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## Soils of the Sugarcane Development Centres in Coimbatore District (Madras)

by

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**Introduction:** Coimbatore district is the third largest sugarcane growing tract in the Madras State, with 45,846 acres under sugarcane, the major portion of which extends over the taluks of Coimbatore and Udumalpet. The soil survey of sugarcane tracts was undertaken during the year 1961-62 and was confined to the sugarcane soils of these two taluks alone the results of which are presented. The object of the survey was to classify the soils of the cane areas of the district into major broad soil divisions.

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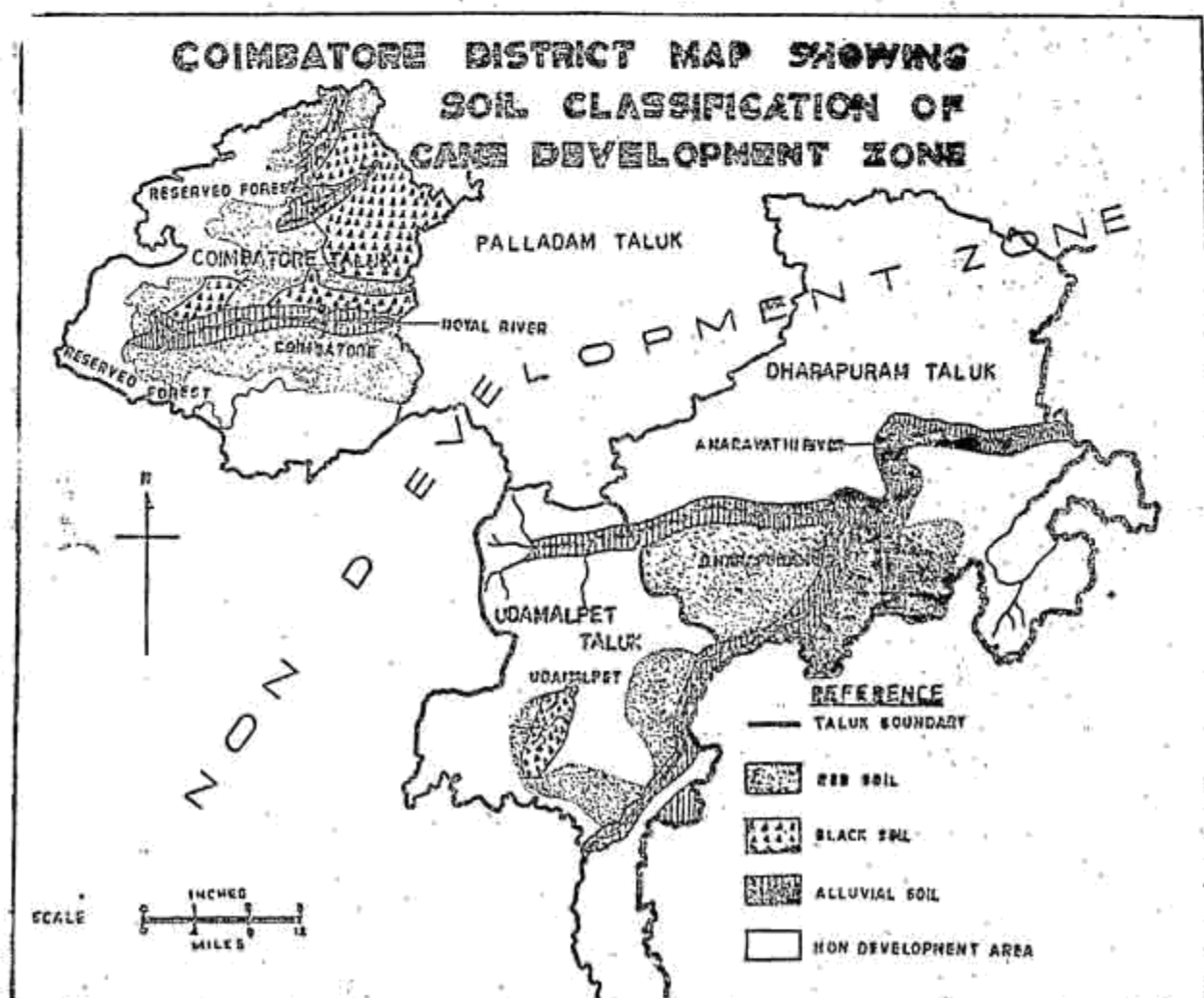
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**Physiography:** Coimbatore taluk is situated in the south-west corner of the district at the foot of the Nilgiris which bound it on the west and north. The taluk is a large open plateau about 1300 feet above sea level. To the west is the Velliangiri hills and further to the south is the Palghat gap. The taluk is traversed by two rivers, the Bhavani in the north and the Noyyal in the South. Kallar is a jungle stream issuing from the Nilgiris.

The taluk of Udumalpet is the southern most taluk of the district. Anamalai hills constitute the great southern barrier. The country is an open plain, flat in the west but gently undulating in the south and east. The only river of importance is the Amaravathi river which flows about due north on the eastern edge of the taluk.

**Geology:** The whole surface of the Coimbatore district is stated to be composed of a vast spread of foliated rocks. *Quartz, felspar* and *hornblende* are the chief constituents with *gneiss* as the foundation. The *t-ufacious* lime stone is a remarkable geological feature in Coimbatore.



**Seasonal conditions:** The district proper, lying south of western ghats, is very dry, some taluks averaging only 18 inches of rainfall per year. The pleasant and chill months of January and February are followed by hotter April and May when a few showers are also received. South-west monsoon sets in at the end of May and brings instant relief to a great part of the district with frequent showers during the four months to follow, till it dries out by the end of August. In October, north-east monsoon sets in and the heaviest rains are received by the end of October and throughout November. The average rainfall of the district is about 24 inches.

**Materials and Methods:** The method of detailed reconnaissance soil survey as proposed by the U. S. D. A. Workers (1951) was followed during the study involving examination of soil profiles upto six feet depth or upto the parent material if it were to occur earlier for the morphological examination of each horizon or foot. Soil samples were drawn and analysed in the laboratory by the usual conventional methods for mechanical composition, nutrient status, pH, moisture-retention capacity, carbon-nitrogen ratio, water soluble salts, cation exchange capacity etc.

**Results of soil examination:** The soil classes met with in the cane growing areas of the Coimbatore and Udumalpet taluks of the district fall under three major groups viz. (i) black soil (ii) red soil and (iii) alluvial soil.

**Black soils:** The black soils of the sugarcane tract are confined to Coimbatore city and around in Coimbatore taluk and the area commanded by the seven tanks of "Boothanam Series" in Udumalpet taluk.

**Typical profiles:** 1. *Coimbatore taluk, Upplipalayam village:* The soils occur on normal slopes with no erosion or slight erosion. Drainage is impeded with surface accumulation of salts and also in the lower depths of the profile.

**PROFILE CHARACTERISTICS:**

- 0 — 12" Very dark grey brown; clayey; angular blocky; sticky when wet and hard when dry.
- 12 — 72" Very dark brown; clayey; angular blocky; sticky when wet and hard when dry.

2. *Udumalpet taluk, Sundakkampalayam village:* The soils occur on normal slope ranging from 0–1 per cent with no erosion or slight erosion. The soils are very deep with clay content increasing with depth.

## PROFILE CHARACTERISTICS :

- 0 — 36" Black to brownish black ; clayey ; angular to sub-angular blocky ; very hard when dry and sticky when wet ; *kankar* present in small quantities.
- 36 — 48" Greyish black ; sandy clay ; sub-angular blocky ; hard when dry and slightly sticky when wet ; more *kankar* present in this depth than in the upper layer.

Range of characteristics : The colour varies from very dark grey brown to black and the structure from sub-angular blocky to angular blocky. The soils are deeper in Udumalpet than in Coimbatore. Gypsum deposits are also met with in a few profiles at the sub-soil region.

*Red soils* : The major part of the cane growing areas of the district comes under red soil. The red soils chiefly occur on the west and north of Coimbatore Taluk and on the north, south and east of Udumalpet Taluk. They are moderately deep on normal slopes having practically no erosion.

Typical profile : 1. *Coimbatore taluk, Chettipalayam village* .

## PROFILE CHARACTERISTICS :

- 0 — 48" Reddish brown to red ; sandy clay loam ; granular to sub-angular blocky ; slightly sticky when wet and slightly hard when dry.
- 48 — 72" Red ; sandy loam ; granular ; loose when dry and friable when moist.

2. *Vellaikinar village, Perianaickenpalayam* :

## PROFILE CHARACTERISTICS :

- 0 — 36" Dark brown ; sandy clay ; angular to sub-angular blocky ; hard when dry and sticky when wet ; sub soil mixed with stones *kankar* coated parent material.

3. *Udumalpet taluk, Mettupalayam village* :

## PROFILE CHARACTERISTICS :

- 0 — 8" Dark grey brown ; sandy loam ; granular ; slightly hard when dry and slightly sticky when wet ; few pieces of *kankar* ;
- 8 — 14" Red ; sandy loam ; granular ; disintegrated parent material coated with *kankar*.

4. *Udumalpet taluk, Sarkarkannadiputhur village :*

## PROFILE CHARACTERISTICS :

- 0 — 13" Light reddish brown; sandy; loose when dry friable when moist; single grained.
- 13 — 48" Red; sandy; single grain; loose when dry friable when moist; few *kankar* pieces.

**Range of characteristics :** The colour varies from reddish brown to red and the texture from sandy to sandy loam. *Kankar* is generally absent in the surface but invariably present in the sub-soil. The red soils of Udumalpet are shallower than that of Coimbatore taluk. Where the soil is very shallow *kankar* appears very near the surface.

**Alluvial soils :** These soils are met with only to a very small extent. Alluvial deposits due to the river Noyyal occur near the villages Telungupalayam, Perur *etc.* in Coimbatore taluk and due to the river Amaravathi near the "K" villages of the Udumalpet taluk. These very deep, freely drained soils occur on normal slopes where erosion is negligible.

Typical profile : 1. *Coimbatore taluk, Vadavalli (Noyyal alluvium) :*

## PROFILE CHARACTERISTICS :

- 0 — 25" Reddish brown; sandy clay loam; granular; slightly hard when dry and slightly sticky when wet.
- 25 — 36" Red; sandy; single grain; loose when dry and friable when moist;
- 36 — 48" Reddish brown; sandy clay loam; granular to crumb; slightly hard when dry and slightly sticky when wet;
- 48 — 60" Reddish brown; sandy clay; sub-angular blocky; slightly hard when dry and slightly sticky when wet;

2. *Udumalpet taluk, Sankaramanallur village :*

## PROFILE CHARACTERISTICS :

- 0 — 12" Grey brown; sandy clay loam; granular; slightly hard when dry and slightly sticky when wet;
- 12 — 72" Grey brown; sandy to sandy loam; single grain to granular structure; loose when dry and friable when moist.

**Range of characteristics :** The colour of the soil ranges from reddish brown to grey brown and the texture from sandy loam to sandy clay loam. The structure varies from granular to sub-angular blocky.

Results and discussions: The soils of the cane growing areas of the district are primarily derived from the disintegration of the *gneiss* both *felspathic* and *hornblendic* which underlies the surface and slopes gradually up to the surrounding hills. The *quartz* of the *gneiss* has broken down into stoney gravel and sands and the *felspar* has partly disintegrated into clay and sand.

The black soils have a fair to good supply of total nitrogen ranging from 0.09 per cent in the surface to 0.3 per cent in the sub-soil. The C/N ratio is fairly wide of the order of 5 to 12. These characters indicate the addition of vegetable matter from the vicinity. The soils are rich in lime which can be attributed to the fact that they have developed from the trap rocks having *hornblende* and *augite* in the composition. The total potash status is also very high ranging from 0.18 to 1.04 per cent which might have come from the potash *felspar* in the rock below. The soils are rich in bases and have a high cation exchange capacity of 84 m. e. per 100 g. of soil. The high clay content and organic matter might have contributed to the high moisture holding capacity which indicates a superior drought resistance. Such soils are well suited for light irrigation at longer intervals. Though the total phosphorus status is fair to good the availability is very low to low. The high pH and clay may also be the causes of low availability of phosphorus. The soluble salts are present in harmless amounts. Being heavy clay, the soils disburse completely and as a result, the drainage is impeded.

The red soils have been derived from the disintegration of *quartz* and *gneisses*. They are sandy to sandy loam and moderately deep. As can be seen from the table the soils are poor to fair in total nitrogen (0.036 to 0.054 per cent) rich in total potash and phosphorus. But the availability of all the nutrients is very low especially phosphorus. *Kankar* nodules are distributed throughout the profile and the lime content is very high. In many areas tufacious lime stone, locally called as "*Odeikal*" occurs as long sheets of considerable thickness. The soils are mildly alkaline in reaction. Wherever lime occurs in the surface soil, lime-induced chlorosis in sugarcane, groundnut and cholam is a common sight. The organic matter content is very low and the C/N ratio is narrow. The texture of the soil being sandy loam drainage is good and the concentration of soluble salts is well within toxic limits. The cation exchange capacity is much less than in the black soils wherever, the soils are moderately deep they are well suited for sugarcane.

The alluvial soils are sandy loam to loam in texture, very deep with granular to sub-angular blocky structure. They have a fair supply of total nitrogen, and are rich in total phosphorus and potash. But the

availability is quite low as can be seen from table. One of the reasons for the low availability may be that the soils are mildly alkaline. Total soluble salts and electrical conductivity are quite low indicating that the soils are free from salinity hazards. The C/N ratio is fairly wide (8-10). The moisture holding capacity is very high. Compared to the black soils of the tract the cation exchange capacity of the alluvial soils is rather low. Except that they are low in available nutrients the soils are otherwise well suited for sugarcane cultivation.

TABLE. Results of analysis of soils of typical profile

No.	Heads of analysis	Black soil			Red soil			Alluvial soil		
		0-12"	12-24"	24-36"	0-12"	12-24"	24-36"	0-12"	12-24"	24-36"
1.	Total Nitrogen (N) percentage	0.090	0.038	0.031	0.054	0.052	0.036	0.041	0.031	0.022
2.	Total Phosphoric acid percentage ( $P_2O_5$ )	0.053	0.048	0.147	0.216	0.186	0.211	0.102	0.056	0.034
3.	Total Potash ( $K_2O$ ) percentage	0.887	0.974	1.040	0.427	0.385	0.391	0.427	0.420	0.150
4.	Lime (CaO) percentage	3.15	3.32	3.54	2.098	0.923	1.241	1.131	0.760	1.042
5.	Available Nitrogen (N) lb./acre	210	112	140	154	112	70	196	...	...
6.	Available Phosphorus (P) lb./acre	8.0	2.0	5.2	3.2	5.2	4.8	10.4	5.2	2.8
7.	pH	8.2	8.3	8.3	8.5	8.3	8.4	8.7	8.5	8.4
8.	Total soluble salts percentage	0.355	0.100	0.186	0.052	0.046	0.056	0.084	0.074	0.070
9.	Electrical conductivity m. mhos/cm.	1.3	0.7	0.7	0.2	0.2	0.2	0.6	0.35	0.45
10.	C/N Ratio	8.1	12.2	9.7	6.4	4.3	5.0	10.08	8.58	10.15
11.	Water-holding capacity percentage	66.22	70.66	69.45	50.63	46.17	50.93	52.11	56.59	49.03
12.	Cation-exchange capacity (m. e./100 gms. of clay)	75.53	84.95	81.50	36.58	19.11	21.45	34.78	23.79	32.89

**Summary:** A detailed reconnaissance soil survey of the sugarcane development zones and contiguous dry areas of the Coimbatore district comprising Coimbatore and Udumalpet taluks was conducted and the survey has led to three broad soil divisions viz (a) black soil, (b) red soil and (c) alluvial soil.

The black soils are grey brown, clayey and sub-angular blocky to angular blocky. They are deep with *kankar* bed or red soils as parent material. *Gypsum* also occurs in some places. They are fair in plant nutrients. The red soils are moderately deep, loam to sandy loam, and

granular to sub-angular blocky. They are fair to low in plant nutrients. The alluvial soils are very deep red brown sandy clay loam to sandy loam and granular to sub-angular blocky. They possess medium amounts of plant nutrients.

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## Ideal Breeding and Selection of Sugarcane

by

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**Introduction:** For a long time upto 1959 breeding was being done broadly for the requirements of the Sub-Tropical Northern India, and the Tropical Southern India. Since 1959 the Indian union was divided into seven main regions according to the soil and climatic conditions, and breeding programme was re-orientated accordingly. It is therefore necessary that certain norms or guide lines should be investigated and fixed up for each region to evolve an ideal cane.

**Materials and methods:** The yield attributes in cane viz. the length and thickness of cane, number of internodes, individual weight of cane, tillering or population per acre and juice quality were studied in 200 selections from six parental crosses at the Sugarcane Research Station, Cuddalore, in 1965. Thickness of cane was determined by recording the girth at top middle and bottom of the cane and taking the average. From the length of cane and the number of internodes the average length of internode was worked out. From the weight of individual cane and the number of internodes, the average weight of internode was calculated.

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