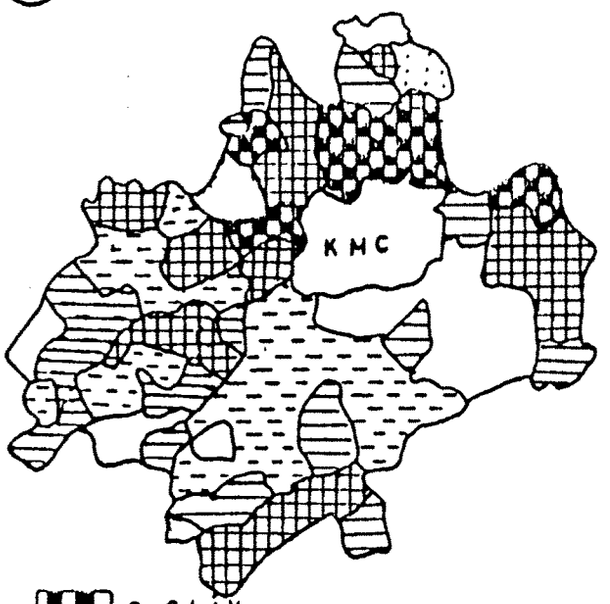
3. SOIL DEPTH :

The depth of a soil is determined by the thickness of soil layers. The soil depth is important for the growth of the plant or crop. The areal variation of soil depth in Karveer taluka is shown in the map (Fig.2.1-C).

Very deep soil is found on the banks of the Panchganga river covering the villages of Bavada, Nigave Dumal, Vadange,

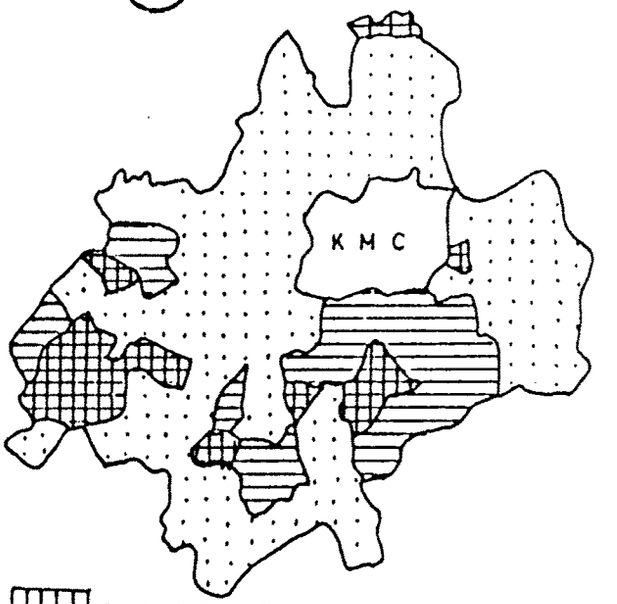
PHYSICAL PROPERTIES OF SOIL

(A) SOIL TEXTURE



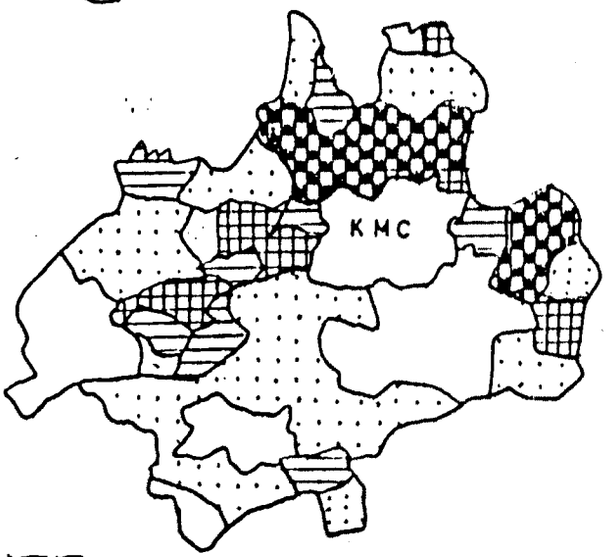
C CLAY
CL CLAY LOAM
SC SANDY CLAY
SL SANDY LOAM
SCL SANDY CLAY LOAM
S SANDY

(B) SLOPE



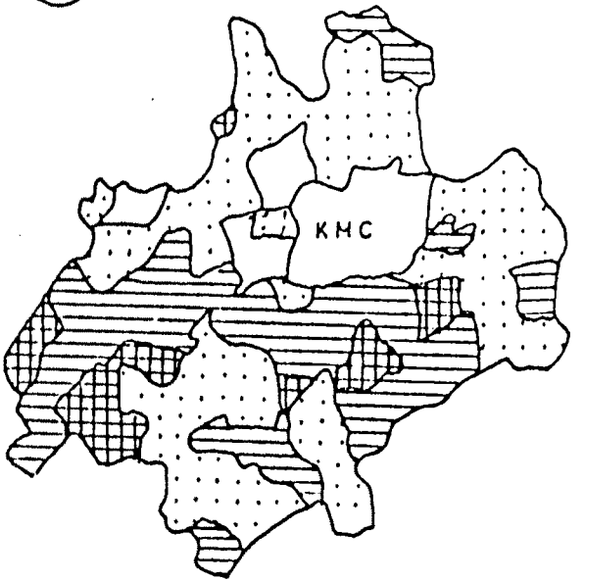
D MODERATELY SLOPING
C GENTLY SLOPING
B VERY GENTLE

(C) SOIL DEPTH



d5 VERY DEEP
d4 DEEP
d3 MODERATELY DEEP
d2 SHALLOW
d1 VERY SHALLOW

(D) SOIL EROSION



e 4 VERY HIGH EROSION
e 3 HIGH EROSION
e 2 MODERATE EROSION
e 1 LESS EROSION

N

0 5 KMS

KMC - KOLHAPUR MUNCIPAL CORPORATION

FIG. 2.1

Shinganapur, Chikali, Varange, Padali-Budruk, Mudshingi, Waliwade and Chinchawad etc. In these villages soil depth is above 90 cm. and the areal extent is about 14% of the taluka (Table 2-C). The deep soil class ranging from 45 to 90 cm. depth has covered 6% land of the taluka. The villages such as Padali Kh.,Donavade, Wakare, Beed and Sangavade have recorded the layer of deep soil. And the moderate deep soil has covered some 8% land of the talukas with its more concentration in the villages of Kerli, Unchagaon, Nave-Balinge, Koge, Are, Bachani, Adur, Kalambe, Bhamte and Chinchavade.

The 40% land has been covered by shallow soil in different parts of the taluka. Whereas about 26% land of the Karveer taluka has been occupied by very shallow soil (Appendix - I). This class of soil is found in southern and some south-western part and very small patch in northern part of the taluka.

4. SOIL EROSION :

Soil erosion is the wearing away of soil. It is caused by flowing water and wind or any other agent. Erosion is the loss of soil by water and wind (Raychaudhuri,1969). Due to erosion the fertility of soil is reduced.

In this area the soil erosion is caused by rainfall and flowing water. 10% land of the taluka is occupied by less erosion hazard, and the 41% area has been affected by moderate soil erosion and is more dominant in the study area (Fig.2.1-D).

Table 2 : Physical properties of soil and percentage of area.

(A) SOIL TEXTURE

Class	% Area
Clay	10
Clay loam	23
Sandy clay	21
Sandy loam	20
Sandy clay loam	02
Sandy	18

(B) SLOPE

Class	% Area
Moderately sloping	09
Gently sloping	20
Very gentle	65

(C) SOIL DEPTH

Class	% Area
Very deep	14
Deep	06
Moderately deep	08
Shallow	40
Very shallow	26

(D) SOIL EROSION

Class	% Area
Very high erosion	08
High erosion	35
Moderate erosion	41
Less erosion	10

(E) SOIL DRAINAGE

Class	% Area
High drained	04
Well-drained	19
Moderately drained	48
Less drained	23

(F) SOIL GRAVEL

Class	% Area
Moderate gravels	21
Less gravels	53
No gravels	20

(G) SOIL COLOUR

Class	% Area
Dark red brown	10
Red brown	47
Brown	05
Light brown	31
Black	01

Note : 6% area of KMC is not considered in the percentage area.

SOURCE : Compiled by Author.

The proportion of high soil erosion is 43% of the total land of the taluka and the villages namely Gokulshiragaon, Giragaon, Jaithal, Upavade, Arale, Donavade, Chafodi and Mandharewadi face the problems of high erosion.

5. SOIL DRAINAGE :

When water enters through the soil surface, it is called infilteration of water. If this infilteration is not rapid enough, the rain or irrigation water will flow over the soil surface, and cause the water-logging. If the flow of soil water is with certain velocity it will carry the top fertile soil with it and will result erosion (Vaidya & Sahastra-budhe,1979). The fertile soil surface will be protected from erosion and water-logging if the soil drainage is proper.

The land of Karveer taluka is classified into five categories of soil drainage viz. highly drained, well drained, moderate drained and less drained soil (Fig.2.2-A). 23% area is of less drained soil class and it covers the very gentle and gently sloping area of the taluka. 48% area is of modera-tely drained soil category. The well and highly drained area is about 19 and 4% respectively (Table 2-E). The highly drained area is hilly and so infilteration is less.

6. SOIL GRAVELS :

The presence of gravels affect the fertility of soil. The area under study is classified into three classes of gravel

content, namely no gravels, less gravels and moderate gravels. In Karveer taluka, the soils, on the bank of the Panchganga river have no gravels and it's proportion in the region is about 20%. Whereas the proportion of less gravel soil cover is about 53% of the total and the major portion of the taluka is occupied by this type of soil (Fig.2.2-B). The western part of the taluka is covered by moderate gravel soil with 21% of area.

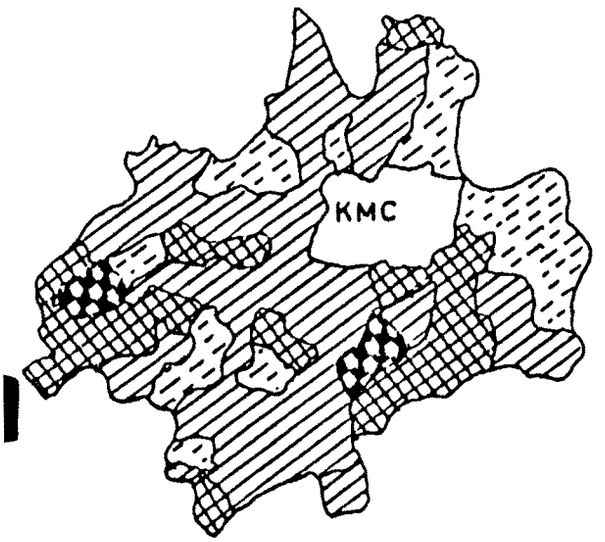
7. SOIL COLOUR :

The different shades of soil colour are due to parent material, organic matter and the presences of certain minerals. The colour of soil is mostly due to the iron and manganese compounds and the organic matter in soil (Narayana & Shah,1966).

Fig.2.2-C, shows the areal distribution of different soil types in the taluka. Dark red brown soil occurs in the villages of Bavada, Vadange, Nigave-Dumal, Shinganapur, Chikali, Waliwade and Chinchwad covering an area of about 10% of the total. Major portion of Karveer taluka is covered by red brown colour soil and its proportion is 47% of the total area (Table 2-G). Brown colour soil is found in the eastern part of taluka and it's proportion is only 5%. The land of the villages that display this colour group are Tamagaon, Ujalaiwadi and Kaneri. The light brown soil is found in major portion of the taluka and it's areal extent is 31% of the total area. The black soil is recorded in the eastern part perticularly the village Sangavade and its proportion is negligible.

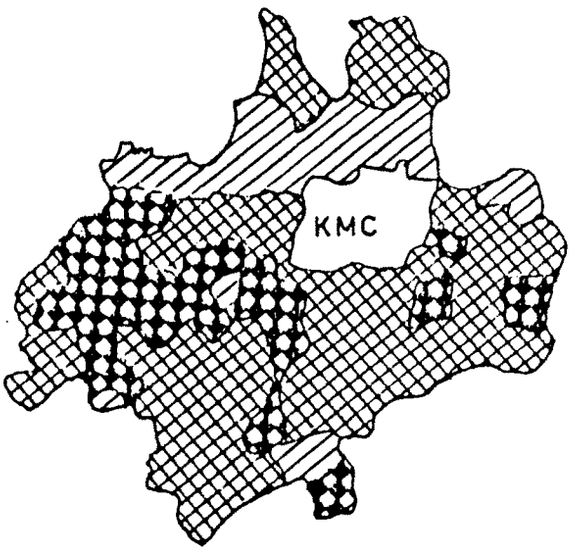
PHYSICAL PROPERTIES OF SOIL

(A) DRAINAGE



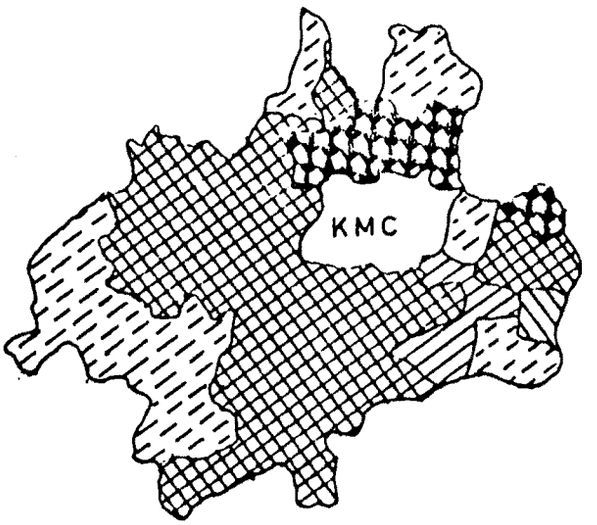
D5 HIGH DRAINED
D4 WELL DRAINED
D3 MODERATELY DRAINED
D2 LESS DRAINED

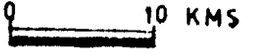
(B) GRAVELS



g2 MODERATE GRAVELS
g1 LESS GRAVELS
g0 NO GRAVELS

(C) SOIL COLOUR





DRB DARK RED BROWN
RB RED BROWN
BR BROWN RED
LBR LIGHT BROWN RED
BLA BLACK

KMC = KOLHAPUR MUNCIPAL CORPORATION

FIG. 2.2

SUMMARY :

The physical properties of soil such as soil texture, slope, depth, erosion, drainage, gravelness and colour are used as bases for land capability classification. Soil texture means the composition of soil in respect to particle size. Clay-loam, sandy clay, sandy loam, sandy and clay textured soil is found in the study area. The clay textural soil is observed only along the Panchganga river banks. The average slope of the land of taluka is very gentle. Soil depth is determined by the thickness of soil layers and mostly the proportion of shallow soil cover is wide spread in the study area.

Soil erosion means the removal of soil layer by different agents. High and moderate erosion hazard has covered about 84% land of the taluka. The soil drainage is moderate to high and occurs in 71% area of the taluka. The presence of gravels affects the fertility of soil. In Karveer taluka the land that falls on the banks of Panchganga river has no gravel. Whereas the moderate and less gravel soil is observed in the remaining part of taluka. Generally all over the taluka the red-brown colour soil is observed.

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