Distributional pattern and soil analysis: a micro level study of Mahewa block, district Etawah (U.P.)

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Abstract

Soil is the most valuable asset for any area, the present study was aims to analysis the fertility status of soil through the classification of different types of soil. Resultantly the study area divided into eight soil series. Generally, the soils of the study area are mainly loam to sandy loam in texture. The clay content in the profile is found to vary from place to place to place. It was also attempt to analyses the impact of soil fertility on agricultural production of mahewa block of district Etawah, U.P.

Key words-Soil series, soil texture, thickness an kankar

Introduction

Study of soil for any area where agriculture occupies an important economic aspect is highly significant as it is the quality of land which is responsible for crop yield. Good fertile soils help in better crop growth and high yields whereas poor soils are responsible for a poor agricultural economy. The importance of soils in older times as well as civilization since the ancient history has depended on the soils of its region and availability of irrigational water which can very well be seen while looking at great rivers like Ganga and Nile (Brady 1967). India is an agrobased country. With high population pressure force force to do studies on soil Therefore some relevant studies about Indian soil came out Theru Narayan's (1930) study can be said first description in the history of soil formation.Taking this into account, the soils of the area under present study stated Mahewa evelopmental Block of Etawah district of U.P. was studied for their mechanic characters and chemical properties which are the prime factors in the evaluation of the texture of soil, its water holding capacity, moisture content, porosity and fertility status.

Study area

Mahewa developmental block are one of the four blocks of bharthana subdivision is situated in the central part of the district Etawah. It extends between 26^0 $44^/$ $12^{//}$ north latitudes and 79^0 $2^/$ $18^{//}$ to 79^0 $19^/$ east longitudes with an area of about 323.34 sq. km. It bounds in the east and west Ajitmal and Basrehar blocks respectively, while the northern boundary is demarked by river Sengur, a tributary of river Yamuna, which

also forms the southern boundary with the total population of includes 117 revenue villages divided into 14 Nyay Panchayats and 105 villages. It also includes a town area called Lakhna.

Methodology

The soil analyses were based on village level, in the study for this purpose the data has been collected from various government agencies specially soil conservation department of District Etawah and field surveys. All informations and data has been scientifically analyzed and arranged into systematic tables, relevant data have been tabulated and maped along with the text. The purpose of soil classification is to arrange various types of soils into groups. According to their engineering or agricultural properties and various other
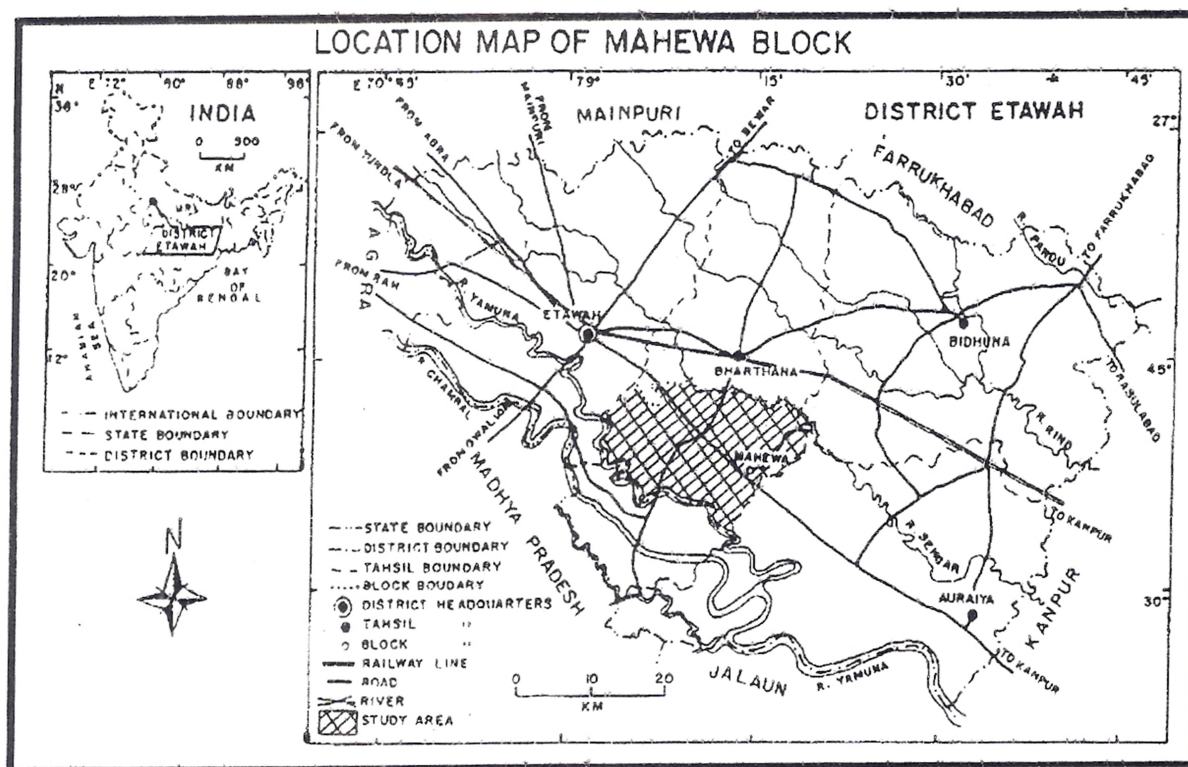

Fig : 1

characteristics it can be placed in the same group for the purpose of agriculture, the classifications are carried out by soil scientists from the point of view of the sustainability of the soil for crops and its fertility. According to data analyses and soil distribution map, the area could be grouped into eight different soil series as followes-

- Bakewar Series
- Karwa Buzurg Series
- Eknor Series
- Dalipnagar Series
- Basaulighat Series

- Damodarpur Series
- Sultanpur Series
- Bechapur Series

In general the soils in this area were mainly loam to sandy loam in texture. The clay content in the profile is found to vary from place to place with increasing depth to depth. The high amount of clay content mostly below 70 to 80 cm depth could be attributed to the leaching of fine fraction within the profile. The sand content was observed to be comparatively higher in Damodarpur area whereas it was only confined to 'A' horizon in larger amounts in Bakewar and sultanpur soils. The soil showing 'Kankar' layer; mainly formed of calcium carbonate nodules, was observed in the soil of Karwa Buzurg. This varying amount of calcium carbonate present in the soil shows a mild to high reaction with the acid in the form of effervescence. It was high in soils of Dalipnagar, Eknor, Bechapur and Baisolighat where the $_pH$ of the soil are found to be above 8.0.

Soil series in the area

Bakewar Series- Bakewar soils were observed on mid land well drained flat topography (fig. 2.A). That soils were very deep pale brown (10 year, 7/3, 6/5, 5/6, etc.), loamy, sub angular blacky, mildly alkaline ($_pH$ about 8.0), about 15 cm thick in the 'A' horizon and it is brownish yellow and yellowish brown, loam to clay loam, sub-angular blacky in the 'B' horizon which showd about 15 to 100 cm thickness containing ferro-Mangenese concretion and mildly alkaline reaction with the acid (fig. 2-B). Soils were poor in fertility as it contains a low nitrogen and phosphorus content but the potash was observed to be high.

Karwabuzurg Series- Soils in the series were observed to be very deep, fine loamy in texture situated on a moderate well – drained mid and. It has approximately 20 to 25 cm thick 'A' horizon which bears a brown to yellowish brown colour, loamy texture and sub-angular blocky structure. About 85 cm thick 'B' horizon full of mottles. Ferro-manganese and calcium carbonate concretions were observed situated within the fragmented soil having 'Kankar pan' below 110 cm depth. This soil although contains a low nitrogen, medium phosphorus and high potash content, it was not very suitable for crops due to their 'Kankar pan' and calcium carbonate concretions.

Damodarpur Series- Series was situated on upland; undulating topography was very deep and excessively drained. The 'A' horizon which was 40 cm thick, yellowish brown in colour (10yr 5/4) loamy to sandy loam in texture, had granular structure. Representing $_pH$ around 8.0, it was mildly alkaline in nature. The 'B' horizon which was about 140 cm thick is observed to be dark brown in colour, sandy loam structure, granular and has a mild alkaline reaction (the $_pH$ in this horizon is about 7.6 to 8.1). Fertility vies the soil showeda poor status similar to Bakewar Series and has a low nitrogen and phosphorus level.

Eknor Series- Soils was fine loams and very deep. These are situated on well drained flood plains. The 'A' hoizon is the series shows a very pale brown colour, loam to clay loam texture and sub-angular blacky s a mild alkaline reaction and contains a high amount of mottles, ferro-manganese and calcium carbonate concentration. These soils are very poor in fertility as represented by a NPK values.

Dalipnagar Series- Soils were situated on excessively drained upland and deep ravines having more than 20% slope. These speciality in those series were a highly eroded 'A' horizon which was nearly absent

in places although the soil shows about 180 cm thickness. It was yellowish to yellowish brown in colour loam to clay loam in texture, sub-angular blacky structure and contains calcium carbonate concretions. These soils of that group are very poor in fertility as these are low in their nitrogen phosphorus contents.

SOIL CLASSIFICATION

Fig. 2
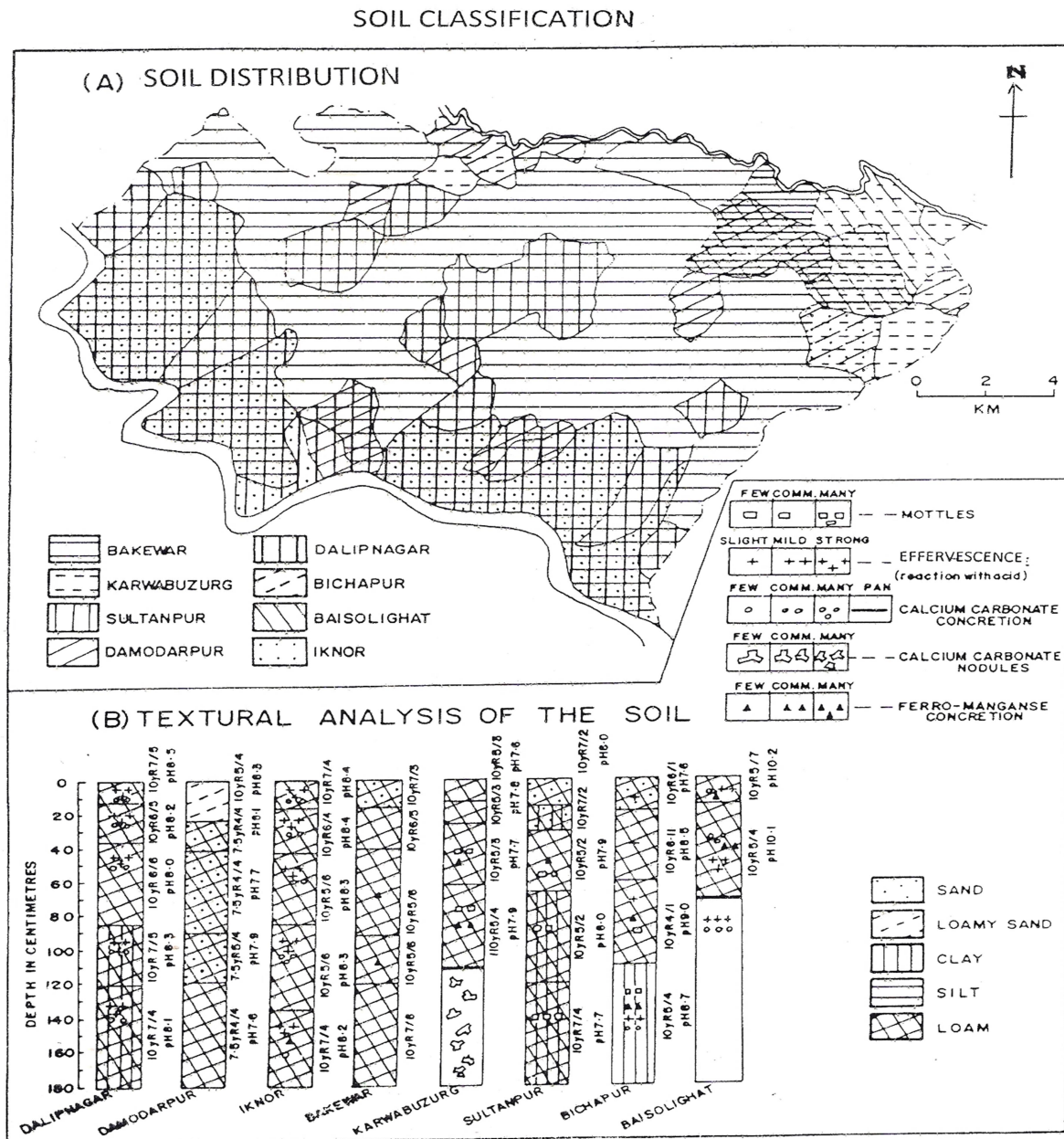
Basolighat Series- Soils in the category were deep and situated on nearly level flat lowland topography. Those were poorly drained having about 15 cm thick 'A' horizon which was yellowish brown in colour, sandy clay loam in texture and sub-angular blacky structure. This horizon exhibited a strongly alkaline

reaction and contains large number of calcium carbonate concretions. The 'B' horizon below 15 cm depth having about 50-55 cm thickness shows a yellowish brown colour clay o silty clay loam texture and a sub-angular blacky. It also contains mottles, ferro-manganese and calcium carbonate concretions and has a strongly alkaline in nature. Soil below 70 cm depth is observed to contain a 'Kankar pan' which was mostly calcium carbonate as it was evident by its high reaction with acid indicared to poor in fertility.

ltanpur Series- A flat lowland and poorly drained topography in the series having about 20 cm thick 'A' horizon, grey to greish brown colour loamy structure, sub-angular blacky structure is observed in the area, this layer has a moderately alkaline reaction and conatains mottles of various sizes. Soil below 30 cm depth which runs upto 180 cm depth forms the 'B' horizon iyt is dark greyish to pale brown clay loam to clay, sub-angular blacky structured soil which contains mottles and has a derately alkaline reaction. The soil in general in the series exhibits similarly within the profile excepting a difference in its colour from its surface to its depth. The soil has a poor nitrogen and phosphorus status.

Series- Soil in the series was very deep, situated on a midland on a well drained topography. The 'A' horizon about 50 cm thick, brown in colour, loamy texture, sub-angular, blacky structure has a mild alkaline reaction. Soil below 'A' horizon and upto 110 cm depth is brown to yellowish brown in colour, clay loam texture and has a strong sub-angular blacky structure showed a mild alkaline reaction. A 'Kankar pan' containing mostly calcium carbonate is observed below 110 cm depth in the series, soils falling under different soil series in the block as described above had been represented in the soil map (fig. 2-A).

Soil fertility

The whole description shows that the status of available nitrogen, phosphorus and potash in the soils of the area is not sufficient. The nutrient rating for various categories of soils as fixed by department of agriculture is given below (Table-1). The percent of organic matter has been taken as the basis of evaluation of nitrogen On the basis of rating chart for the soil testing data, the fertility status of different soil series of the block has been summarised in the following table 2. The soils was found low organic carbon and phosphorus content, potash was generally high in the soil accepting of Eknor series which was poor in its K_2O contents also under prevailing system of contents it was imperative in order to have a good sustained yield from the soils that these are managed and properly and enriched with needed fertilizers rich in their nitrogen phosphorus values. The application of potashic fertilizers might also be required in some areas depending on specific requirement of a particular crop, therefore, the use of chemical fertilizers were one of important practice in agriculture. With the adoption of modern technology in agriculture, demand of fertilizers was gradually increasing in the study area for last 15 years at present it was 75% cultivated land. The use of nitrogen is about 120 kg, phosphorus 32 kg and potassium 11 kg per ha. The low fertility status of the area was improving by using chemical fertilizers. The main crops are wheat, pea, gram, bejhar, bajra and rice, with the yield of about 24, 14, 15, 7, 10 and 9 quintals per ha respectively.

Table-1 Rating chart of soil testing data

Nutrients Avalable	Very Low	Low	Medium	Medium High	High
Organic Carbon (%)	0 - 0.2	0.2 – 0.4	0.4 – 0.6	0.6 – 0.8	Above 0.8
P_2O_5 kg./ha.	0 – 22	22 – 46	46 – 70	70 – 90	Above 90
K_2O kg./ha.	0 – 56	56 – 112	112 – 200	200 - 280	Above 280

Source: Soil Survey Report - Department of Agriculture, Etawah

Table-2 Soil fertility status

Name of the series	Major Nutirents		
	Organic Carbon	P_2O_5	K_2O
Bakewar	Low	Low	High
Karwabuzurg	Low	Medium	High
Eknor	Low	Low	Low
Dalipnagar	Low	Low	Medium
Baisolighat	Low	Low	High
Damodarpur	Low	Low	High
Sultanpur	Low	Low	High
Bichapur	Low	Medium	High

Conclusion

The study area had low fertility status with respect to nitrogen and phosphorus. The application of potassic fertilizers might be required in some areas depending upon specific requirement of particular crop. Timely application of fertilizers along with green manuring and application of composet are essential parameters in the region, which will not only help in improving soil texture but also it will in helpful producing high crop yield.

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