

BENCHMARK SOILS OF ANDHRA PRADESH



NATIONAL BUREAU OF SOIL SURVEY & LAND USE PLANNING (ICAR)
Amravati Road, Nagpur - 440 010

In Cooperation with

DEPARTMENT OF AGRICULTURE, GOVT. OF ANDHRA PRADESH, HYDERABAD

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BENCHMARK SOILS

of

ANDHRA PRADESH

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ABOUT NBSS & LUP

The National Bureau of Soil Survey and Land Use Planning (NBSS & LUP), Nagpur, a premier institute of Indian Council of Agricultural Research (ICAR), was set up in the year 1976 with the objective of preparing soil-resource maps at village, watershed, taluk, district, state and national levels and to provide research inputs in soil-resource mapping, soil correlation and classification, soil genesis, remote-sensing applications, land evaluation, land-use planning, land-resource management and data-base management using GIS for optimizing land use on different kinds of soils in the country. The Bureau has been engaged in carrying out agro-ecological and soil-degradation mapping at the country, state and district levels for qualitative assessment and monitoring of soil health towards viable land-use planning.

The research activities of the Bureau have resulted in identifying soil potentials and problems and the various applications of soil surveys with the ultimate objective of sustainable agricultural development. The Bureau has the mandate to correlate and classify soils of the country and maintain a National Register of all the established soil series. The Institute is also imparting in-service training to staff of soil survey agencies in the area of soil survey, land evaluation, land-use planning and GIS. The Bureau in collaboration with Punjabrao Krishi Vidyapeeth, Akola, and Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, is running post-graduate teaching and research programmes in land- resource management, under which M.Sc. and Ph.D. degrees are awarded. The Regional Centres of the Bureau are associating with SAU's in teaching, research and other academic activities.

The publication on "Benchmark soils of Andhra Pradesh" is prepared from soil-resource information generated during soil-resource mapping and provides all the required information needed to evolve viable and sustainable land-use plans for the development of the state.

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FOREWORD

Information on soil and land resources and their management is an important endeavour for sustenance of agriculture and other related environmental issues. In the present context of burgeoning population, and with increase in demand for land by different sectors, the soil resource information is gaining importance in regional, state and national developmental planning towards optimizing land use and to maintain a sound ecological balance. In the recent past, the country is experiencing the rapidity in deterioration of soil resources mainly in the form of erosion, salinity, sodicity, nutrient depletion and physical deterioration. It is a matter of great concern that about 57 per cent of the total geographical area of the country is suffering from various forms of soil degradation. Over 5.3 billion tones of top soil is lost every year through erosion alone resulting in the loss of 8 million tonnes of plant nutrients. In addition, about 9.4 M ha area is suffering from soil salinity and waterlogging. Soil resource base is also shrinking at an alarming rate of 0.25 M ha/annum due to industrialization, urbanisation and other nonagricultural uses. Although, we inherited a cleaner and greener earth from our forefathers, we are degrading it by not caring the future generations what is rightfully inheritance.

Water is another critical resource whose availability is continuously diminishing for agricultural use due to enhanced demand from other sectors. Declining water table has threatened the hydrological cycle. Quality of water resource is being deteriorated due to enhanced disposal of pollutants, sewage and other effluents. The water resources both surface and ground water need to be efficiently managed in order to preserve and protect the productivity of soil resource base for sustainable crop productivity.

India is endowed with rich natural vegetation of great diversity. It is well acknowledged that preservation of biodiversity is a matter of insurance and investment that is necessary to sustain and improve agriculture, forestry and fisheries production. The modern methods of agroforestry provide ways and means of protecting fragile ecosystems, moderating the hard climates and enhance productivity on otherwise barren and waste lands.

The pros and cons of all the above issues necessitates to systematically inventorise the soil resource and categorize into well defined soil units indicating their potentials and problems for normal crop husbandry under the existing agroenvironment.

Under such a challenging scenario, it gives me an immense pleasure to note that Sh.R.S. Reddy, Principal Scientist, Project Leader, Soil Resource Mapping of Andhra Pradesh and the team of scientists from Bangalore Regional Centre, under the leadership of Dr.K.S. Gajbhiye, Director, Dr.P. Krishnan and Dr.S. Vadivelu, Principal Scientists and Heads, Regional Centre, Bangalore, with the active cooperation of the Department of Agriculture, Govt. of Andhra Pradesh have brought out a publication on Benchmark Soils of Andhra Pradesh. The publication describes the geographic distribution and extent, potentials and problems and needed measures for management of the soils of the state. I congratulate them profusely for bringing out such an useful publication.

The publication is extremely useful for researchers, planners, policy makers and all others who have a stake on the land in the State of Andhra Pradesh. It is hoped that this publication will be helpful in better understanding of the soil and land resources and to formulate future research, development and extension programmes for optimising land use in the state of Andhra Pradesh.

(J.S. SAMRA)
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PREFACE

Soil, water and vegetation are the vital natural resources of a country. It is of paramount importance that conservation and management of these resources to sustain life on the planet of earth. India with the ever increasing population, which is likely to cross 1225 million by 2015 AD and livestock by 600 million requires 275 M tonnes of foodgrains, 1083 M tonnes of green fodder and 235 M m³ of firewood as against the current production of 200 M tonnes of foodgrains, 513 M tonnes of green fodder and 40 M m³ of firewood. The complex problems of food security, poverty, equity and sustainability of resource base will continue to be the cause of concern for agricultural planners in the years to come. It is a fact that stress on natural resources is inevitable as it would be required to increase the carrying capacity of the soil resource base.

Soil are being subjected to indiscriminate and faulty use that cause various kinds of deterioration. It is estimated that about 57 per cent of the total geographical area of the country is prone to various degradative processes such as water and wind erosion, salinization and waterlogging, ravine formation, mine-spoils, quarrying and landslides. The pressure on forests and other marginal lands on steep slopes may exceed the resilience power of the natural ecosystems leading to irreversible degradation.

It is being felt and discussed at various fora that there must be a long term policy for conservation, management and sustainable utilization of natural resources so that the newly emerging challenges can be addressed successfully. It is therefore, imperative to strengthen research for improving and efficient utilization of soil resource base. For assessing the productivity potential of the soils of an area, one needs to have proper soil resource data base on the kinds, characteristics, geographic distribution and extent of different soils. The predictions on soil behaviour depend on the soil and site-specific information on soils. To achieve this objective, the Regional Centre, Bangalore of NBSS & LUP has made an attempt to bring out a publication on "Benchmark Soils of Andhra Pradesh" based on the data generated during soil resource mapping of the state.

The benchmark soils numbering 55 have been grouped under six soil orders. Each soil has been described in respect of its nature, characteristics, problems and potentials, land use, yield levels of major crops grown and land suitability for crops. This would help in developing strategies for increasing agricultural production on sustainable basis. It is hoped that the publication will be useful to researchers, policy makers, extension workers and others for optimising land use at the state level.

I appreciate the efforts made by Sh. R.S. Reddy, Principal Scientist and his team of scientist colleagues under the leadership of Dr. P. Krishnan and Dr.S. Vadivelu, Principal Scientists and Heads, Regional Centre, Bangalore in bringing out this publication and I congratulate them for their efforts.

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1. ANDHRA PRADESH : AN OVERVIEW

Andhra Pradesh covers an area of 27 M ha. It has a population of 66.51 M and is the fifth largest state in India. It is located between 12°37' to 19°54' North latitudes and 76° 46' to 84° 46' East longitudes. It is bounded by Maharashtra on the north, Chattisgarh and Orissa on the northeast, Tamil Nadu on the south, Karnataka and Maharashtra in the west and the Bay of Bengal on the east (Fig. 1). It has a long sea coast that stretches nearly 972 km. The state has three administrative regions namely, agriculturally advanced and economically prosperous Coastal region (9 districts), economically and socially backward Telangana region (10 districts) and a perennially drought-prone Rayalaseema region (4 districts) with a fairly extended tribal belt along the northeastern and northern parts of the state. It has 1150 revenue mandals, 27220 inhabited and 2207 uninhabited villages. Hyderabad is the capital city of Andhra Pradesh.

The geological formations comprised of Archaean, Precambrian, Paleozoic, Carboniferous, Triassic, Cretaceous, Mesozoic, Tertiary, Miocene, Pliocene and Pleistocene.

The state has been divided into three major physiographic regions, (Deccan Plateau, Eastern Ghats and Coastal Plains based on altitude and general relief) and four physiographic divisions (South Deccan Plateau, Eastern Ghats (South), Eastern Ghats (North) and East Coastal Plains) (Fig. 2). There are further subdivided into 18 landforms.

South Deccan Plateau in Andhra Pradesh, locally known as Telengana and Bangalore Plateau covers an area of about 54 per cent. The terrain is undulating hummocky with denudation hills, buttes, mesas, plateaus, dissected pediments, pediplains and alluvium of recent origin. The plateau has two erosional surfaces with altitudes of 150-600 m and 300-900m above MSL. The highest surface is in the southern part near Penukonda (940 m) and the lowest is in the central part in the valleys of the Godavari river (150 m).

Eastern Ghats represents a series of broken hill ranges, hills and ridges and are largely covered by forests and uncultivable rocky wastes. They cover about 33 per cent of the area of the state and extend from Chittoor district in the south to Srikakulam district in the north. It has three elevational surfaces, (600-900 m, 900-1200 m and 1200-1600 m above MSL). The highest peak being 1680 m in Chintapalle and Paderu in Visakhapatnam district.

The Coastal Plains flanking the Bay of Bengal in the east stretches for about 1000 km and cover about 13 per cent area of the state. It is a flat plain stretching from the Bay of Bengal to the foothills of the Eastern Ghats. It has an elevation of upto 150 m above MSL. It is widest in the middle, where the rivers Krishna and Godavari flow into the sea forming a broad deltaic plain.

The state is drained by three major rivers (Godavari, Krishna and Pennar), five minor rivers (Manjra, Vamsadhara, Gundalkamma, Araniar and Poini) and 18 small rivers and several ephemeral *nalas* and *vagus* comprising various sub-basins within the main river basin. The major direction of drainage is towards the Bay of Bengal from west to east, with tributaries and minor streams taking up north-south or north-west-southeast trend. The state has a dendritic to subdendritic and at places, parallel to subparallel drainage. The major rivers flow in broad valleys which appeared to be nearly graded with very gentle gradients of 1/7000. They are even more gentle in the delta plains. Steeper gradients of 1/1000 or smaller occur at few places in the plateau region. The northern rivers of Godavari and Krishna are perennial because of their origin in the humid Western Ghats, whereas the southern rivers are seasonal because of their flow through semiarid and arid areas.

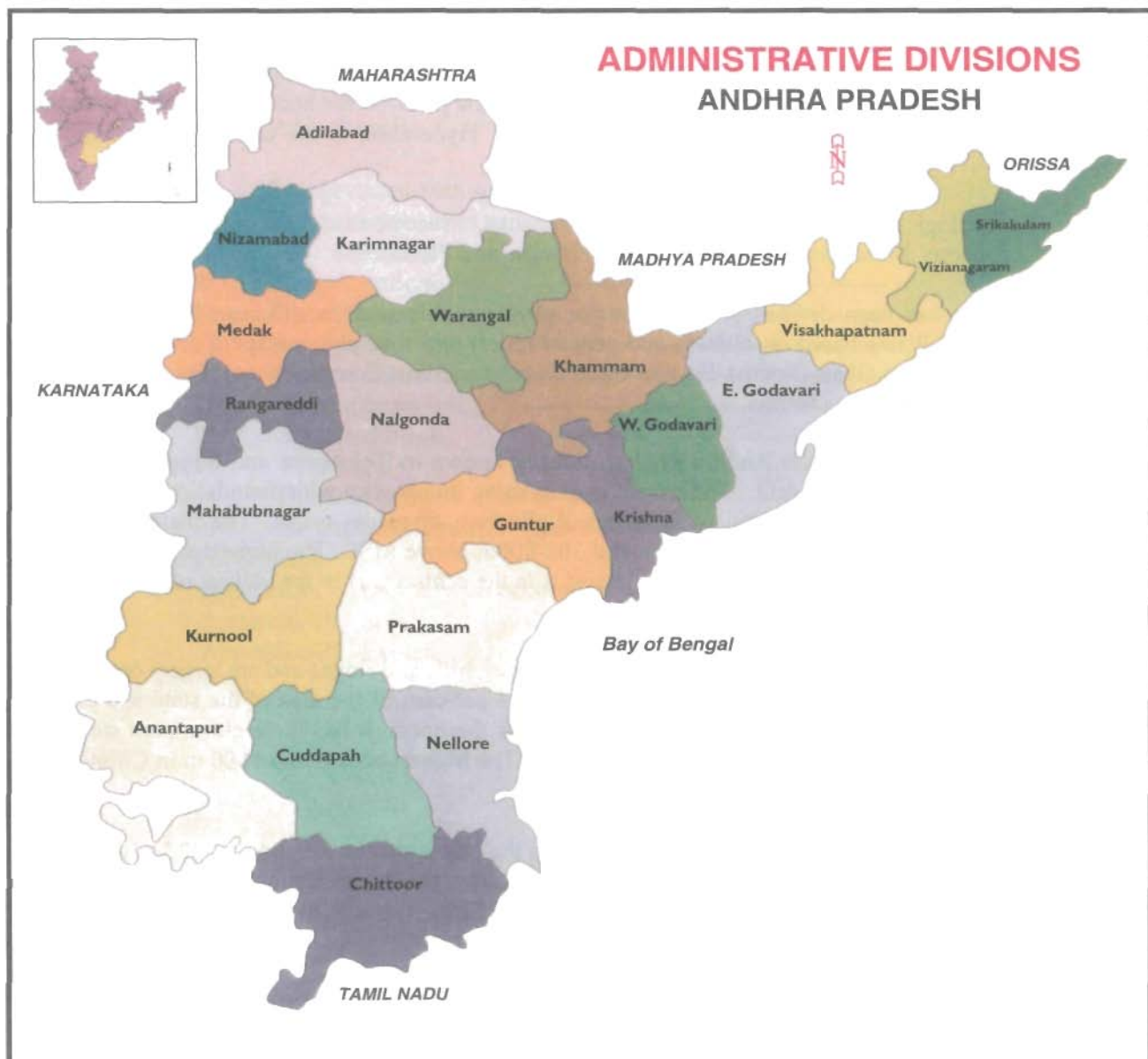


Fig.1 Administrative Divisions - Andhra Pradesh

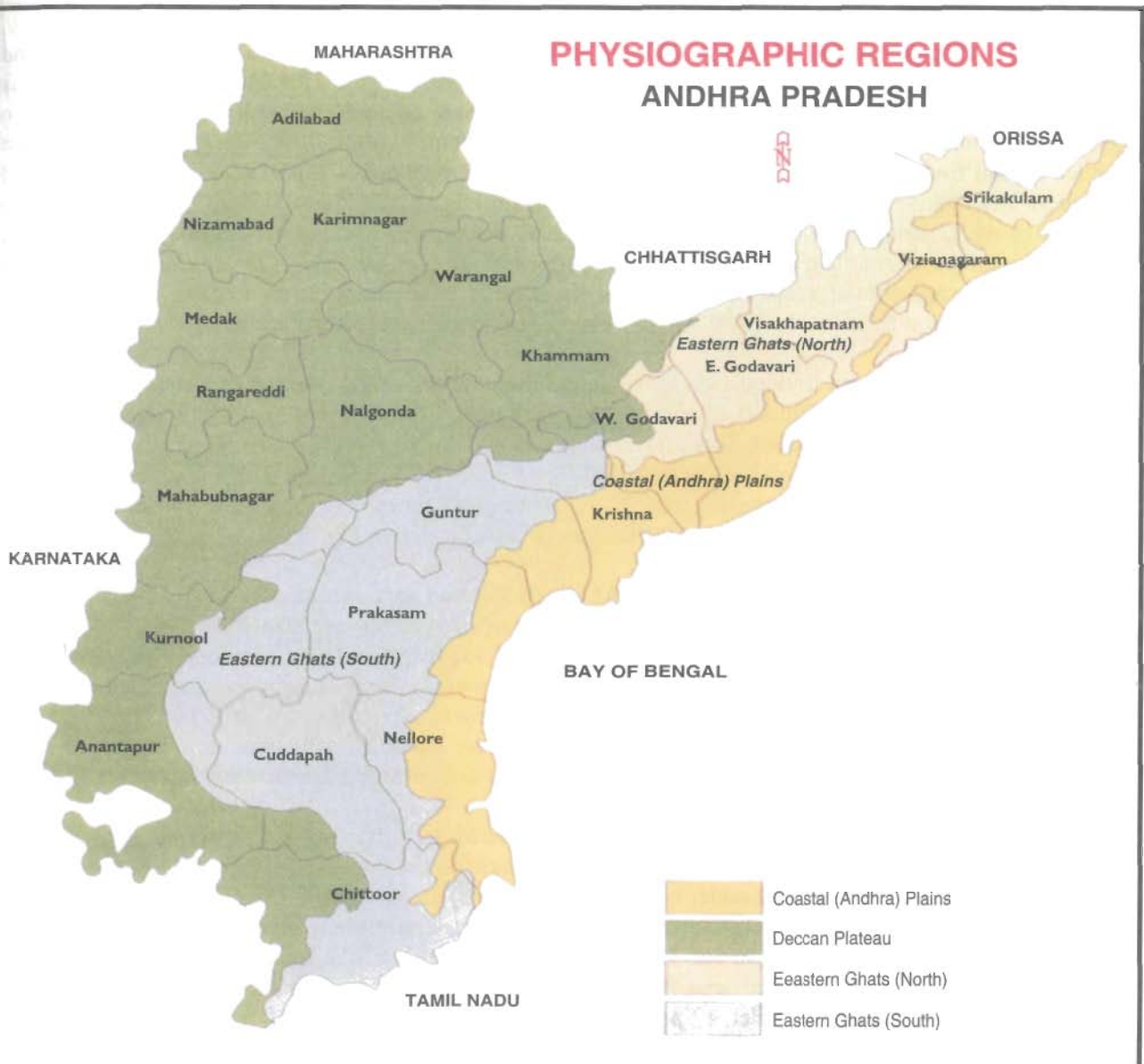


Fig.2 Physiographic Regions - Andhra Pradesh

The state falls under a transitional zone from tropical to subtropical monsoonic climate of semiarid in Telangana region, arid to semiarid in Rayalaseema region and humid to subhumid in the Coastal region. The summers are hot and the winters are relatively pleasant especially on the plateaus of the interior. Although, the differences in relief cause only small variations in temperature from one place to another, they significantly influence the distribution pattern of rainfall, the hill areas getting relatively higher amount of rainfall. The state has four climatic seasons namely, summer season (March-May), southwest monsoon season (June to September), northeast monsoon season (October-November) and winter season (December-February).

The average annual rainfall is 830mm. It varies considerably from 690 mm in Rayalaseema region to 860 mm in Telangana region and 950 mm in Coastal region (Fig.3). About 70 per cent is received during June to October except in Nellore district where about 60 per cent is received during the Northeast monsoon period. There are regular breaks in the southwest monsoon during July and August which extend from one to three weeks resulting in frequent crop failures especially in Rayalaseema and southern Telangana regions. The average annual temperature is 29 °C and varies from 22 °C to 35 °C; the highest of 44 °C being in May and the lowest of 12 °C in January. Atmospheric humidity is maximum during the rainy season. The mean daily evapotranspiration ranges from 3mm to 10 mm per day in the state. The average annual evapotranspiration for the state is 1713 mm with the highest of 1770 mm in Rayalaseema region followed by 1720 mm in Telangana region and 1660 mm in the Coastal region.

The state has been divided into seven agroclimatic zones (Fig. 4) based on physiography, soil types, the amount and distribution of rainfall and crops and cropping patterns. They are 1) Krishna-Godavari Zone, 2) North-Coastal Zone, 3) Southern Zone, 4) Northern Telangana Zone, 5) Southern Telangana Zone, 6) Scarce Rainfall Zone and 7) High Altitude and Tribal Area Zone. The state is broadly divided into six agroecological regions and 22 agroecological zones (Fig. 5a). The soil physiographic relationship in Deccan plateau and Eastern Ghat (south) is indicated in Fig. 5b.

The forests in the state cover about 6.3 M ha (22.9%) and are concentrated mainly in the northern, northeastern, eastern, southeastern and central parts. Six types of forests are identified. They are Southern Tropical Dry Deciduous, South Indian Moist Deciduous, South Indian Dry Evergreen, Southern Thorn and Miscellaneous and Littoral forests. The forest species include *Terminalia tomentosa*, *Shorea talura*, *Anogeissus latifolia*, *Pterocarpus santalinus*, *Morinda tinctoria*, *Zyzyphus jujuba*, *Acacia spp.*, *Albizia lebbek*, *Hardwickia binata*, *Bassia latifolia*, *Dalbergia sisso*, *Bambusa arundinacea*, *Phoenix sylvestris* and *Borassus flabellifer*. The uncultured wastes are covered with thorny bushes and grasses.

Andhra Pradesh is one of the few states considered as a granary and is surplus in foodgrain production. Agriculture is the mainstay of nearly 73 per cent of the population. About 38 per cent of the area is under cultivation. The area under coarse grains (millets) has decreased from 31 M ha in 1980 to 14 M ha in 1997 yielding remunerative crops like groundnut, sunflower, pulses, soybean, oil palm and cotton. The net area under irrigation was 13 per cent during eighties which has increased to 28 per cent in the nineties. Of the total cropped area (12.60 M ha), 47 per cent is under cereal crops such as rice, sorghum, maize, *bajra*, finger millet, 17 per cent under pulses, 24 per cent by oil seeds and 11 per cent by commercial crops.

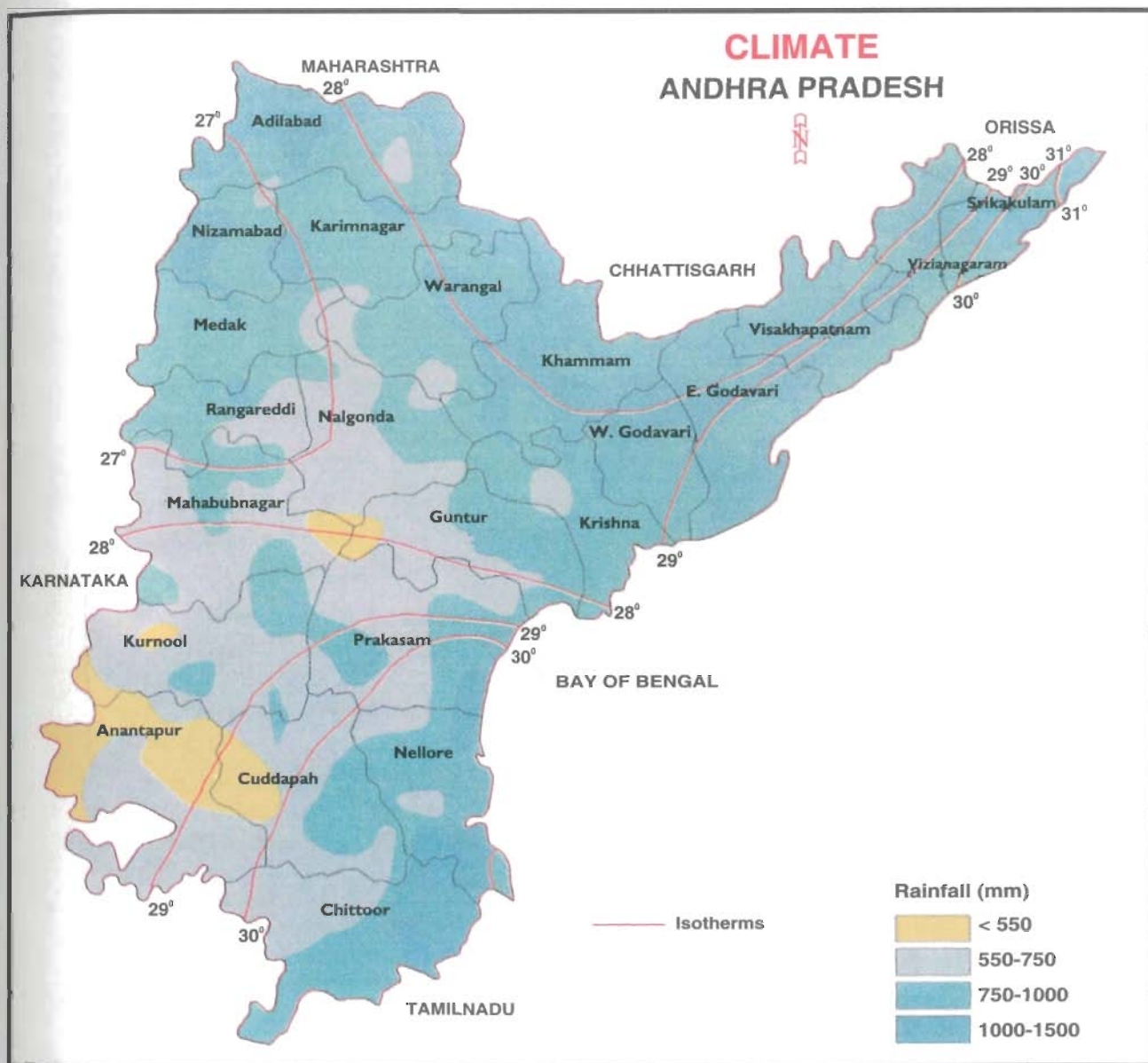


Fig.3 Climate - Andhra Pradesh

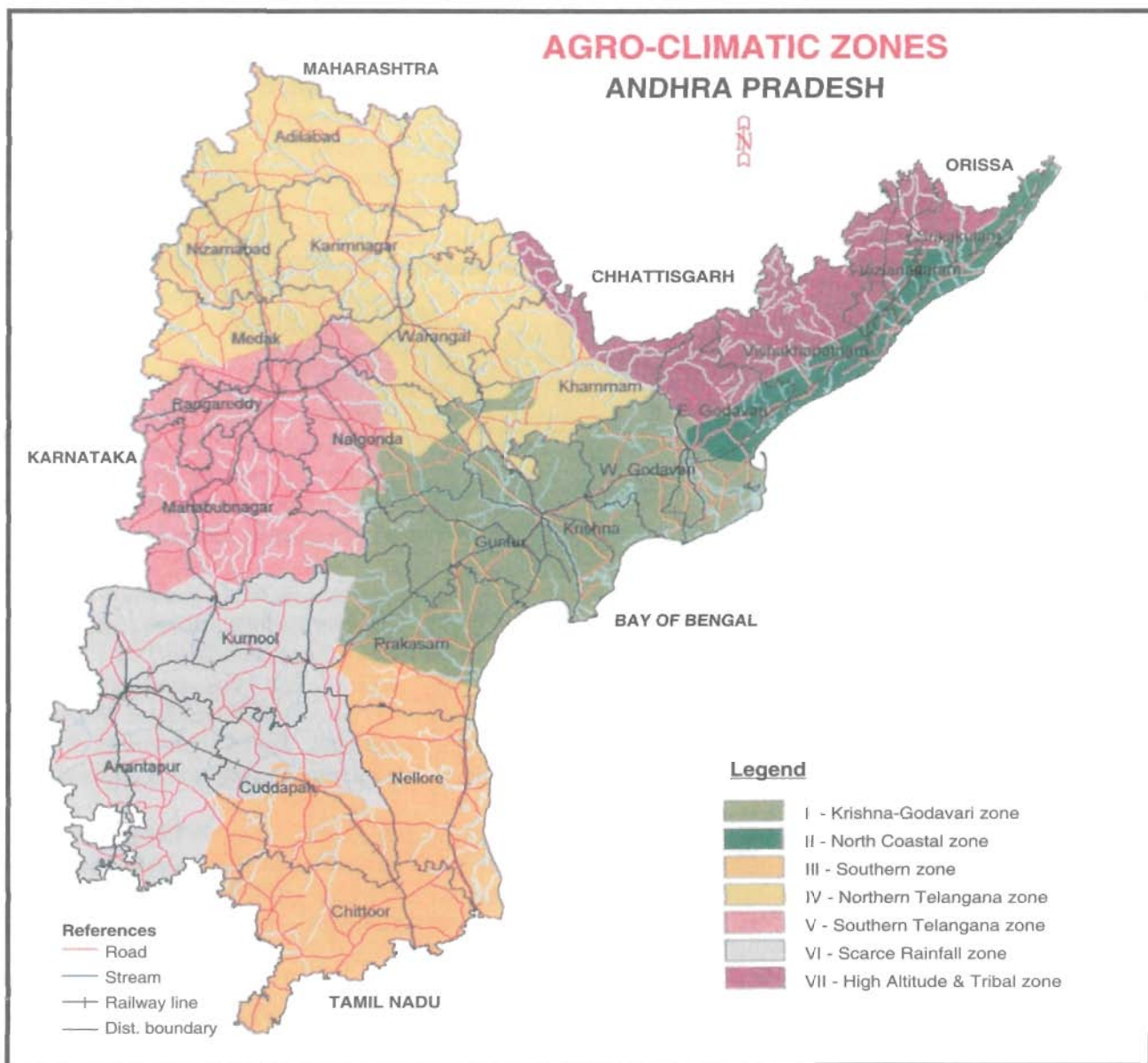


Fig.4 Agroclimatic Zones - Andhra Pradesh

AGRO-ECOLOGICAL ZONES ANDHRA PRADESH

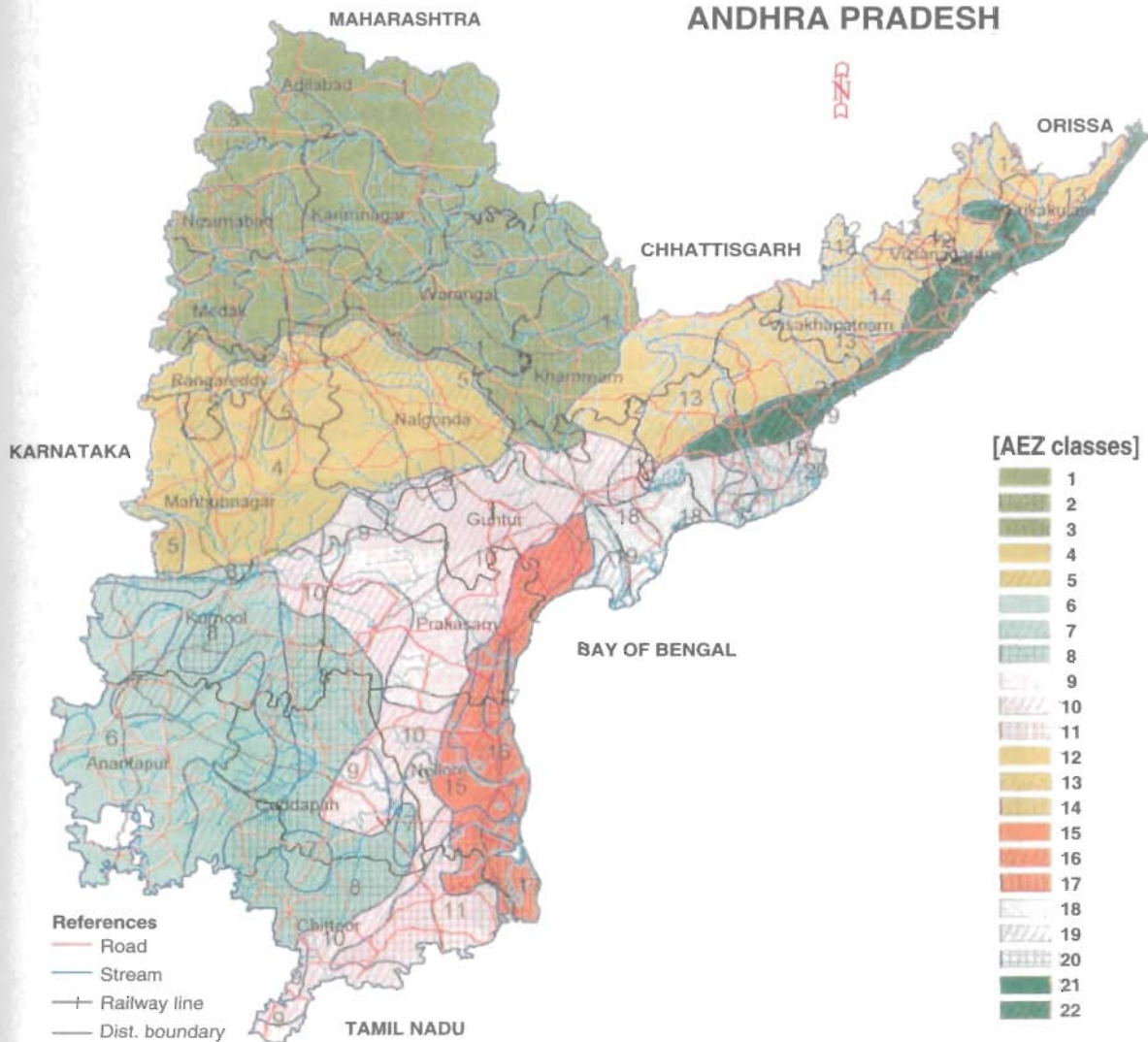


Fig.5 a Agro-ecological Zones - Andhra Pradesh

SOILS-PHYSIOGRAPHIC RELATIONSHIP IN DECCAN PLATEAU AND EASTERN GHATS (SOUTH)

Dharwars, Cuddapahs and Kurnools landform

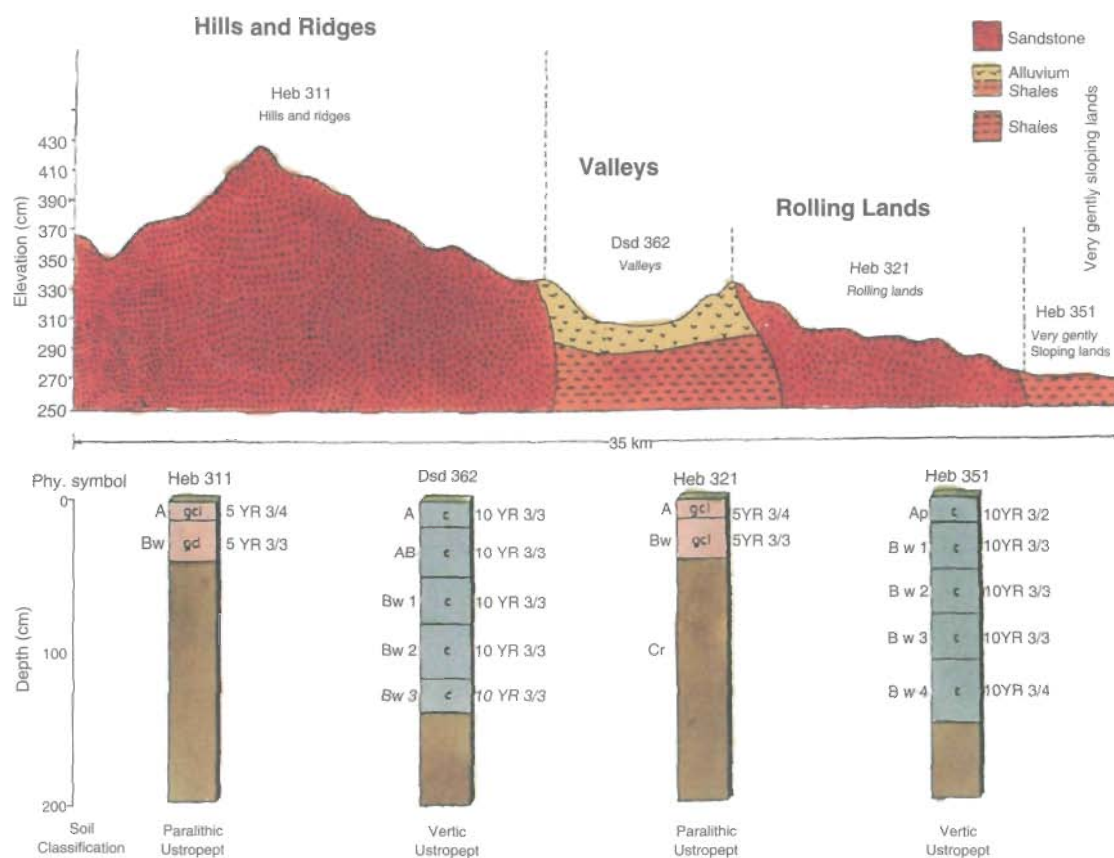


Fig. 5 b Soil-Physiographic relationships - Eastern Ghats (South)

2. METHODOLOGY

Soil resource mapping of Andhra Pradesh was conducted by adopting remote sensing techniques with adequate ground truth. The procedure comprised a three-tier approach of image interpretation for physiography, field survey and laboratory investigations, and cartography and printing.

False colour composites of landsat imagery on 1:250,000 scale were visually interpreted in conjunction with the available collateral data. The physiographic delineations were transferred to a planimetrically accurate 1:250,000 scale topobase. These topobases were used as base map for field investigations along with the imagery. Andhra Pradesh has been divided into three major physiographic divisions which were further subdivided into four physiographic regions based on geographical location. These regions were again divided into 18 landforms based on geology and geomorphology, and as identified on the FCC's of Landsat imagery. They were further subdivided into 97 physiographic units based on elevation and slope. These physiographic units were subdivided into 277 photomorphic units based on image interpretation elements.

Detailed field investigations was carried out in selected sample areas (264), grid observations (2740) at 10 km interval, and at random sites (100) and ANGRAU and ICAR research farms (160). In all, about 10,000 soil observations were made. Soils were classified upto family level using USDA Soil Taxonomy (1999) and mapped as associations of families (Reddy *et al.*, 1996). The soil map prepared on 1:250,000 scale was reduced and printed on 1:500,000 scale without cartographic and categorical generalization. Soil map unit consisted of dominant soil (>50%), subdominant (>35%) and inclusions (<15%). The dominant phases identified and mapped were soil depth, surface soil texture, coarse fragments, drainage, slope, erosion, salinity, sodicity, calcareousness, waterlogging and flooding.

In all, 132 soil families have been identified and mapped in the state. They were correlated and 55 benchmark soils were selected. The criteria was that it occupies a large extent, holds a key position in the soil classification system or is of special significance to farming, engineering, drainage, horticulture, forestry, pasture or other uses. The distribution and extent has been computed based on their occurrence in different soil map units. They were described and correlated with soils identified or established by different agencies like NBSS&LUP, AIS&LUS and State Department of Agriculture. The correlation status is given in appendix II. The name has been assigned based on their extensive occurrence among districts or taluks.

The description includes classification, type location, profile no., physiographic position, elevation, rainfall, ground water table, slope, relief and erosion, drainage and permeability, surface stoniness/rockiness, land use and vegetation, geology and parent material, SRM association no., associated soils and distribution and extent. Soils associated and soil series correlated followed by the typifying pedon description, range in characteristics, competing soils, interpretation for land capability, land irrigability, length of growing period and productivity potential, crop yields (farmer's and improved practices), land suitability for major crops, suggested land use, morphological, physical and chemical characteristics are included.

3. THE SOILS

3.1 Soils of South Deccan Plateau

The South Deccan Plateau is located between 12° 00' to 19° 54' N latitudes and 76° 46' to 81° 15' E longitudes. It covers the major part of Telangana and Rayalaseema regions in Adilabad, Warangal, Karimnagar, Khammam, Nalgonda, Mahbubnagar, Rangareddi, Medak, Nizamabad, Kurnool, Cuddapah, Anantapur, Chittoor, Krishna, East and West Godavari districts, and has an area of about 14.7 m ha (53.6%). The rock formations are granites, gneisses, Deccan trap, laterites and sedimentaries and metamorphosed sedimentaries like Gondwanas, Dharwars, and Cuddapahs and Kurnools. This physiographic division has been divided into six landforms. Two soil moisture regimes, viz., ustic and aridic are recognised. Parts of Anantapur, Cuddapah and Kurnool districts have aridic soil moisture regime. The soil water balance for Mahbubnagar and Anantapur which are typical of the plateau region are given in Figure 6.

The plateau is characterized by hills and ridges, isolated hills, rolling, undulating, gently sloping lands, mesas, buttes, plateaus and valleys. The hills and ridges are moderately steeply sloping and have boulders and rocks with soils only in patches. Rolling and undulating lands have moderately shallow to moderately deep, well drained, gravelly loam to gravelly clay soils associated with rock outcrops. Gently sloping lands and very gently sloping plains have deep to very deep, well drained to moderately well drained, gravelly clay to gravelly loam and loam soils, at places calcareous cracking clay soils are encountered. The mesas, buttes and plateau summits have very shallow to shallow, somewhat excessively drained, loam to clay soils. Deep to very deep, moderately well drained cracking clay soils occur on lower slopes of plateaus and plains. Soils of the valleys are deep to very deep, moderately well drained to poorly drained, calcareous, clay to loam with salinity in patches.

The red soils are slightly acid to neutral and black soils are slightly to strongly alkaline. The clay content increases with depth. The cation exchange capacity and base saturation are medium to high. The soils are low in organic carbon content, low to medium in available phosphorus and medium to high in available potassium.

Land Use The hills, ridges and other wastelands are mostly covered by scrub forest. Under rainfed agriculture, major crops like sorghum, groundnut, maize, *bajra*, castor, pulses and other minor millets are grown. Under irrigated conditions, paddy, sunflower, sugarcane, maize, sorghum, finger millet, vegetables and flowers are grown. Cotton, chillies, safflower, linseed, sorghum, bengal gram and coriander are grown in black soils.

Soil constraints The major constraints associated with red and laterite soils are shallow rooting depth, coarse surface soil texture, high erodibility, excessive run off, low water storage, surface crusting, high content of gravel and stones, poor native fertility, micronutrient deficiency, risk of salinity and sodicity in low lands, organic matter depletion, removal of crop residues and termite activity. In black soils, heavy texture, shrink-swell potential, cracking nature, poor workability, suboptimum oxygen availability and high lime content leading to nutrient imbalance are the major constraints.

Potential Gently sloping lands, very gently sloping plains and valleys have high potential for growing commercial and horticultural crops. Hills and ridges can be brought under forestry whereas rolling and undulating uplands can profitably be put under agroforestry and agri-horti-silvipasture. Black soils have the potential for growing both *kharif* and *rabi* crops, and mesas and plateau summits can be used for agri-horti-silvipasture.

SOIL WATER BALANCE DIAGRAMS

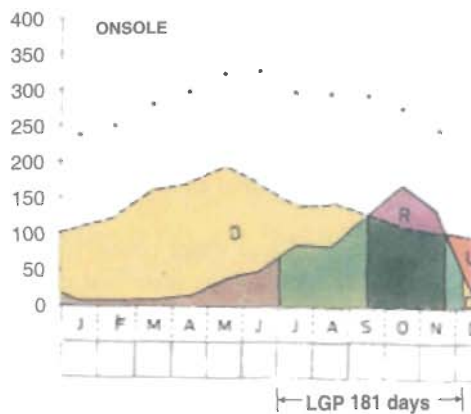
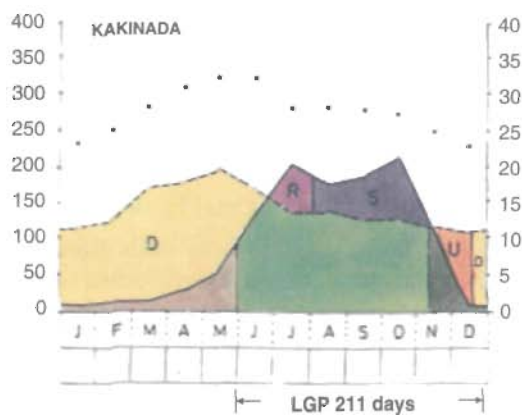
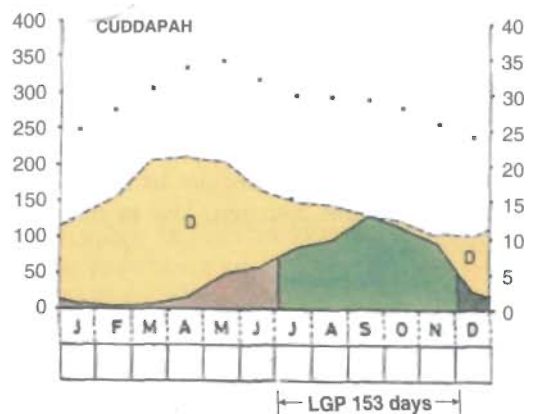
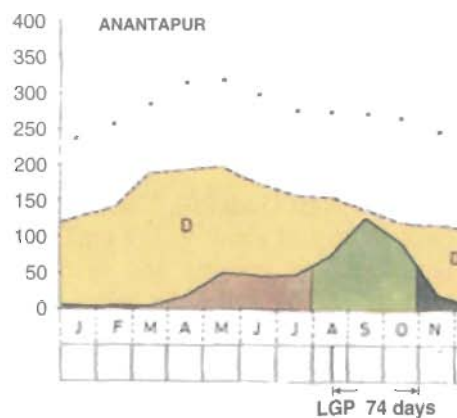
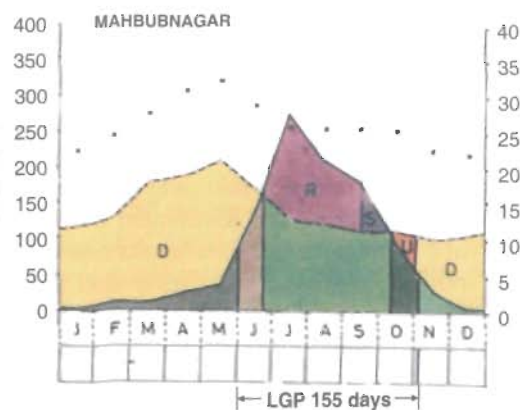


Fig.6 Soil water balance at different stations - Andhra Pradesh

Strategies The shallow and barren lands in the hills, ridges, rolling and undulating uplands are to be brought under agroforestry and agri-horti-silvipasture with controlled grazing. Soil and water conservation measures need to be taken up intensively. Saline patches in the valleys and plains need to be reclaimed. Shrink-swell black soils need to be managed judiciously. Low lands can profitably be brought under commercial agriculture if irrigation water is used judiciously.

3.2 Soils of Eastern Ghats

The Eastern Ghats in Andhra Pradesh are located between 12° 37' to 19° 27' N latitudes and 77° 48' to 84° 46' E longitudes. They cover parts of Rayalaseema, Coastal and a very small area in Telangana region in Cuddapah, Kurnool, Chittoor, Anantapur, Nellore, Prakasam, Guntur, Krishna, East and West Godavari, Visakhapatnam, Vizianagaram, Srikakulam and Khammam districts. They have an area of about 91789 km² (33%). The major rock formations are Cuddapahs and Kurnools, Dharwar's and granites and granite-gneisses. Two moisture regimes, viz., ustic and aridic are recognised. The soil water balance for Ongole and Cuddapah which are typical of the Eastern Ghats are given in Figure 6. This physiographic division has been divided into two physiographic regions and six landforms.

3.2.1 Eastern Ghats (South): Soils of Eastern Ghats (South) are characterized by hills and ridges, rolling, undulating and gently sloping lands, very gently sloping plains and valleys. The soils are very shallow, somewhat excessively drained, gravelly clay and gravelly loam with rock outcrops on hills and ridges. Rolling lands have shallow to moderately shallow, welldrained, gravelly loam to gravelly clay soils associated with rock outcrops. Undulating and gently sloping lands have moderately deep to deep, welldrained, clay to gravelly clay soils. Very gently sloping plains have deep to moderately deep, welldrained to moderately well drained, calcareous, gravelly clay to cracking clay soils.

The soils are neutral to alkaline with medium to high cation exchange capacity and base saturation. The soils are low in available nitrogen, low to medium in available phosphorus and medium to high in available potassium.

Land use Considerable area is under forest and rocky waste lands. Under rainfed conditions, groundnut, sorghum, *bajra*, minor millets, pulses, cotton, tobacco, castor, chillies, coriander and bengal gram are grown. Under irrigation, paddy, mulberry, finger millet, vegetables, sugarcane, acid lime, sweet orange, gingely and flowers are grown.

Soil constraints The major soil- constraints for agriculture are shallow rooting depth, high gravel and stone content, coarse surface textures, moderate slopes, excessive run off, erosion hazard, low water storage, calcareousness, low nutrient status and drainage problem in valleys and plains.

Potential Forested areas of hills, ridges and rolling lands have high potential for growing a wide variety of forest species, and for wild life, recreation and tourism. Rocky hills have high potential for quarrying for export purposes. The plains and valleys have potential for growing a wide variety of commercial crops such as mulberry, vegetables and flowers for export. Growing tobacco on red soils needs to be intensified as it has a high potential for export.

Strategies Soil and water conservation measures are to be taken up on priority basis along with the dry land technology for sustained crop production in the upland areas. Hilly and other waste lands need to be put under agroforestry, forestry or pasture. Proper drainage measures are required for low lands and plains as the soils are prone to salinization.

3.2.2 Eastern Ghats (North): The hill ranges are very steeply sloping, and have boulders and rocks here and there. The soils are moderately deep to shallow, excessively drained, loam to gravelly loam and gravelly clay, and are moderately eroded. Interhill basins have deep, welldrained to moderately well drained, loam to clay soils. Rolling, undulating and gently sloping lands have deep to very deep, welldrained, loam to clay and gravelly loam soils. Very gently sloping plains and valleys have very deep, moderately well drained clay and cracking clay soils.

The soils are slightly acid to neutral and strongly alkaline, and medium in cation exchange capacity and medium to high in base saturation. The organic matter content is high at the surface and medium in the subsoil as most of the area is under dense forest. Available phosphorus is low to medium and available potassium is high to medium.

Land use Hill ranges and most of the rolling lands are generally under reserve forest and degraded scrub forest. Cleared areas are cultivated to sorghum, *bajra* finger millet, rainfed paddy, groundnut, chillies, virginia tobacco, *mesta*, tapioca, mango, banana and other minor millets. Paddy, sugarcane and vegetables are grown in valleys and interhill basins. *Jhum* cultivation is prevalent in the area.

Soil constraints The major constraints for agriculture are steep slopes, excessive run off, coarse textured surface soils, erosion hazard, high gravel and stone content, low nutrient status, indiscriminate felling of trees and *jhum* cultivation.

Strategies Cultivation of annual crops and *Jhuming* in the steeper slopes may be prohibited and high economic value forest species planted. This will help in preventing further soil degradation. Valleys and plains have potential for commercial agriculture. Drainage in the low lands are to be improved as the soils are prone to salinization. Appropriate soil conservation measures to be adopted in the upland and hilly areas.

3.3 Soils of Coastal (Andhra) Plains

The Coastal Plains in Andhra Pradesh are located between 13° 54' to 18° 58' N latitudes and 79° 15' to 84° 46' E longitudes. They cover an area of about 35540 km² (13%) spread over parts of Srikakulam, Vizianagaram, Visakhapatnam, East and West Godavari, Krishna, Guntur, Prakasam, Nellore and Chittoor districts. The major rock formations are alluvium of marine and riverine origin, laterite and sandstone. Two moisture regimes, viz., ustic and aquic are recognised. The soil water balance for Kakinada which is typical of the Coastal region is given in Figure 6.

The marine landform has sandy soils in sand dunes and sandy plains and clayey to loamy soils in flat lands. The soils are neutral to alkaline. The available nitrogen and phosphorus are low and available potassium is medium to low.

Soils of Krishna and Godavari delta are deep to very deep, imperfectly drained, calcareous, cracking clay soils. They are alkaline in reaction, cation exchange capacity and base saturation is high. Flooding and waterlogging is common during the rainy season. Available nitrogen and phosphorus is low to medium, and high to medium in available potassium.

Soils of laterite landform are deep to very deep, welldrained loam to clay and ferruginous. The soils are slightly acid to neutral. The organic carbon content is low, available phosphorus is low and available potassium is medium to high.

Land use High-intensity irrigated crops like paddy, sugarcane, black gram, green gram, banana, turmeric and chillies are grown. Under rainfed conditions, groundnut, pulses, sorghum, maize, mango, cashew and casuarina are grown.

Soil Constraints Coarse textured surface and subsurface soils, heavy textures, calcareousness, cracking clay soils pose serious problems of drainage in addition to frequent flooding and waterlogging, highly saline and sodic soils in swamps and marshes, surface crusting and compaction, high gravel content, low available water capacity and low nutrient status are the major constraints for agriculture.

Potential The soils have potential to grow two to three crops in a year; potential to grow horticultural crops like mango, cashew, oilpalm, vegetables etc. Salt pans can be exploited for making table salt, and swamps, marshes, lagoons and estuaries can be developed as tourist spots and for resting of migratory birds.

Strategies More area needs to be brought under mango, cashew, oilpalm, casuarina and pulses. Prevention of sea erosion, frequent flooding and waterlogging by constructing series of dykes and shelter belts along the coast. Soil and water conservation measures need to be taken up in the uplands. There are 55 benchmark soils which are classified into six orders and 18 great groups. The area extent is given in (Table 1).

Table 1. Total area of Soil Orders and Great groups in Andhra Pradesh

Order/Great group	Area (ha)	Per cent	Order/Great group	Area (ha)	Per cent
ALFISOLS	8354893	30.31	INCEPTISOLS	10007694	36.42
Paleustalfs	2403954	8.72	Sulfaquepts	26003	0.09
Rhodustalfs	2777562	10.09	Epiaquepts	64332	0.23
Haplustalfs	3173377	11.50	Haplustepts	9917359	36.10
ARIDISOLS			MOLLISOLS	510332	1.86
Palcargids	817043	2.97	Argiustolls	510332	1.86
Haplargids	112659	0.41	VERTISOLS	2238685	8.10
Haplocambids	284680	1.03	Endoaquerts	19879	0.07
	419704	1.53	Haplusterts	2218806	8.03
ENTISOLS			Rock land	2371363	8.64
Fluvaquents	2906559	10.61	Water body	296550	1.09
Ustipsamments	12444	0.05			
Torrifluents	110565	0.42			
Ustifluents	26922	0.10			
Torriorthents	373392	1.36			
Ustorthents	50988	0.19			
	2332248	8.49			

The description with respect to nature, area extent, characteristics, potential, problems and strategies and land use of individual Benchmark soil is given in following pages.

1. ZAHEERABAD SOILS (75,520 ha)

(Deep red ferruginous clayey soils)

Classification	:	Clayey-skeletal, kaolinitic, isohyperthermic Kandic Paleustalfs
Type location	:	Village: Algol, Taluk: Zaheerabad, District: Medak, Andhra Pradesh; 17° 43' 30" N 77° 37' 33" E
Profile No	:	56G/10/T3/1
Physiographic position	:	Summits of lower plateaus
Elevation (m)	:	600-620
Rainfall (mm)	:	919
Ground water table (m)	:	>10
Slope, relief and erosion	:	0-1 per cent slopes; slightly eroded
Drainage and permeability	:	Well drained with moderate permeability
Surface stoniness/rockiness	:	<3 per cent stones of <2.5 cm diameter
Land use and vegetation	:	Large area under eucalyptus; mainly cultivated to sorghum, pulses, sunflower; natural vegetation – <i>Acacia</i> spp. (babul), <i>Azadirachta indica</i> (neem), <i>Pongamia pinnata</i> (karanj).
Geology and soil parent material	:	Laterite
SRM association number	:	AP 69, 70, 71
Distribution and extent	:	Extensive (75520 ha) Rangareddi (36888 ha), Medak (36787 ha), Adilabad (1541 ha) and Mahbubnagar (304 ha)
Soils associated	:	Fine, kaolinitic, Rhodic Paleustalfs Clayey-skeletal, kaolinitic, Typic Paleustalfs
Soil series correlated	:	Algol series (NBBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Algol gravelly sandy clay - cultivated.

Ap	0–13 cm	Dark reddish brown (5YR 3/4 D) and reddish brown (2.5YR 4/4 M) gravelly sandy clay; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; 45 per cent iron gravel; slightly acid (pH 6.2); clear smooth boundary.
Bt1	13–55 cm	Dark red (2.5YR 3/6 M) gravelly clay; fine to medium subangular blocky structure; friable, sticky and plastic; common very fine and fine roots; 50 per cent iron gravel; broken moderately thick clay cutans; slightly acid (pH 6.4); gradual smooth boundary.
Bt2	55–104 cm	Dark reddish brown (2.5YR 3/4 M) gravelly clay; fine to medium subangular blocky structure; friable, sticky and plastic; few very fine roots; 60 per cent iron gravel; broken moderately thick clay cutans; slightly acid (pH 6.5); gradual smooth boundary.
Bt3	104–150 cm	Dark red (2.5YR 3/6 M) gravelly clay; weak fine to medium subangular blocky structure; friable, sticky and plastic; few very fine roots; 60 per cent iron gravel; broken moderately thick clay cutans; slightly acid (pH 6.5).

Range in characteristics: The thickness of the solum is 150 cm. The A horizon is 10 to 23 cm thick. Its colour is in hues 5YR and 2.5YR, value 4 to 3 and chroma 4 to 3. Its texture is clay to sandy clay. Coarse fragments (iron gravel) range from 15 to 50 per cent. Its structure is fine to medium subangular blocky. The Bt horizon is 127 to 140 cm thick. Its colour is in hue 2.5YR, value 3 and chroma 6 to 4. Its texture is gravelly clay, coarse fragments (iron gravel) range from 35 to 60 per cent.

Interpretation: These are very deep and clayey in texture. Subsoil gravelliness, low AWC, moderate erodibility and low available phosphorus and potassium are the main limitations for normal crop husbandry.

a) Interpretative grouping:

Land capability subclass : lies
Land irrigability subclass : 3st

Length of growing period : 120-180 days
Productivity potential : Medium

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Green gram	2.96	12
Jowar	6.57	35
Maize	14.96	45
Red gram	2.24	18
Rice	20.18	60

c) Land suitability for crops:

Crops	Sorghum	Maize	Red gram	Green gram
Suitability class	S3gn	S3gn	S3gn	S3g

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size d.stribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-13	Ap	49.9	14.4	35.7	g sc	6.2	5.3	0.97	tr
13-55	Bt1	25.5	07.6	66.9	g c	6.4	5.3	0.84	tr
55-104	Bt2	17.5	07.3	75.2	g c	6.5	5.5	0.34	0.03
104-150	Bt3	24.8	06.9	68.3	g c	6.5	5.5	0.47	0.03

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-13	06.4	2.3	0.1	0.1	08.9	10.3	0.0	0.0
13-55	10.8	3.4	0.1	0.1	14.4	12.6	0.0	0.0
55-104	09.7	2.6	0.1	0.1	12.5	10.2	0.0	0.0
104-150	09.7	2.4	0.1	0.1	12.3	09.5	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-13	08.9	09.3	19.2	0.26	96	46
13-55	14.4	18.1	27.0	0.27	80	53
55-104	12.5	15.9	22.7	0.21	79	55
104-150	12.3	14.5	21.8	0.21	85	56

2. NALGONDA SOILS (5,25,159 ha)

(Medium deep red gravelly loam soils)

Classification	:	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs
Type location	:	Village: Kottapalle Tanda; Tehsil: Kadiri; District: Anantapur; 14° 24 '7" N 71° 3' 11" E
Profile No	:	57J/S5/25
Physiographic position	:	Undulating interfluvies
Elevation (m)	:	460
Rainfall (mm)	:	700-800
Ground water table (m)	:	>10
Slope, relief and erosion	:	3 to 8 per cent slopes; moderately eroded
Drainage and permeability	:	Well drained
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Groundnut, pigeonpea, horsegram; acacia, neem
Geology and soil parent material	:	Archaean; granite-gneiss
SRM association number	:	AP 02
Distribution and extent	:	Extensive (525159 ha) Nalgonda (114132 ha), Mahbubnagar (100034 ha), Warangal (94337 ha), Kurnool (52446 ha), Anantapur (47410 ha), Khammam (34919 ha), Karimnagar (32530 ha), Cuddapah (20660 ha), Chittoor (18759 ha), Rangareddi (9932 ha)
Soils associated	:	Clayey-skeletal, mixed, Typic Rhodustalfs
Soil series correlated	:	Nil

Typifying pedon: Kottapalle Tanda gravelly loamy sand- cultivated

Ap	0-11cm	Dark brown (7.5YR 4/4 M) gravelly loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 20 per cent fine quartz gravel; many fine roots; neutral (pH 7.1); clear smooth boundary.
Bt1	11-30 cm	Dark red (2.5YR 3/6 M) gravelly sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; 65 per cent fine quartz gravel; patchy thin clay cutans; few very fine roots; slightly acid (pH 6.5); clear smooth boundary.
Bt2	30-63 cm	Dark red (2.5 YR 3/6 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; 35 per cent fine quartz gravel; patchy thin clay cutans; few very fine roots; slightly acid (pH 6.5); clear smooth boundary.
BC	63-96 cm	Red (2.5 YR 4/6 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 50 per cent fine quartz gravel; patchy thin clay cutans; slightly acid (pH 6.3); gradual smooth boundary.
Cr	96-127 cm	Weathered parent material.

Interpretation: These are deep and loamy in texture. Subsoil gravelliness, moderate slopes, low AWC, erosion hazard and low nutrient status are the major limitations for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIes
 Land irrigability sub-class : 2st
 Length of growing period : 120-150 days
 Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.94	11
Green gram	2.06	12
Jowar	3.19	35
Maize	14.96	45
Rice	17.43	60

c) Land suitability for crops:

Crops	Sorghum	Maize	Groundnut	Cotton	Green gram
Suitability class	S3gn	S3gn	S3gl	N	S3gn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		$\longleftrightarrow$ (USDA) $\longrightarrow$							
0-11	Ap	84.6	8.2	07.2	ls	7.1	6.4	0.28	3.5
11-30	Bt1	54.3	7.8	37.9	g sc	6.5	5.5	0.61	15.0
30-63	Bt2	58.2	8.5	33.3	scl	6.5	5.4	0.39	13.6
63-96	BC	71.7	6.2	22.1	g scl	6.3	5.3	0.23	14.0

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-11	0.0	02.4	1.0	0.0	0.1	03.5	2.2	0.0	0.0
11-30	0.7	11.3	3.4	0.1	0.2	15.0	7.5	0.0	0.0
30-63	0.7	10.1	3.1	0.1	0.2	13.5	6.6	0.1	0.0
63-96	1.5	08.8	4.7	0.2	0.3	14.0	6.0	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-11	03.5	03.5	05.7	0.49	100	61
11-30	15.0	15.3	22.5	0.40	98	67
30-63	13.6	13.6	20.1	0.41	99	67
63-96	14.0	13.5	20.0	0.61	104	70

3. ANANTAPUR SOILS (4,32,609 ha)

(Medium deep red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, semiactive, isohyperthermic Rhodic Paleustalfs
Type location	: Village: Bhainsa, Tehsil : Bhainsa; District: Adilabad; 19°6'20" N 77°58'41" E
Profile No	: 56E/S1/11
Physiographic position	: Side slopes
Elevation (m)	: 380-400
Rainfall (mm)	: 1200
Ground water table (m)	: >10
Slope, relief and erosion	: 8 to 15 per cent slopes; severely eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 7.5-25 cm diameter
Land use and vegetation	: Cultivated to <i>chigeva</i> , <i>ber</i> , <i>seethaphal</i> , neem,
Geology and soil parent material	: Granite, weathered granite
SRM association number	: AP 03, 04, 05
Distribution and extent	: Extensive (432609 ha) Anantapur (208012 ha), Medak (54640 ha), Adilabad (43585 ha), Rangareddi (36444 ha), Mahbubnagar (25865 ha), Chittoor (25691 ha), Nalgonda (17075 ha), Warangal (15419 ha), Cuddapah (2816 ha), Khammam (2309 ha), Nizamabad (753 ha)
Soils associated	: Clayey-skeletal, Typic Rhodustalfs Clayey-skeletal (Paralithic) Rhodustalfs
Soil series correlated	: Nil

Typifying pedon: Bhainsa gravelly loamy sand -cultivated.

Ap	0-7cm	Strong brown (7.5YR 5/6 M) gravelly loamy sand; weak very fine subangular blocky structure; loose, nonsticky and non plastic; common very fine and fine roots; 20 per cent fine quartz gravel; neutral (pH 6.7); clear smooth boundary.
Bt1	7-16 cm	Dark red (2.5YR 3/6 M) gravelly sandy clay; moderate fine subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; common very fine and fine roots; 50 per cent fine quartz gravel; neutral (pH 6.6); clear wavy boundary.
Bt2	16-40 cm	Dark red (2.5 YR 3/6 M) gravelly sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; 65 per cent fine quartz gravel; slightly acid (pH 6.5); clear smooth boundary.
BC	40-70 cm	Dark red (2.5 YR 3/6 M) gravelly sandy clay; moderate medium subangular blocky structure; friable, slightly sticky and plastic; 70 per cent fine quartz gravel; slightly acid (pH 6.4) abrupt wavy boundary.
Cr	70 cm	Weathered granite.

Interpretation: These are medium deep and clayey in texture. Subsoil gravelliness, steep to moderate slopes, low AWC, severe erosion hazard and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Land irrigability sub-class : 4st

Length of growing period :90-120 days

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.94	11
Green gram	3.47	12
Jowar	9.14	35
Maize	27.23	45
Rice	21.65	60

c) Land suitability for crops:

Crops	Sorghum	Maize	Green gram	Rice
Suitability class	N	N	N	N

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		$\longleftrightarrow$ ------(USDA)----- $\rightarrow$						
0-7	Ap	83.1	4.6	12.3	ls	6.7	5.7	0.50
7-16	Bt1	58.6	3.7	37.7	sc	6.6	5.2	0.65
16-40	Bt2	59.0	3.3	37.7	sc	6.5	5.0	0.46
40-70	BC	59.1	5.8	35.1	sc	6.4	5.0	0.34
70+	Cr	62.8	6.5	30.7	g scl	6.6	4.9	0.23

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-7	3.0	2.4	0.0	0.2	05.6	2.7	0.0	0.0
7-16	6.7	3.7	0.0	0.1	10.5	6.2	0.0	0.0
16-40	7.3	5.6	0.1	0.2	13.2	7.3	0.0	0.0
40-70	6.8	5.8	0.2	0.2	13.0	5.7	0.0	0.0
70+	6.5	5.3	0.1	0.1	12.0	5.6	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-7	05.6	03.8	08.3	0.34	81	67
7-16	13.5	12.6	16.7	0.31	83	63
16-40	13.2	12.1	20.5	0.30	85	64
40-70	13.0	15.2	18.7	0.44	88	70
70+	13.1	16.1	18.7	0.42	86	72

4. PEDDAPURAM SOILS (5,12,579 ha)

(Deep red clayey soils)

Classification	: Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs
Type location	: Village: Virapalem; Tehsil: Chintalapalli; District: West Godavari; 16° 56' N 81° 8' E
Profile No	: 65H/S11/3
Physiographic position	: Gently sloping land
Elevation (m)	: 100
Rainfall (mm)	: 1310
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Cashew plantation
Geology and soil parent material	: Sandstone
SRM association number	: AP 08, 76, 77, 124, 125, 128, 141, 148, 161, 236, 237, 238
Distribution and extent	: Extensive (512579 ha) West Godavari (78467 ha), East Godavari (74536 ha), Vizianagaram (62975 ha), Visakhapatnam (53165 ha), Khammam (45912 ha), Guntur (33189 ha), Krishna (28763 ha), Adilabad (27003 ha), Chittoor (25365 ha), Nellore (23610 ha), Srikakulam (18089 ha), Nalgonda (15445 ha), Anantapur (10581 ha), Warangal (8088 ha), Karimnagar (5182 ha), Prakasam (1509 ha) and Mahbubnagar (700 ha)
Soils associated	: Clayey-skeletal, mixed, Typic Rhodustalfs Fine, mixed, Typic Ustorthents Fine-loamy, mixed, Typic Haplustepts Fine, mixed, Typic Haplustepts Fine, mixed, Typic Rhodustalfs Fine-loamy, mixed, Typic Haplustalfs Clayey-skeletal, mixed, Typic Paleustalfs
Soil series correlated	: Butpur series, Uplingapur series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Virapalem loamy sand- cultivated

Ap	0-10 cm	Reddish brown (5YR 4/3 D) and dark reddish brown (5YR 3/3 M) loamy sand; weak fine granular structure; loose, friable, nonsticky and nonplastic; many fine roots; slightly acid (pH 6.3); abrupt smooth boundary.
AB	10-21 cm	Yellowish red (5YR 4/6 M) sandy loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; moderately acid (pH 5.2); clear smooth boundary.
Bt1	21-49 cm	Dark red (2.5YR 3/6 M) sandy clay; moderate medium subangular blocky structure; very firm, sticky and plastic; continuous thin clay cutans; very fine common roots; moderately acid (pH 5.3); clear smooth boundary.
Bt2	49-88 cm	Dark red (2.5YR 3/6 M) sandy clay; moderate medium subangular blocky structure; very firm, sticky and plastic; continuous thin clay cutans; slightly acid (pH 5.6); clear smooth boundary.
Bt3	88-112 cm	Dark red (2.5YR 3/6 M) clay; moderate medium subangular blocky structure; very firm, very sticky and very plastic; continuous thin clay cutans; slightly acid (pH 5.6); clear smooth boundary.
Bt4	112-150 cm	Dark red (2.5 YR 3/6) clay; moderate medium subangular blocky structure; very firm, very sticky and very plastic; continuous thin clay cutans; slightly acid (pH 5.9).

Interpretation: These are very deep and clayey in texture; have high potential for growing mango, cashew and other horticultural crops.

a) Interpretative groupings:

Land capability sub-class : Iies

Length of growing period : 150-180 days

Land irrigability sub-class : 2s

Productivity potential : Medium to high

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.76	13
Green gram	3.93	12
Rice	35.15	60
Sugarcane	879.91	1250
Tobacco	14.74	14

c) Land suitability for crops:

Crops	Sugarcane	Tobacco	Rice	Green gram	Black gram
Suitability class	S2tn	S2tn	S3tw	S3tn	S2tn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		$\longleftrightarrow$ (USDA) $\longleftrightarrow$							
0-10	Ap	85.0	4.4	10.6	ls	6.3	4.9	0.28	0.0
10-21	AB	76.8	6.7	16.5	sl	5.2	4.2	0.24	0.1
21-49	Bt1	57.7	2.9	39.4	sc	5.3	4.2	0.26	0.1
49-88	Bt2	48.5	1.9	49.6	sc	5.6	4.5	0.26	0.0
88-112	Bt3	41.2	1.4	57.4	c	5.6	4.5	0.25	0.0
112-150	Bt4	44.8	2.2	53.0	c	5.9	4.5	0.26	0.0

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-10	0.0	0.6	0.3	0.0	0.2	1.1	1.4	0.0	0.0
10-21	3.7	0.5	0.2	0.1	0.2	1.0	2.6	0.2	0.1
21-49	0.0	1.1	0.8	0.0	0.3	2.2	0.0	0.0	0.0
49-88	1.4	1.9	1.0	0.1	0.3	3.3	5.8	0.2	0.1
88-112	1.1	2.3	1.4	0.1	0.3	4.1	5.6	0.1	0.0
112-150	1.3	2.3	1.2	0.1	0.2	3.8	4.7	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-10	1.1	1.9	2.5	0.18	58	44
10-21	1.2	2.7	3.6	0.16	37	28
21-49	0.0	6.6	0.0	0.17	33	00
49-88	3.5	7.4	9.1	0.15	45	36
88-112	4.2	8.8	9.7	0.15	47	42
112-150	3.8	7.6	8.5	0.16	50	45

5. NELLORE SOILS (1,45,466 ha)

(Medium deep red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, semiactive, isohyperthermic Typic Paleustalfs
Type location	: Village:Curumukala;Tehsil:Makthal; District:Mahbubnagar; 16° 36' N 77° 39' E
Profile No	: 56H/SS/13
Physiographic position	: Undulating interfluvies
Elevation (m)	: 340-380
Rainfall (mm)	: 600
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; severely eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones with 2.5-7.5 cm diameter
Land use and vegetation	: Pasture; acacia
Geology and soil parent material	: Granite
SRM association number	: AP 147, 148
Distribution and extent	: Extensive (145466 ha) Mahbubnagar (52639 ha), Cuddapah (34273 ha), Chittoor (23231 ha), Nalgonda (12675 ha), Nellore (10968 ha), Krishna (7197 ha), Kurnool (2778 ha), Prakasam (1070 ha), Khammam (343 ha), Guntur (292 ha)
Soils associated	: Loamy-skeletal, mixed, Typic Haplustepts Fine, mixed, Rhodic Paleustalfs Fine loamy, mixed, (calc.), Typic Haplustalfs
Soil series correlated	: Upparguda series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: - Curumukala loamy sand-pasture

A	0-12 cm	Dark brown to strong brown (7.5YR 4/5 M) loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many very fine and fine roots; neutral (pH 6.6) abrupt smooth boundary.
Bt1	12-31 cm	Reddish brown to dark reddish brown (5YR 3.5/3 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay cutans; common very fine and fine roots; slightly acid (pH 6.5); clear smooth boundary.
Bt2	31-47 cm	Dark reddish brown (5YR 3/2.5 M) gravelly sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; common very fine to fine roots; slightly acid (pH 5.9) 25 per cent fine quartz gravel; gradual smooth boundary.
Bt3	47-64 cm	Dark reddish brown (5YR 3/3 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; slightly acid (pH 5.9); 50 per cent fine and coarse quartz gravels; gradual wavy boundary
Bt4	64-86cm	Reddish brown to dark reddish brown (5YR 3.5/4 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; thick patchy clay cutans; slightly acid (pH 5.7); 60 per cent fine and coarse quartz gravel; abrupt wavy boundary.
C	86 cm	Weathered granite.

Interpretation: These are medium deep and clayey in texture. High gravel content in the subsoil, severe erosion hazard, moderate slopes, low to medium AWC and low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIes

Length of growing period : 120-150 days

Land irrigability subclass : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Groundnut	6.59	18
Jowar	9.14	35
Maize	23.51	45
Red gram	3.75	18
Rice	21.65	60

c) Land suitability for crops:

Crops	Groundnut	Maize	Sorghum	Red gram
Suitability class	S2I	S2tn	S2tl	S3tl

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<------(USDA)----->							
0-12	Ap	83.3	7.0	09.7	ls	6.6	5.7	0.33	0.0
12-31	Bt1	59.6	6.1	34.3	scl	6.5	5.1	0.51	0.0
31-47	Bt2	52.9	8.2	38.9	g sc	5.9	5.0	0.55	0.1
47-64	Bt3	53.3	5.5	52.2	g c	5.9	5.0	0.40	0.2
64-86	Bt4/BC	44.8	7.9	47.3	g c	5.7	5.0	0.30	0.2

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-12	0.0	1.9	2.0	0.0	0.2	04.1	2.3	0.0	0.0
12-31	0.0	8.3	3.7	0.0	0.1	12.1	8.1	0.0	0.0
31-47	0.7	9.7	5.3	0.1	0.2	15.3	7.5	0.0	0.0
47-64	0.6	10.0	4.6	0.1	0.2	14.9	9.8	0.0	0.0
64-86	0.6	8.5	4.1	0.1	0.2	12.9	10.0	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-12	4.1	4.1	6.4	0.42	100	64
12-31	12.1	13.5	20.2	0.39	90	60
31-47	15.3	15.3	22.8	0.39	100	67
47-64	14.9	16.3	24.7	0.31	91	60
64-86	12.9	17.1	22.9	0.36	75	66

6. SIRPUR SOILS (1,74,069 ha)

(Deep red loamy soils)

Classification	: Fine- loamy, mixed, subactive, isohyperthermic Typic Paleustalfs
Type location	: Village: Dharmacherla; Tehsil: Kothagudem; District: Khammam; 17° 21' 8" N 80° 39' 6" E
Profile No	: 65C/S6/20
Physiographic position	: Gently sloping interfluvies
Elevation (m)	: 130-140
Rainfall (mm)	: 900-1100
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes, slightly eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones/gravels of < 2.5 cm diameter
Land use and vegetation	: Pasture; palmyra, acacia, tendu leaves
Geology and soil parent material	: Precambrian- schist
SRM association number	: AP 73, 74, 123
Distribution and extent	: Extensive (174069 ha) Adilabad (54651 ha), Khammam (30089 ha), Karimnagar (26151 ha), Warangal (20230 ha), East Godavari (17552 ha), Visakhapatnam (9409 ha), West Godavari (8998 ha) and Vizianagaram (6989 ha)
Soils associated	: Coarse-loamy, mixed, Typic/ Rhodic Paleustalfs Fine, mixed, Typic Haplustalfs Fine-loamy, mixed, Typic Haplustalfs
Soil series correlated	: Nil

Typifying pedon: Dharmacherla loamy sand- pasture

A1	0-15 cm	Brown (7.5YR 5/4 D) and Yellowish red (7.5 YR 4/6 M) loamy sand; weak fine to medium subangular blocky structure; soft, friable nonsticky and nonplastic; few very fine to fine roots; slightly alkaline (pH 8.0); clear smooth boundary.
Bt1	15-32 cm	Strong brown (5YR 5/6 D) and (5YR 4/6M) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; few coarse and medium roots; neutral (pH 6.7); gradual smooth boundary.
Bt2	32-50 cm	Red (2.5YR 4/6 D and 2.5YR 4/8M) sandy clay loam; weak medium subangular blocky structure; firm, slightly sticky and plastic; patchy moderately thick clay cutans; many very fine iron nodules; few fine to medium roots; slightly acid (pH 6.2); gradual smooth boundary.
Bt3	50-73 cm	Red (2.5YR 4/8 D and 2.5YR 4/6M) sandy clay loam; strong medium subangular blocky structure; firm, sticky and plastic; patchy moderately thick clay cutans; many fine iron nodules; few fine to medium roots; slightly acid (pH 6.1); gradual smooth boundary.
Bt4	73-94 cm	Dark red (2.5YR 3/6 M) sandy clay loam; strong medium subangular blocky structure; firm, sticky and plastic; moderately thick clay cutans; many fine iron nodules; few fine to medium roots; slightly acid (pH 6.0); gradual smooth boundary.
Bt5	94-114 cm	Red (2.5YR 4/6 D and 2.5YR 4/8 M) gravelly clay; weak fine subangular blocky structure; friable, sticky and plastic; many medium iron nodules; 70 per cent fine and coarse gravel; slightly acid (pH 6.2); clear smooth boundary.

Interpretation: These are very deep and loamy in texture; have high potential for growing mango, cashew and other horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class :Iis

Length of growing period :150-180 days

Land irrigability subclass :2s

Productivity potential : Medium to high

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	3.17	13
Cotton	2.07	11
Green gram	3.47	12
Jowar	9.44	35
Red gram	4.17	18
Rice	22.6	60

c) Land suitability for crops:

Crops	Green gram	Black gram	Cotton	Sorghum	Rice
Suitability class	S2tn	S2tn	S3tn	S2tn	S3tn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-15	A1	85.8	06.3	07.9	ls	8.0	7.7	0.42
15-32	Bt1	65.2	18.5	16.3	sl	6.7	5.7	0.38
32-50	Bt2	50.7	22.8	26.5	scl	6.1	5.1	0.35
50-73	Bt3	49.2	19.8	31.0	scl	6.1	5.0	0.40
73-94	Bt4	54.3	14.7	31.0	scl	6.0	4.9	0.31
94-114	BC	33.3	15.0	51.7	gc	6.2	5.1	0.33

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-15	2.6	0.5	0.0	0.2	3.3	1.5	0.0	0.0
15-32	1.5	0.4	0.0	0.5	2.4	2.3	0.0	0.0
32-50	2.4	0.5	0.0	0.3	3.2	2.0	0.0	0.0
50-73	2.5	0.8	0.0	0.2	3.5	1.0	0.0	0.0
73-94	2.4	1.0	0.0	0.2	3.6	0.6	0.0	0.0
94-114	4.8	1.9	0.0	0.4	7.1	1.7	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-15	3.3	2.6	4.8	0.33	127	69
15-32	2.4	3.0	4.7	0.18	80	51
32-50	3.2	4.6	5.2	0.17	70	62
50-73	3.5	4.6	4.5	0.15	76	78
73-94	3.6	5.2	4.2	0.17	69	86
94-114	7.1	8.9	8.8	0.17	80	81

7. NUZVID SOILS (2,50,161 ha)

(Deep red clayey soils)

Classification	: Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs
Type location	: Village: Digavalli; Tehsil: Nuzvid; District: Krishna; 80° 50 '5" N 16° 52' 7" E
Profile No	: 65D/S3/39
Physiographic position	: Very gently sloping lands
Elevation (m)	: 160-170
Rainfall (mm)	: 1040
Ground water table (m)	: 10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Mango and other horticultural crops
Geology and soil parent material	: Quartzite
SRM association number	: AP
Distribution and extent	: Extensive (250161 ha) Khammam (54408 ha), Srikakulam (41759 ha), Adilabad (36248 ha), Vizianagaram (31797 ha), Warangal (27190), Visakhapatnam (16655 ha), Krishna (15975 ha), Nellore (6764 ha), Kurnool (5883 ha), Guntur (4791 ha), Mahbubnagar (3506 ha), Karimnagar (2475 ha), West Godavari (2277 ha) and Prakasam (433 ha)
Soils associated	: Fine, mixed, Typic Ustorthents Fine, mixed, Typic Haplustalfs Fine, mixed, Typic Haplustepts Clayey-skeletal, mixed, Typic Rhodustalfs Clayey-skeletal, mixed, Typic Haplustepts
Soil series correlated	: Tadarpalli series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Digavalli loamy sand-cultivated

Ap	0-8 cm	Yellowish red (5YR 5/6 M) loamy sand; weak fine granular structure; friable, nonsticky and nonplastic; many fine to medium roots; neutral (pH 6.9); abrupt smooth boundary.
Bt1	8-30 cm	Red (2.5YR 4/6 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; few medium fine roots; slightly acid (pH 6.1); gradual smooth boundary.
Bt2	30-63 cm	Dark red (2.5YR 3/6 M) sandy clay; moderate coarse subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; few fine to medium roots; slightly acid (pH 6.0); gradual smooth boundary.
Bt3	63-150 cm	Dark red (2.5YR 3/6 M) sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; patchy moderately thick clay cutans; slightly acid (pH 5.9).

Interpretation: These are very deep and clayey in texture; have high potential for growing mango, cashew and other horticultural crops and medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : IIes

Land irrigability sub-class : 2s

Length of growing period : 150-180 days

Productivity potential : Medium to high

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Green gram	3.93	12
Groundnut	8.96	18
Horse gram	2.43	12
Rice	34.62	60
Sesamum	2.61	6

c) Land suitability for crops:

Crops	Groundnut	Sesamum	Green gram	Rice
Suitability class	S1/S2n	S2n	S2t	S3tn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<------(USDA)----->						
0-8	Ap	85.9	6.8	07.3	ls	6.9	6.2	0.31
8-30	Bt1	63.7	5.7	30.6	scl	6.1	4.9	0.39
30-63	Bt2	58.7	6.0	35.3	sc	6.0	5.0	0.25
63-150	Bt3	49.9	7.5	42.6	sc	5.9	5.0	0.26

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-8	0.0	1.0	1.0	0.0	0.2	2.2	1.4	0.0	0.0
8-30	0.0	2.5	2.7	0.0	0.3	5.5	3.7	0.1	0.0
30-63	0.0	3.5	3.1	0.0	0.3	6.9	4.2	0.0	0.0
63-150	1.0	4.2	3.4	0.1	0.3	8.0	4.5	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-8	2.2	02.4	03.6	0.33	92	61
8-30	5.6	07.1	09.2	0.23	77	60
30-63	6.9	08.1	11.1	0.23	85	62
63-150	8.0	10.5	12.5	0.25	76	64

8. WARANGAL SOILS (2,95,751 ha)

(Shallow red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, semiactive, isohyperthermic Lithic Rhodustalfs
Type location	: Village: Venkatapuram; Tehsil: Penukonda; District: Anantapur; 14°5'22" N 77°31' E
Profile No	: 57F/S6/18
Physiographic position	: Gently sloping
Elevation (m)	: 655
Rainfall (mm)	: 700-800
Ground water table (m)	: >10
Slope, relief and erosion	: 1 to 3 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of <2.5 cm diameter
Land use and vegetation	: Groundnut, pigeonpea; acacia, neem
Geology and soil parent material	: Archaeans ;granite- gneiss
SRM association number	: AP 04, 108, 113, 185
Distribution and extent	: Extensive (295751 ha) Cuddapah (48850 ha), Warangal (43148 ha), Guntur (41591 ha), Khammam (41514 ha), Prakasam (40683 ha), Adilabad (34792 ha), Anantapur (23890 ha), Kurnool (10998 ha), Karimnagar (9202 ha) and Nalgonda (1083 ha)
Soils associated	: Clayey-skeletal, mixed, Lithic Haplustalfs Loamy, mixed, Paralithic Haplustepts Clayey-skeletal, mixed, Lithic Haplustepts
Soil series correlated	: Nil

Typifying pedon: Venkatapuram gravelly sandy loam - cultivated

Ap	0-7cm	Yellowish red (5YR 5/6 M) gravelly sandy loam; weak fine to medium subangular blocky structure; friable, nonsticky and nonplastic; 30-40 per cent fine quartz gravel; few very fine to fine roots; slightly acid (pH 6.4); clear smooth boundary.
Bt1	7-23 cm	Dark reddish brown (2.5YR 3/4 M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; 60-70 per cent fine quartz gravel; patchy thin clay cutans; few very fine roots; slightly acid (pH 6.2); gradual smooth boundary.
Bt2	23-41 cm	Dark reddish brown (2.5 YR 3/4 M) gravelly clay; weak medium subangular blocky structure; friable, sticky and plastic; 60-70 per cent fine quartz gravel; patchy thin clay cutans; few very fine roots; neutral (pH 6.7); clear smooth boundary.
Cr	41-63 cm	Hard rock (granite-gneiss).

Interpretation: These are shallow and clayey in texture. High subsoil gravelliness, low AWC, moderate erosion, low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class :IIIes

Land irrigability sub-class : 2s

Length of growing period :150-180 days

Productivity potential :Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.89	11
Green gram	1.92	12
Groundnut	3.44	18
Jowar	3.19	35
Maize	13.01	45
Red gram	2.12	18
Rice	12.37	60
Sesamum	1.61	6

c) Land suitability for crops:

Crops	Sorghum	Green gram	Groundnut	Sesamum
Suitability class	S3gn	N	S3tn	N

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←----->(USDA)<-----						
0-7	Ap	79.2	09.9	10.9	g sl	6.4	5.4	0.34
7-23	Bt1	49.8	09.2	41.0	g sc	6.2	5.0	0.65
23-41	Bt2	44.3	12.4	43.3	g c	6.7	5.3	0.58

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-7	0.0	2.3	1.2	0.0	0.2	03.7	11.7	0.0	0.0
7-23	0.7	9.0	3.1	0.1	0.3	12.5	07.2	0.0	0.0
23-41	0.7	8.2	4.8	0.1	0.3	13.4	08.0	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-7	03.7	04.3	15.4	0.39	86	24
7-23	12.5	14.5	19.7	0.35	86	63
23-41	13.4	15.3	21.4	0.35	88	63

9. BHONGIR SOILS (3,35,832 ha)

(Medium deep red gravelly loam soils)

Classification	: Loamy-skeletal, mixed, semiactive, isohyperthermic Typic Rhodustalfs
Type location	: Village: Pambanuru; Tehsil: Anantapur; District: Anantapur; 14°39'45" N 77°24'40" E
Profile No	: 57F/S2/19
Physiographic position	: Gently sloping pediments
Elevation (m)	: 470
Rainfall (mm)	: 540
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: Cultivated to groundnut, red gram
Geology and soil parent material	: Granite, granite-gneiss.
SRM association number	: AP 06, 07, 207
Distribution and extent	: Extensive (335832 ha) Nalgonda (111583 ha), Anantapur (58137 ha), Warangal (35887 ha), Chittoor (27542 ha), Mahbubnagar (19936 ha), Rangareddi (17423 ha), Khammam (12420 ha), Medak (11546 ha), Krishna (10735 ha), Nellore (9257 ha), Vizianagaram (6955 ha), Nizamabad (6150 ha), Adilabad (4257 ha), Karimnagar (2728 ha) and Srikakulam (1276 ha)
Soils associated	: Loamy-skeletal, mixed, Lithic Ustrothents Clayey-skeletal, mixed, Typic Haplustalfs Fine loamy, mixed, Typic Haplustalfs
Soil series correlated	: Vayalpad series [Soil series of Anantapur district, AP, (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Pambanuru gravelly sandy loam – cultivated

Ap	0-10 cm	Reddish yellow (5 YR 6/6 D) and yellowish red (5YR 4/4 M) gravelly sandy loam; weak fine subangular blocky structure; loose, friable, nonsticky and nonplastic; 45 per cent fine and coarse quartz gravel; common fine to very fine roots; slightly alkaline (pH 8.1); clear smooth boundary.
Bt1	10-30 cm	Dark reddish brown (2.5YR 3 /4 M) gravelly sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 35 per cent fine and coarse quartz gravel; thin patchy clay cutans; few very fine to fine roots; neutral (pH 7.5); clear smooth boundary.
Bt2	30-57 cm	Dark red (2.5 YR 3/6 M) gravelly sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 40 per cent fine and coarse quartz gravel; thin patchy clay cutans; few very fine to fine roots; neutral (pH 7.0); clear smooth boundary.
Bt3	57-95 cm	Dark red (2.5 YR 3/6M) gravelly sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 45 per cent fine and coarse quartz gravel; thin patchy clay cutans; neutral (pH 7.0); clear wavy boundary.
Cr	95 cm	Weathered granite.

Interpretation: These are medium deep and loamy in texture. High gravel content in the subsoil, low AWC, moderate to severe erosion and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Land irrigability sub-class : 3st

Length of growing period : 150-180 days

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.94	11
Green gram	2.06	12
Groundnut	3.72	18
Jowar	3.19	35
Red gram	2.12	18
Rice	17.43	60

c) Land suitability for crops:

Crops	Groundnut	Sorghum	Green gram	Red gram
Suitability class	S2g	S3tg	S3tg	S3gr

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<----->(USDA)<----->							
0-10	Ap	76.5	14.7	08.8	g sl	8.1	7.2	0.23	0.0
10-30	Bt1	62.0	10.6	27.4	g scl	7.5	6.2	0.50	0.0
30-57	Bt2	59.4	09.7	30.9	g scl	7.0	5.5	0.32	0.0
57-95	Bt3	63.7	08.8	27.5	g scl	7.1	5.5	0.25	0.0

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-10	0.0	7.6	0.6	0.0	0.1	08.3	0.9	0.0	0.0
10-30	0.0	9.3	2.2	0.0	0.2	11.7	5.0	0.0	0.0
30-57	1.1	9.1	3.2	0.1	0.1	12.5	5.5	0.0	0.0
57-95	1.2	6.5	3.2	0.1	0.1	09.9	4.5	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-10	08.3	3.6	09.2	0.41	231	90
10-30	11.7	8.3	16.7	0.30	141	70
30-57	12.5	8.9	18.0	0.29	140	69
57-95	09.9	8.2	14.4	0.30	121	69

10. PENUKONDA SOILS (7,01,506 ha)

(Deep red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs
Type location	: Village: Appanpalli; Tehsil: Makhtal; District: Mahbubnagar; 14° 5' 22" N 77° 31' E
Profile No	: 56H/S5/6
Physiographic position	: Undulating lands
Elevation (m)	: 340-400
Rainfall (mm)	: 600
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; severely eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Pasture; acacia, neem
Geology and soil parent material	: Granite, granite- gneiss.
SRM association number	: AP 02,03,05,08,09,52,107,149,160,162,167,182,238
Distribution and extent	: Extensive (701506 ha) Anantapur (175168 ha), Nalgonda (121892 ha), Mahbubnagar (79648 ha), Warangal (73768 ha), Kurnool (65754 ha), Cuddapah (56628 ha), Chittoor (49464 ha), Karimnagar (36809 ha), Rangareddi (31410 ha) and Nizamabad (2738 ha)
Soils associated	: Loamy-skeletal, mixed, Rhodic Paleustalfs Clayey-skeletal, mixed, Rhodic Paleustalfs Clayey-skeletal, mixed, Typic Haplustalfs Loamy-skeletal, mixed, Typic Haplustepts Fine, mixed, Typic Paleustalfs Loamy-skeletal, mixed, Lithic Haplustepts Rock lands
Soil series correlated	: - Chandubatlal series, Peddamarur series, Timmanenipalle series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore) - Garnimitta series, Ramapuram series [Soil series of Anantapur district, A.P., (Unpubl.) NBSS&LUP, Bangalore.]

Typifying pedon: - Appanpalli gravelly sand- pasture

A	0-13 cm	Brown to strong brown (7YR 4/5 M) gravelly sand; weak fine granular structure; friable, nonsticky and nonplastic; 30-35 per cent fine and coarse quartz gravel; many fine to very fine roots; neutral (pH 6.9); abrupt smooth boundary.
AB	13-33 cm	Dark brown (7YR 3/4 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 50-60 per cent fine and coarse quartz gravel; common fine to very fine roots; slightly acid (pH 6.1); gradual smooth boundary.
Bt1	33-62 cm	Dark reddish brown (2.5YR 3/4 M) gravelly sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; patchy thick clay cutans; 65 to 75 per cent fine and coarse quartz gravel; common fine to very fine roots; slightly acid (pH 5.9); gradual smooth boundary.
Bt2	62-92	Dark reddish brown to dark red (2.5YR 3/5 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; patchy thick clay cutans; 65 to 75 per cent fine and coarse quartz gravel; few fine roots; moderately acid (pH 5.5); gradual wavy boundary.
BC	92-109	Dark red (2.5YR 3/6 M) sandy clay loam; weak medium subangular blocky structure; friable, sticky and plastic; patchy thin clay cutans; 15 to 25 per cent fine and coarse quartz gravel; slightly acid (pH 6.0).

Interpretation: These are deep and clayey in texture. High subsoil gravelliness, moderate slopes, severe erosion, low AWC and low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIes

Length of growing period : 120-150 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Green gram	3.14	12
Groundnut	6.48	18
Jowar	9.05	35
Red gram	2.45	18
Rice	20.31	60

c) Land suitability for crops:

Crops	Groundnut	Sorghum	Red gram	Green gram
Suitability class	S3gl	S3gl/N	S3gl/N	S3gl/N

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<------(USDA)----->							
0-13	A	87.1	8.8	04.1	g s	6.9	6.0	0.36	0.5
13-33	AB	75.0	6.7	18.3	g sl	6.1	4.7	0.47	0.0
33-62	Bt1	50.6	7.9	41.5	g sc	5.9	5.1	0.62	0.0
62-92	Bt2	42.6	6.2	51.2	g c	5.5	4.6	0.45	0.6
92-109	BC	64.5	6.3	29.2	scl	6.0	4.8	0.24	0.0

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-13	5.9	01.1	0.5	0.1	0.3	02.0	01.7	0.0	0.0
13-33	1.4	04.9	1.9	0.1	0.2	07.1	05.9	0.1	0.0
33-62	0.6	09.8	4.1	0.1	0.4	14.4	04.7	0.1	0.2
62-92	0.9	11.8	5.2	0.2	0.4	17.6	13.3	0.1	0.0
92-109	1.4	08.5	3.7	0.2	0.2	12.6	05.7	0.1	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-13	02.0	01.7	03.7	0.41	118	54
13-33	07.2	08.6	13.0	0.47	83	55
33-62	14.5	17.6	19.1	0.42	82	75
62-92	17.7	21.6	30.9	0.42	81	57
92-109	12.7	13.8	18.3	0.47	91	69

11. KANIGIRI SOILS (3,32,080 ha)

(Deep red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, subactive, isohyperthermic Typic Rhodustalfs
Type location	: Village: Rogunta; Tehsil: Nuzvid; District: Krishna: 16°45'6" N 80°48'9" E
Profile No	: 65D/S3/15
Physiographic position	: Steeply sloping lands
Elevation (m)	: 240-260
Rainfall (mm)	: 1040
Ground water table (m)	: >10
Slope, relief and erosion	: 8-15 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 7.5 to 25 cm diameter
Land use and vegetation	: Forest (bushes)
Geology and soil parent material	: Sandstone
SRM association number	: AP 02,03,05,08,09,52,107,149,160,162,167,182, 238
Distribution and extent	: Extensive (332080 ha) Prakasam (81352 ha), Guntur (73066 ha), Nellore (53666 ha), Khammam (53403 ha), East Godavari (37944 ha), West Godavari (16870 ha) and Krishna (15779 ha)
Soils associated	: Loamy-skeletal, mixed, Rhodic Paleustalfs Clayey-skeletal, mixed, Rhodic Paleustalfs Clayey-skeletal, mixed, Typic Haplustalfs Loamy-skeletal, mixed, Typic Haplustepts Fine, mixed, Typic Paleustalfs Loamy-skeletal, mixed, Lithic Haplustepts Rock lands
Soil series correlated	: - Chandubatlā series, Peddamarur series, Timmanenipalle series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore) - Garnimitta series, Ramapuram series [Soil series of Anantapur district, A.P., (Unpubl.) NBSS&LUP, Bangalore]

Typifying pedon: Rogunta sandy loam-forest

A	0-8 cm	Dark reddish brown (5YR 3/4 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; 25 per cent coarse gravel and stones; neutral (pH 6.6); clear smooth boundary.
BA	8-29 cm	Dark red (2.5YR 3/6 M) gravelly sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many medium and coarse roots; 30 per cent coarse gravel, slightly acid (pH 6.2); gradual smooth boundary.
Bt1	29-55 cm	Dark red (2.5YR 3/6 M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; few medium and coarse roots; slightly acid (pH 6.1); gradual smooth boundary.
Bt2	55-100 cm	Dark red (2.5YR 3/6 M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; few medium and coarse roots; 40 per cent coarse gravel; slightly acid (pH 5.8); abrupt smooth boundary.
R	100 cm	Hard rock (sandstone)

Interpretation: These are deep and clayey in texture. High gravel content in the subsoil, moderate to steep slopes, moderate to severe erosion, low AWC and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : Ivc.

Length of growing period :150-180 days

Land irrigability sub-class :6st

Productivity potential :Low to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Green gram	3.14	12
Groundnut	6.48	18
Jowar	9.05	35
Red gram	2.45	18
Rice	20.31	60

c) Land suitability for crops:

Crops	Red gram	Green gram	Groundnut	Bajra	Sesamum
Suitability class	N	N	N	N	N

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC
		Sand	Silt	Clay		Water	KCl	
		(2-0.05 mm)	(0.05-0.002 mm)	(<0.002 mm)		(1:2.5)	(1:2.5)	
<------(USDA)----->								
0-8	Ap	68.9	16.7	14.4	sl	6.6	5.5	0.93
8-29	BA	61.5	13.9	24.6	g scl	6.2	4.8	0.69
29-55	Bt1	51.1	10.1	38.8	g sc	6.1	4.6	0.65
55-100	Bt2	52.9	08.2	38.9	g sc	5.8	4.6	0.47

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-8	2.0	1.7	0.0	0.5	4.2	1.8	0.0	0.0
8-29	1.7	2.0	0.0	0.3	4.0	4.1	0.1	0.0
29-55	2.5	2.2	0.0	0.2	4.9	5.2	0.1	0.0
55-100	2.5	2.6	0.0	0.2	5.3	5.3	0.2	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-8	4.2	4.8	06.0	0.33	88	70
8-29	4.1	5.5	08.1	0.22	73	49
29-55	5.0	7.2	10.1	0.19	68	49
55-100	5.5	6.8	10.6	0.17	78	50

12. KHAMMAM SOILS (7,89,662 ha)

(Medium deep red clayey soils)

Classification	: Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs
Type location	: Village: Manesamudram, Tehsil: Hindupur; District: Anantapur: 13°50'N 77°27'E
Profile No	: 57G/S2/13
Physiographic position	: Rolling interfluvies
Elevation (m)	: 600-610
Rainfall (mm)	: 570-750
Ground water table (m)	: 25
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3 to 15 per cent stones of <2.5cm diameter
Land use and vegetation	: Groundnut, pigeon pea, horse gram.
Geology and soil parent material	: Granite, granite- gneiss
SRM association number	: AP 10, 83, 91, 125, 126, 127, 132, 143, 151, 161, 172, 236
Distribution and extent	: Extensive (789662 ha) Khammam (113384 ha), Chittoor (112065 ha), Visakhapatnam (77483 ha), Kurnool (68377 ha), Vizianagaram (65523 ha), Nalgonda (58254 ha), Warangal (39910 ha), Anantapur (39512 ha), Rangareddi (35440 ha), East Godavari (31028 ha), Srikakulam (29541 ha), Guntur (24292 ha), West Godavari (19736 ha), Krishna (18080 ha), Cuddapah (14021 ha), Mahbubnagar (12009 ha), Karimnagar (11596 ha), Adilabad (11034 ha), Nellore (4592 ha), Nizamabad (3037 ha), Medak (459 ha), Prakasam (289 ha)
Soils associated	: Fine, mixed, Typic Haplustalfs Loamy, mixed, Lithic Ustrothents Fine, mixed, Rhodic Paleustalfs Loamy-skeletal, mixed, Typic Haplustepts Fine, mixed, Typic Haplustepts
Soil series correlated	: • Kalwakurthy series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore) • Brahmanapalle series [Soil series of Anantapur district, (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Manesamudram loamy sand – cultivated

Ap	0-11 cm	Strong brown (7.5 YR 5/6 D) dark brown (7.5YR 4/4 M) loamy sand; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine to very fine roots; slightly acid (pH 5.9); clear smooth boundary.
Bt1	11-26 cm	Red (2.5YR 4/6 D) dark reddish brown (2.5YR 3/4 M) sandy clay loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; patchy thin clay cutans; few very fine roots; slightly acid (pH 5.7); gradual smooth boundary.
Bt2	26-50 cm	Dark brown (2.5 YR 3/4 M) sandy clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; patchy thick clay cutans; few very fine roots; neutral (pH 6.7); clear smooth boundary.
Bt3	50-66 cm	Reddish brown (2.5YR 3/4 M) sandy clay; moderate medium subangular blocky structure; friable, sticky and slightly plastic; patchy thick clay cutans; few very fine roots; neutral (pH 7.1); clear smooth boundary.
Cr	66 cm	Weathered granite-gneiss.

Interpretation: These are medium deep and clayey in texture. Moderate slopes, moderate erosion and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Length of growing period : 120-180 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	15.02	25
Cotton	2.93	11
Green gram	3.47	12
Groundnut	8.02	18
Maize	32.66	45
Red gram	5.85	18
Rice	22.60	60
Sesamum	1.70	6
Sugarcane	809.86	1250

c) Land suitability for crops:

Crops	Groundnut	Red gram	Green gram	Bajra	Sesamum
Suitability class	S2I	S2It	S3It	S2I	S3It

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<------(USDA)----->						
0-11	Ap	85.5	04.9	09.6	ls	5.9	4.7	0.23
11-26	Bt1	67.1	05.9	27.0	scl	5.7	4.4	0.31
26-50	Bt2	50.4	05.8	43.8	sc	6.7	5.0	0.32
50-66	Bt3	45.0	12.4	42.6	sc	7.1	5.1	0.25

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-11	0.0	01.1	1.7	0.0	0.1	02.9	2.3	0.1	0.0
11-26	1.2	04.4	3.3	0.1	0.1	07.9	5.8	0.1	0.1
26-50	1.2	08.7	4.6	0.2	0.2	13.7	6.3	0.0	0.0
50-66	1.5	12.2	5.6	0.3	0.2	18.3	6.7	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-11	03.0	03.1	05.2	0.32	94	56
11-26	08.0	08.5	13.7	0.31	93	58
26-50	13.7	16.3	20.0	0.37	84	69
50-66	18.3	19.4	25.0	0.46	94	73

13. NIZAMABAD SOILS (3,16,850 ha)

(Deep red gravelly loam soils)

Classification	: Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs
Type location	: Village: Ravanahalli; Tehsil: Kalyandurg; District: Anantapur; 14°40'38" N 77°6' E
Profile No	: 57F/S1/2
Physiographic position	: Rolling interfluvies
Elevation (m)	: 470
Rainfall (mm)	: 570-700
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Somewhat excessively drained with moderate permeability
Surface stoniness/rockiness	: 40-75 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Groundnut; acacia, neem
Geology and soil parent material	: Granite; granite gneiss
SRM association number	: AP 11, 13
Distribution and extent	: Extensive (316850 ha) Nalgonda (84071 ha), Nizamabad (66030 ha), Adilabad (59758 ha), Khammam (35645 ha), Karimnagar (18746 ha), Warangal (17468 ha), Anantapur (15158 ha), Krishna (10533 ha), Rangareddi (5846 ha), Medak (2970 ha) and Mahbubnagar (625 ha)
Soils associated	: Clayey-skeletal, mixed, Typic Haplustepts Clayey-skeletal, mixed, Typic Haplustalfs
Soil series correlated	: • Masanpalli series, Tanigandla series (NBSS Publ. 791, NBSS&LUP, Nagpur) • Patancheru series (Benchmark soils of India, 1982, NBSS&LUP, Nagpur)

Typifying pedon: Ravanahalli gravelly sandy clay loam – cultivated

Ap	0-9 cm	Brown to dark brown (7.5YR 4/4 M) gravelly sandy clay loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; 30 per cent fine and 10 per cent coarse quartz gravel; many fine roots; neutral (pH 6.9); clear smooth boundary.
A2	9-27 cm	Red to dark red (2.5YR 3.5/6 M) gravelly loamy sand; weak medium granular structure; very friable, nonsticky and non plastic; 20 per cent fine quartz gravel; few fine roots; neutral (pH 7.4); gradual smooth boundary.
Bt1	27-48 cm	Dark red (2.5 YR 3/6 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay cutans; few very fine roots; few fine lime nodules; 60 per cent fine quartz gravel; neutral (pH 6.7); gradual smooth boundary.
Bt2	48-95 cm	Reddish brown (2.5YR 4/4 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay cutans; many medium lime nodules; 50 per cent fine quartz gravel; neutral (pH 7.1); gradual smooth boundary.
Ck	95-108 cm	Common medium and coarse lime nodules mixed with weathered granite-gneiss; violent effervescence with dilute HCl.

Interpretation: These are deep and loamy in texture. High subsoil gravelliness, moderate slopes, moderate erosion, low AWC and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIs

Length of growing period : 120-180 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield : Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.89	11
Green gram	2.02	12
Groundnut	3.44	18
Jowar	3.19	35
Maize	13.01	45
Rice	15.87	60
Sugarcane	607.69	1250

c) Land suitability for crops:

Crops	Sorghum	Maize	Green gram	Groundnut
Suitability class	S3gm	S3gm	Sgn	S3gm

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<-----<USDA>----->						
0-9	Ap	80.7	10.1	9.2	g ls	7.4	6.4	0.36
9-27	A2	63.8	11.0	25.2	scl	6.5	5.0	0.40
27-48	Bt1	58.9	7.0	34.1	g scl	6.7	5.5	0.37
48-95	Bt2	56.5	12.2	31.3	g scl	7.1	6.1	0.35

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-9	0.0	2.1	2.0	0.0	0.3	04.4	3.6	0.0	0.0
9-27	1.0	5.8	4.5	0.1	0.1	10.5	5.4	0.0	0.0
27-48	nd	nd	nd	nd	nd	nd	nd	nd	nd
48-95	nd	nd	nd	nd	nd	nd	nd	nd	nd

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-9	04.4	03.6	08.0	0.39	102	55
9-27	10.5	10.3	15.9	0.41	127	66
27-48	nd	nd	nd	nd	nd	nd
48-95	nd	nd	nd	nd	nd	nd

14. RAMANNAPETA SOILS (3,79,030 ha)

(Medium deep red gravelly clay soils)

Classification	:	Clayey-skeletal, mixed, semiactive, isohyperthermic Typic Haplustalfs
Type location	:	Village: Regional Agricultural Research Station, ANGRAU, Palem; Tehsil: Nagarkurnool; District: Mahbubnagar; 16° 31' N 78° 15' E
Profile No	:	56L/RARS/15
Physiographic position	:	Gently sloping interfluvies
Elevation (m)	:	462
Rainfall (mm)	:	600-700
Ground water table (m)	:	>10
Slope, relief and erosion	:	1 to 3 per cent slopes, moderately eroded
Drainage and permeability	:	Well drained with moderate permeability
Surface stoniness/rockiness	:	<3 per cent stones of <2.5 cm diameter
Land use and vegetation	:	Castor, red gram, paddy; neem, pongamia, prosopis
Geology and soil parent material	:	Archaean; weathered granite
SRM association number	:	AP 07,09,13,14,15,17,92,109,150
Distribution and extent	:	Extensive (379030 ha) Nalgonda (107793 ha), Khammam (48425 ha), Karimnagar (41103 ha), Adilabad (39833 ha), Warangal (23924 ha), Chittoor (20828 ha), Rangareddi (18346 ha), Mahbubnagar (16746 ha), Nizamabad (14277 ha), Medak (12372 ha), Cuddapah (10593 ha), Krishna (10163 ha), Nellore (5417 ha), Anantapur (4732 ha), Kurnool (2606 ha) and West Godavari (1872 ha)
Soils associated	:	Loamy-skeletal, mixed, Typic Rhodustalfs Clayey-skeletal, mixed, Typic Rhodustalfs Loamy-skeletal, mixed, Typic Haplustalfs Clayey-skeletal, mixed, Typic Haplustepts Fine, mixed, Typic Haplustalfs Rock lands
Soil series correlated	:	• Palem series [DSS of ZARS Farm, ANGRAU, Palem, (Unpubl.), NBSS&LUP, Bangalore] • Gadwal series, Peddadaripalli series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)

Typifying pedon: Palem sandy clay loam-cultivated

Ap	0-12 cm	Reddish brown (5YR 4/4 M) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 5 per cent fine quartz gravel; fine common pores, few very fine roots; slightly acid (pH 6.3); clear smooth boundary.
Bt1	12-24 cm	Dark reddish brown (2.5YR 3/4 M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; 25 per cent fine quartz gravel; many fine pores; thin patchy clay cutans; few very fine roots; neutral (pH 6.8); clear smooth boundary.
Bt2	24-40 cm	Dark reddish brown (2.5YR 3/4M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; 50 per cent fine and medium quartz gravel; many fine pores; thin patchy clay cutans; few very fine roots; neutral (pH 7.0); gradual smooth boundary.
Bt3	40-66 cm	Reddish brown (5YR 4/4M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; 40 per cent fine and medium quartz gravel; common fine pores; thin patchy clay cutans; few very fine roots; neutral (pH 6.8); gradual smooth boundary.
Cr	66-92 cm	Weathered granite

Range in characteristics: The solum depth ranges from 58 to 175 cm. The thickness of the Ap horizon ranges from 10 to 16 cm, texture ranges from loamy sand to sandy loam and sandy clay loam, colour of Ap horizon is reddish brown (5YR 4/4 M) to dark brown (7.5YR 3/4 M). The thickness of the Bt horizon ranges from 48-125cm. Colour ranges in 7.5 YR, 5YR and 2.5 YR hues with value 3 to 4 and chroma 3 to 6. The gravel content ranges from 20 to 60 per cent and increases with depth.

Interpretation: These are medium deep and clayey in texture. Shallow rooting depth, high subsoil gravelliness, low AWC, moderate erosion hazard and low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : lies

Length of growing period :120-180 days

Land irrigability sub-class : 2s

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.94	11
Green gram	3.14	12
Groundnut	6.48	18
Jowar	9.05	35
Maize	23.51	45
Red gram	2.45	18
Rice	20.31	60

c) Land suitability for crops:

Crops	Groundnut	Red gram	Green gram	Sorghum	Maize
Suitability class	S2gr	S2rg	S2g	S3gr	S2gr

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-12	Ap	65.7	5.6	28.7	scl	6.3	4.8	0.46	0.1
12-24	Bt1	46.7	4.8	48.5	g sc	6.8	5.2	0.62	0.1
24-40	Bt2	44.9	0.9	54.2	g c	7.0	5.5	0.31	0.1
40-66	Bt3	47.2	6.5	46.3	g sc	6.8	5.2	0.37	0.1

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-12	0.0	06.8	2.4	0.0	0.5	9.7
12-24	0.6	12.7	3.0	0.1	0.2	16.0
24-40	0.5	14.1	2.7	0.1	0.2	17.1
40-66	0.5	14.5	2.5	0.1	0.3	17.4

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹	CEC/Clay ratio	Per cent Base Saturation
	NH ₄ OAc (pH 7.0)		CEC (pH 7.0)
0-12	11.5	0.40	84
12-24	17.9	0.36	89
24-40	18.5	0.34	92
40-66	18.3	0.40	95

15. PRAKASAM SOILS (6,39,449 ha)

(Medium deep red loamy soils)

Classification	: Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs
Type location	: Village: Wadaramavaram; Tehsil: Kothagudem; District: Khammam; 17°32'8" N 80° 46'3" E
Profile No	: 65C/S5/10
Physiographic position	: Undulating interfluvies with isolated mounds
Elevation (m)	: 80-100
Rainfall (mm)	: 900-1000
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes, moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: Jowar; neem, acacia, prosopis
Geology and soil parent material	: Schist
SRM association number	: AP 16,79,80,123,126,128,129,207,208
Distribution and extent	: Extensive (639449 ha) Prakasam (160104 ha), East Godavari (80291 ha), Nellore (78628 ha), Guntur (50244 ha), Vizianagaram (48105 ha), Visakhapatnam (47594 ha), Khammam (43679 ha), Nizamabad (31263 ha), Srikakulam (24234 ha), Karimnagar (18631 ha), Chittoor (12686 ha), Warangal (11154 ha), Medak (10740 ha), West Godavari (8019 ha), Mahbubnagar (7417 ha), Adilabad (5476 ha) and Krishna (1184 ha)
Soils associated	: Clayey-skeletal, mixed, Lithic Ustorthents Clayey-skeletal, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Paleustalfs Fine, mixed, Typic Rhodustalfs Loamy-skeletal, mixed, Typic Rhodustalfs
Soil series correlated	: Kottacheruvu series, Satarpalle series [Soil series of Anantapur district, A.P., (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Wadaramavaram sand- cultivated

Ap	0-13 cm	Brown (7.5YR 5/4 D) and dark brown (5 YR 4/4 M) sand; single grained; loose, very friable, nonsticky and nonplastic; many fine to medium roots; neutral (pH 7.2); clear smooth boundary.
Bt1	13-26 cm	Strong brown (5YR 4/4 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; neutral (pH 6.9); gradual smooth boundary.
Bt2	26-52 cm	Strong brown (5YR 4/4 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; neutral (pH 6.8); abrupt smooth boundary.
C	52 cm	Rock (schist).

Interpretation: These are medium deep and loamy in texture. Shallow rooting depth, moderate erosion hazard and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Length of growing period : 150-210 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	11.08	25
Blackgram	3	13
Green gram	3.47	12
Red gram	4.15	18
Rice	22.6	60
Sesamum	1.66	6
Tobacco	13.36	14

c) Land suitability for crops:

Crops	Tobacco	Green gram	Black gram	Sesamum	Rice
Suitability class	S2l	S2tl	S2tl	S2tl	S3tn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		$\leftarrow$ ------(USDA)----- $\rightarrow$						
0-13	Ap	88.5	5.1	06.4	s	7.2	6.6	0.25
13-26	Bt1	66.6	7.1	26.3	scl	6.9	5.9	0.36
26-52	Bt2	59.1	7.7	33.2	scl	6.8	5.2	0.41

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-13	1.3	1.0	0.0	0.2	2.5	4.5	0.0	0.0
13-26	2.5	1.5	0.0	1.5	5.5	1.2	0.0	0.0
26-52	2.8	1.9	0.0	0.9	5.6	1.4	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-13	2.5	2.2	7.0	0.34	114	36
13-26	5.5	5.7	6.7	0.21	096	82
26-52	5.6	7.2	7.0	0.22	078	80

16. CHITTOOR SOILS (8,24,598 ha)

(Medium deep red clayey soils)

Classification	: Fine, mixed, active, isohyperthermic Typic Haplustalfs
Type location	: Village: Peddareddipalli; Tehsil: Hindupur; District: Anantapur; 13°50'29" N 77°53'19" E
Profile No	: 57G/S2/1
Physiographic position	: Undulating Interfluves
Elevation (m)	: 680 to 700
Rainfall (mm)	: 750
Ground water table (m)	: >20
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones with 2.5-7.5 cm diameter.
Land use and vegetation	: Groundnut, pigeon pea; acacia, neem
Geology and soil parent material	: Granite
SRM associated number	: AP 01,10,17,18,19,37,74,81,84,93,130,133,134, 144,151,155,172,209,210
Distribution and extent	: Extensive (824598 ha) Chittoor (112191 ha), Adilabad (110731 ha), Karimnagar (104834 ha), Mahbubnagar (101970 ha), Warangal (93044 ha), Kurnool (45585 ha), Rangareddi (44220 ha), Anantapur (41524 ha), Nalgonda (40795 ha), Nizamabad (35757 ha), Medak (21566 ha) and Cuddapah (254 ha)
Soils associated	: Fine, mixed, Typic Rhodustalfs Loamy-skeletal, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Haplustepts Fine, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Paleustalfs Fine, mixed, Typic Paleustalfs
Soil series correlated	: • Kondalaswamy series (NBSS Publ. 791, NBSS&LUP, Nagpur) • Kaukuntla series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)

Typifying pedon: Peddareddipalli loamy sand-cultivated

Ap	0-6 cm	Dark red (2.5YR 3/6 M) loamy sand; weak medium granular structure; loose, nonsticky and nonplastic; many very fine and fine roots; neutral (pH 6.6); abrupt smooth boundary.
Bt1	6-27 cm	Dusky red (2.5YR 3/2 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin clay cutans; many very fine and fine roots; neutral (pH 6.9); clear smooth boundary.
Bt2	27-52 cm	Reddish brown (5YR 4/3M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; patchy thick clay cutans; few very fine roots; neutral (pH 7.4); abrupt smooth boundary.
Cr	52-58 cm	Weathered granite.

Interpretation: These are medium deep and clayey in texture. Shallow rooting depth, moderate slopes, moderate erosion and low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIe

Length of growing period : 120-180 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.4	13
Cotton	2.14	11
Green gram	3.47	12
Groundnut	7.64	18
Horse gram	2.27	12
Jowar	10.29	35
Red gram	4.35	18
Rice	22.6	60

c) Land suitability for crops:

Crops	Groundnut	Sorghum	Horse gram	Red gram	Green gram	Black gram
Suitability class	S2lr	S2tl	S2tl	S2tl	S2tl	S2tl

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-6	Ap	81.3	7.6	11.1	ls	6.6	5.8	0.31
6-27	Bt1	63.9	7.8	28.3	scl	6.9	5.6	0.47
27-52	Bt2	42.8	15.6	41.6	c	7.4	6.4	0.56

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-6	1.8	1.0	3.0	0.1	0.2	4.3	2.7	0.0	0.0
6-27	0.7	8.6	5.3	0.1	0.2	14.2	5.5	0.0	0.0
27-52	1.1	16.6	9.5	0.3	0.2	26.6	6.6	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Base Saturation (%)
	ECEC	NH ₄ Oac (pH 7.0)	Sum of Cations		
0-6	4.3	5.6	7.0	0.50	77
6-27	14.2	14.2	19.7	0.50	100
27-52	26.6	26.1	33.2	0.63	102

17. SRIKAKULAM SOILS (4,73,118 ha)

(Deep red clayey soils)

Classification	:	Fine, mixed, semiaactive, isohyperthermic Typic Haplustalfs
Type location	:	Village: Lekkavaram; Tehsil: Chintur; District: Khammam; 17°44'12" N 77°31'30" E
Profile No	:	65G/S5/13
Physiographic position	:	Interhill basin
Elevation (m)	:	70
Rainfall (mm)	:	900-1000
Ground water table (m)	:	>10
Slope, relief and erosion	:	1-3 per cent slopes: slightly eroded
Drainage and permeability	:	Moderately well drained with moderate permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Paddy, green gram, black gram
Geology and soil parent material	:	Granite
SRM association number	:	AP 01, 10, 17, 18, 19, 37, 74, 81, 84, 93, 130, 133, 134, 144, 151, 155, 172, 209, 210
Distribution and extent	:	Extensive (473118 ha) Srikakulam (108512 ha), Nellore 100646ha), Krishna (83094 ha), Khammam (72127), Visakhapatnam (52536), West Godavari (50819), Prakasam (33005), Vizianagaram (30586), East Godavari (8812 ha) and Guntur (5108 ha)
Soils associated	:	Fine, mixed, Typic Rhodustalfs Loamy-skeletal, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Haplustepts Fine, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Paleustalfs Fine, mixed, Typic Paleustalfs
Soil series correlated	:	- Kondalaswamy series (NBSS Publ. 791, NBSS&LUP, Nagpur) - Kaukuntla series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)

Typifying pedon: Lekkavaram sandy loam-cultivated

Ap	0-12 cm	Dark yellowish red (10YR 4/4 M) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and non-plastic; common fine to very fine roots; slightly acid (pH 6.2); clear smooth boundary.
Bt1	12-36 cm	Reddish brown (10YR 4/3 M) clay loam; weak to moderate medium subangular blocky structure; friable slightly sticky and slightly plastic; thin patchy clay cutans; few very fine roots; slightly acid (pH 6.1); gradual smooth boundary.
Bt2	36-75 cm	Dark reddish brown (5YR 3/4 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans, few very fine roots; slightly acid (pH 5.9); gradual smooth boundary.
Bt3	75-108cm	Reddish brown (5YR 4/4 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; patchy thin clay cutans; few very fine roots; slightly acid (pH 6.0); gradual smooth boundary.
Bt4	108-150 cm	Dark reddish brown (2.5YR 3/4 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; patchy thin clay cutans; slightly acid (pH 6.0); gradual smooth boundary.

Interpretation: These are very deep and clayey in texture. Have high potential for growing mango, chashew, tobacco and other horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : Iis

Length of growing period : 150-210 days

Land irrigability sub-class : 2s

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	05.4	13
Cotton	02.14	11
Green gram	03.47	12
Groundnut	07.64	18
Horse gram	02.27	12
Jowar	10.29	35
Red gram	04.35	18
Rice	22.60	60

c) Land suitability for crops:

Crops	Red gram	Horse gram	Groundnut	Green gram	Black gram	Sorghum	Cotton	Rice
Suitability class	S1	S1	S2n	S2t	S2t	S2tl	S3tn	S2tw

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-12	Ap	64.5	17.6	17.9	sl	6.2	5.0	0.95	0.0
12-36	Bt1	43.3	19.1	37.6	cl	6.1	4.9	0.43	0.1
36-75	Bt2	31.8	21.6	46.6	c	5.9	5.0	0.52	0.1
75-108	Bt3	29.2	20.9	49.9	c	6.0	5.0	0.41	0.1
108-150	Bt4	27.5	19.8	52.7	c	6.0	5.2	0.35	0.1

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-12	3.1	2.4	1.0	0.2	0.7	4.3	4.9	0.0	0.0
12-36	2.2	2.8	1.3	0.2	0.7	5.0	7.9	0.1	0.0
36-75	2.9	3.3	1.3	0.3	1.0	5.9	8.1	0.1	0.0
75-108	2.4	4.6	1.1	0.3	1.0	7.0	8.3	0.0	0.0
108-150	1.5	5.2	1.0	0.2	0.9	7.3	8.0	0.1	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Base Saturation (%)	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-12	4.3	06.4	09.2	0.36	67	47
12-36	5.1	08.9	12.9	0.23	56	39
36-75	6.0	10.4	14.0	0.22	57	42
75-108	7.0	12.6	15.3	0.25	56	46
108-150	7.4	13.0	15.3	0.25	56	48

18. BADVEL SOILS (96,187 ha)

(Deep red calcareous clayey soils)

Classification	: Fine, mixed (calcareous), isohyperthermic Ustic Paleargids
Type location	: Village: Thamballapalle; Tehsil: Badvel; District: Cuddapah: 15° 8' 8" N 78° 54' E
Profile No	: 571/S8/2
Physiographic position	: Foot slopes of hills
Elevation (m)	: 210
Rainfall (mm)	: 740
Ground water table (m)	: 5-10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Moderately well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: Groundnut; acacia, neem, prosopis
Geology and soil parent material	: Precambrian-slate; alluvium
SRM association number	: AP 20,23,24,26
Distribution and extent	: Extensive (96187 ha) Anantapur (68152 ha), Cuddapah (15464 ha) and Kurnool (12571 ha)
Soils associated	: Clayey-skeletal, mixed, Paralithic Ustic Haplargids Clayey-skeletal, mixed, Ustic Haplargids Fine, mixed, Ustic Haplargids
Soil series correlated	: Nil

Typifying pedon: Thamballapalle sandy loam-cultivated

Ap	0-12 cm	Dark reddish brown (5YR 3/4 M) sandy loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; common very fine roots; few very fine lime nodules; strong effervescence with dilute HCl.; moderately alkaline (pH 8.7); abrupt smooth boundary.
Bt1	12-30 cm	Dark reddish brown (5YR 3/4 M) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; thin patchy clay cutans; common very fine roots; few very fine and fine lime nodules; violent effervescence with dilute HCl.; slightly alkaline (pH 8.5); clear smooth boundary.
Bt2	30-60 cm	Dark reddish brown (5YR 3/3 M) clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; thin patchy clay cutans; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl.; slightly alkaline (pH 8.5); clear smooth boundary.
Bt3	60-121 cm	Dark reddish brown (5YR 3/4 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; moderately thick broken clay cutans; few very fine and fine lime nodules; violent effervescence with dilute HCl.; moderately alkaline (pH 8.6); gradual smooth boundary.
Bt4	121-155 cm	Dark reddish brown (5YR 3/4 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; moderately thick broken clay cutans; common very fine and fine lime nodules; violent effervescence with dilute HCl.; moderately alkaline (pH 8.6); clear smooth boundary.

Interpretation: These are very deep and clayey in texture. Climate, high lime content and erosion are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IVes
 Land irrigability sub-class :2s
 Length of growing period :< 90 days
 Productivity potential : Low to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.89	11
Groundnut	3.44	18
Jowar	7.50	35
Red gram	1.63	18
Rice	21.27	60

c) Land suitability for crops:

Crops	Sorghum	Red gram	Groundnut
Suitability class	S3cz	S3cz	S3cz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size d'stribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<------(USDA)----->						
0-12	Ap	63.6	19.7	16.7	sl	8.7	7.6	0.28
12-30	Bt1	31.2	31.7	37.1	cl	8.5	7.6	0.28
30-60	Bt2	23.4	36.8	39.8	cl	8.5	7.7	0.22
60-121	Bt3	24.0	33.7	42.3	c	8.6	7.8	0.30
121-155	Bt4	18.1	35.1	46.8	c	8.6	7.8	0.26

19. RAYADURG SOILS (1,35,342 ha)

(Medium deep red calcareous gravelly loam soils)

Classification	: Loamy-skeletal, mixed (calcareous), isohyperthermic Ustic Haplargids
Type location	: Village: P. Reddypalle; Tehsil: Badvel; District: Cuddapah; 15° 7' N 78° 57' E
Profile No	: 571/S8/19
Physiographic position	: Upper pediments
Elevation (m)	: 200
Rainfall (mm)	: 740
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Somewhat excessively drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: <i>Bajra</i> , <i>tur</i> and other millets
Geology and soil parent material	: Pre-cambrian - slate; colluvium
SRM association number	: AP 20, 21, 22, 23, 24, 25
Distribution and extent	: Extensive (135342 ha) Anantapur (98697 ha), Cuddapah (32192 ha) and Kurnool (4453 ha)
Soils associated	: Clayey-skeletal, mixed, Ustic Paleargids; Fine, mixed, Ustic Haplargids; Loamy-skeletal, mixed, Lithic Ustic Torriorthents; Clayey-skeletal, mixed, Ustic Haplocambids
Soil series correlated	: Nil

Typifying pedon: P. Reddipalle gravelly loam-cultivated

Ap	0-12 cm	Weak red (5YR 3/4 M) gravelly loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 25 per cent fine quartz gravel, many very fine roots; strong effervescence with dilute HCl; moderately alkaline (pH 8.7); abrupt smooth boundary.
Bt	12-35 cm	Dark reddish brown (2.5YR 2.5/4 M) gravelly clay loam; weak medium subangular blocky structure; friable, sticky and plastic; patchy thin clay cutans; 35 per cent fine quartz gravel; common very fine roots; strong effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.
BC	35-64 cm	Dark reddish brown (2.5 YR 3/4 M) gravelly loam; weak medium subangular blocky structure; slightly sticky and slightly plastic; 50 per cent fine and coarse quartz gravel; common very fine roots; violent effervescence with dilute HCl; moderately alkaline (pH 8.6); clear smooth boundary.
Cr	64 cm	Weathered slate.

Interpretation: These are medium deep and loamy in texture. High subsoil gravelliness, moderate slopes, moderate erosion, low nutrient status and aridity are the major constraints for crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IVes

Land irrigability sub-class : 3st

Length of growing period : <90 days

Productivity potential : Low to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmers' practices	Improved practices
Bajra	5.75	25
Cotton	1.89	11
Groundnut	3.72	18
Jowar	6.80	35
Red gram	4.20	18
Rice	21.27	60
Tobacco	5.69	14

c) Land suitability for crops:

Crops	Bajra	Sorghum	Rice	Red gram	Cotton	Tobacco
Suitability class	S3gz	S3cz	N	S3cz	N	N

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-12	Ap	39.2	39.6	21.2	g l	8.7	7.7	0.49
12-35	Bt	29.9	38.3	31.8	g cl	8.8	7.7	0.55
35-64	BC	34.2	43.9	21.9	g l	8.6	7.8	0.34

20. ALUR SOILS (78,338 ha)

(Deep calcareous black soils)

Classification	: Fine, smectitic (calcareous), isohyperthermic Ustertic Haplocambids
Type location	: Village: Itikyala; Tehsil: Koilkuntla; District: Kurnool; 15° 4' N 78° 4' E
Profile No	: 571/S6/21
Physiographic position	: Gently sloping plains with isolated hills
Elevation (m)	: 350
Rainfall (mm)	: 650
Ground water table (m)	: >10
Slope, relief and erosion	: 1 to 3 per cent slopes; moderately eroded
Drainage and permeability	: Moderately well drained with slow permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Cotton, sorghum, coriander, begal gram; acacia, neem
Geology and soil parent material	: Precambrian
SRM association number	: AP 28, 49, 50, 95, 101, 176, 177, 192
Distribution and extent	: Extensive (78338 ha) Ananatapur (39844 ha) and Kurnool (38494 ha)
Soils associated	: Fine, mixed (calc.), Ustic Haplocambids Fine, mixed, Ustic Haplocambids Fine, smectitic (calc.), Aridic Haplusterts Very fine, smectitic (calc.), Aridic Haplusterts
Soil series correlated	: Nil

Typifying pedon: Itikyala clay-cultivated

Ap	0-18 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; friable, very sticky and plastic; common very fine to fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; slightly alkaline (pH 8.5); clear smooth boundary.
Bw1	18-46 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; common very fine to fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.2); clear smooth boundary.
Bw2	46-78 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few pressure faces; few very fine to fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.3); gradual smooth boundary.
Bw3	78-108 cm	Very dark gray to dark grayish brown (10YR 3/1.5 M) clay; strong medium subangular blocky structure; firm, very sticky and very plastic; prominent pressure faces; few very fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.3); gradual smooth boundary.

Bw4	108-137 cm	Very dark gray to dark grayish brown (10YR 3/1.5 M) clay; strong medium subangular blocky structure; firm, very sticky and very plastic; prominent pressure faces; few very fine roots; few very fine calcium carbonate nodules; violent effervescence with dil HCl; moderately alkaline (pH 9.4); abrupt smooth boundary.
R	137 cm	Hard rock.

Interpretation: These are deep and cracking clay soils. Slow permeability, high shrink-swell potential, suboptimum oxygen availability, poor workability, high lime content, aridity and low available phosphorus are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIes
Land irrigability sub-class : 2ds
Length of growing period :90-120 days
Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	8.12	25
Cotton	2.28	11
Groundnut	3.72	18
Jowar	13.34	35
Red gram	4.20	18
Rice	19.88	60
Tobacco	8.50	14

c) Land suitability for crops:

Crops	Sorghum	Cotton	Tobacco	Groundnut
Suitability class	S2cz	S3cz	S3tz	S3tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-18	Ap	29.5	28.1	42.4	c	8.5	7.6	0.69	10
18-46	Bw1	27.8	25.2	47.0	c	9.2	7.7	0.56	11
46-78	Bw2	24.1	29.3	46.6	c	9.3	7.9	0.56	14
78-108	Bw3	20.6	26.3	53.1	c	9.3	7.9	0.54	15
108-137	Bw4	27.0	27.3	45.7	c	9.4	7.9	0.81	12

21. KALYANDURG SOILS (84,503 ha)

(Deep calcareous alluvial clayey soils)

Classification	: Fine, mixed (calcareous), isohyperthermic Ustic Haplocambids
Type location	: Village: Billam; Tehsil: Banaganapalli; District: Kurnool; 15° 6' N 78° 7' E
Profile No	: 571/S6/9
Physiographic position	: Very gently sloping plain
Elevation (m)	: 300
Rainfall (mm)	: 650
Ground water table (m)	: 10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Moderately well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: Groundnut; cactus; <i>thumbe</i> , <i>broomstick</i>
Geology and soil parent material	: Precambrian; colluvium of limestones and quartz
SRM association number	: AP 28,30,102,176
Distribution and extent	: Extensive (84503 ha) Anantapur (56363 ha), Kurnool (22432 ha) and Cuddapah (5708 ha)
Soils associated	: Fine, smectitic, (calc.), Ustertic Haplocambids Fine, mixed, (calc.), Ustic Torrifluvents Fine, smectitic, (calc.), Aridic Haplusterts
Soil series correlated	: Nil

Typifying pedon: Billam gravelly sandy clay loam-cultivated

Ap	0-18 cm	Dark grayish brown (10YR 4/2 M) gravelly sandy clay loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; common fine roots; few very fine lime nodules; 25 per cent fine and coarse gravel; violent effervescence with dilute HCl; slightly alkaline (pH 8.5); abrupt smooth boundary.
Bw1	18-43 cm	Dark grayish brown (10YR 4/2 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; common very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.
Bw2	43-70 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.
Bw3	70-97 cm	Very dark grayish brown (10YR 4/3M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.
Bw4	97-120 cm	Very dark gray to black (10YR 2.5/1 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.4); clear smooth boundary.
Bw5	120-151 cm	Very dark gray to black (10YR 2.5/1M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.9); clear smooth boundary.

Interpretation: These are deep and clayey soils. Aridity, drainage problems, high lime content and low available phosphorus are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IVes
 Land irrigability sub-class : 2s
 Length of growing period : <90 days
 Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	5.75	25
Cotton	1.89	11
Groundnut	3.72	18
Jowar	8.95	35
Red gram	4.20	18
Rice	21.27	60
Tobacco	5.69	14

c) Land suitability for crops:

Crops	Bajra	Rice	Sorghum	Groundnut	Red gram	Cotton	Tobacco
Suitability class	S2z	S2g	S2cz	S3cz	N	S3cz	N

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		----->(USDA)<-----							
0-18	Ap	51.0	21.0	28.0	scl	8.5	7.7	0.55	12
18-43	Bw1	26.8	29.0	44.2	c	8.8	7.7	0.95	15
43-70	Bw2	22.7	26.6	50.7	c	8.8	7.8	0.78	36
70-97	Bw3	20.5	28.1	51.4	c	8.8	7.8	0.77	01
97-120	Bw4	20.9	32.4	46.7	c	9.4	7.8	0.78	11
120-151	Bw5	20.6	27.3	52.1	c	8.9	7.7	0.79	12

22. KAVELI SOILS (71,658 ha)

(Marine sandy soils)

Classification	:	Mixed, isohyperthermic Typic Ustipsamments
Type location	:	Village: Chakicherla; Tehsil: Kaveli; District: Nellore; 15° 6' 30" N 80° 2' 30" E
Profile No	:	66A & E/S1/31
Physiographic position	:	Flat land (gently sloping)
Elevation (m)	:	10
Rainfall (mm)	:	1110
Ground water table (m)	:	2-5
Slope, relief and erosion	:	3-5 per cent slopes, moderately eroded
Drainage and permeability	:	Excessively drained with rapid permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Groundnut, paddy nursery, cashew, casuarina
Geology and soil parent material	:	Marine alluvium
SRM association number	:	AP 198, 199, 200, 204, 224
Distribution and extent	:	Extensive (71658 ha) Krishna (18250 ha), Nellore (15950 ha), East Godavari (9793 ha), Prakasam (7599 ha), West Godavari (5950 ha), Srikakulam (5525 ha), Guntur (4216 ha), Visakhapatnam (3186 ha) and Vizianagaram (1189 ha)
Soils associated	:	Fine-loamy, mixed, Typic Haplustepts Fine-loamy, mixed, Fluventic Haplustepts Fine, mixed, Aquic Haplustepts
Soil series correlated	:	Nil

Typifying pedon: Chakicherla sand - cultivated

Ap	0-17 cm	Light yellowish brown (10YR 6/4 M) sand; weak very fine single grained structure; very friable, nonsticky and nonplastic; few fine roots; neutral (pH 7.0); clear smooth boundary.
C2	17-53 cm	Dark yellowish brown (10YR 4/4 M) sand; weak very fine single grained structure; very friable, nonsticky and nonplastic; few very fine roots; neutral (pH 6.9); clear smooth boundary.
C3	53-93 cm	Dark yellowish brown (10YR 4/4 M) sand; weak very fine single grained structure; very friable, nonsticky and nonplastic; neutral (pH 7.3); clear smooth boundary.
C4	93-132 cm	Dark yellowish brown (10YR 4/4 M) sand; weak very fine single grained structure; very friable, nonsticky and nonplastic; neutral (pH 7.1); clear smooth boundary.
C5	132-150 cm	Dark yellowish brown (10YR 4/4 M) sand; weak very fine single grained structure; very friable, nonsticky and nonplastic; neutral (pH 7.1).

Interpretation: These are deep and coastal sandy soils. Low AWC, high sand content, low nutrient status and erosion hazard are the major constraints for crop production; have high potential for growing casuarina, cashew and raising paddy nursery.

a) Interpretative groupings:

Land capability sub-class : IVes

Land irrigability sub-class : 4s

Length of growing period : 120-150 days

Productivity potential : Low

b) Yield: Based on data from farmer's field:

Large area covered by sands and some areas are under paddy nursery, casuarina etc.

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)----->							
0-17	Ap	94.2	3.9	1.9	s	7.0	6.4	0.20	1
17-53	C2	95.6	2.6	1.8	s	6.9	5.8	0.03	0
53-93	C3	96.3	2.1	1.6	s	7.1	6.1	0.03	0
93-132	C4	95.4	1.5	3.1	s	7.3	6.2	0.03	0
132-150	C5	92.2	3.2	4.6	s	7.1	6.0	0.03	1

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-17	11.8	0.8	0.5	0.2	0.2	1.7
17-53	20.0	0.6	0.3	0.2	0.1	1.2
53-93	16.7	0.7	0.8	0.2	0.1	1.8
93-132	10.5	1.1	0.6	0.2	0.1	2.0
132-150	14.3	1.2	0.8	0.3	0.1	2.4

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹	CEC/Clay ratio	Per cent Base Saturation
	NH ₄ OAc (pH 7.0)		CEC (pH 7.0)
0-17	1.7	0.89	100
17-53	1.0	0.56	120
53-93	1.2	0.75	150
93-132	1.9	0.61	105
132-150	2.1	0.46	114

23. IBRAHIMPATAN SOILS (36,729 ha)

(Deep calcareous alluvial loamy soils)

Classification	:	Fine-loamy, mixed (calcareous), isohyperthermic Typic Ustifluvents
Type location	:	Village: Nomul; Tehsil: Ibrahimpatan; District: Rangareddi; 17°10' N 78°42' E
Profile No	:	56K/S7/10
Physiographic position	:	Valleys
Elevation (m)	:	540
Rainfall (mm)	:	710 -830
Ground water table (m)	:	>10
Slope, relief and erosion	:	0-1 per cent slopes; very slightly eroded
Drainage and permeability	:	Well drained with moderate permeability.
Surface stoniness/rockiness	:	Nil.
Land use and vegetation	:	Paddy; neem, acacia,
Geology and soil parent material	:	Granite; alluvium
SRM association number	:	AP 34
Distribution and extent	:	Extensive (36729 ha) Rangareddi (36367 ha), Medak (345 ha) and Nalgaonda (17 ha)
Soils associated	:	Fine, mixed, (calc.), Typic Tropaquepts
Soil series correlated	:	- Chandur series (NBSS Publ. 791, NBSS&LUP, Nagpur) - Ibrahimbad series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Nagpur) - Chitravati series, Hagri series, Manesamudram series, Utakallu series [Soil series of Anantapur district, A.P., (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Nomul clay loam- cultivated

Ap	0-13 cm	Dark grayish brown (10YR 4/2 M) clay loam; strong coarse subangular blocky structure; very firm, sticky and plastic; many very fine roots; few medium and common very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.7); clear smooth boundary.
A2	13-30 cm	Dark grayish brown (10YR 4/2 M) clay loam; strong coarse subangular blocky structure; very firm, sticky and plastic; common very fine roots; common very fine and moderate lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.9); clear smooth boundary.
2A3	30-45 cm	Dark grayish brown (10YR 4/2 M) gravelly sandy clay loam; moderate coarse subangular blocky structure; very firm, sticky and plastic; few very fine roots; common very fine and moderate lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.0); 20 per cent fine quartz gravel; abrupt smooth boundary.
3A4	45-80 cm	Reddish brown (5YR 4/3 M) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few very fine lime nodules; strong effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.

4A5	80-104 cm	Dark reddish brown (5YR 3/4 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; 35 per cent fine quartz gravel; moderately alkaline (pH 8.9); gradual smooth boundary.
4A6	104-140 cm	Yellowish red (5YR 4/6 M) gravelly loamy sand; weak fine single grained structure; friable, nonsticky and nonplastic; 30 per cent fine quartz gravel; moderately alkaline (pH 8.8); clear smooth boundary.
5A7	140-160 cm	Dark reddish brown (5YR 3/4 M) gravelly sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 40 per cent fine and coarse quartz gravel; slightly alkaline (pH 8.4).

Interpretation: These are very deep and loamy stratified soils. Have potential for growing paddy, sunflower and vegetables.

a) Interpretative groupings:

Land capability sub-class : II_s

Land irrigability sub-class : 2_s

Length of growing period : 150-180 days

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	4.42	13
Cotton	1.77	11
Groundnut	8.54	18
Jowar	10.29	35
Maize	27.19	45
Red gram	1.07	18
Rice	19.72	60

c) Land suitability for crops:

Crops	Sorghum	Rice	Maize	Groundnut	Black gram
Suitability class	S2tz	S2tw	S3z	S3z	S3z

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		----->(USDA)<-----						
0-13	Ap	42.7	20.6	36.7	cl	8.7	8.0	2.02
13-30	A2	43.8	20.7	35.5	cl	8.9	8.1	1.35
30-45	2A3	57.4	13.7	28.9	scl	9.0	8.2	0.49
45-80	3A4	64.5	09.4	26.1	scl	8.8	8.1	0.51
80-104	4A5	80.1	03.8	16.1	sl	8.9	7.9	0.13
104-140	4A6	84.3	02.8	12.9	ls	8.8	8.1	0.21
140-160	5A7	71.3	07.2	21.5	scl	8.4	7.6	0.19

24. PATTIKONDA SOILS (28,982 ha)

(Shallow red gravelly loam soils)

Classification	: Loamy-skeletal, mixed, superactive, isohyperthermic Lithic Ustic Torriorthents
Type location	: Village: Penakacherla; Tehsil and District: Anantapur; 14° 15' 50" N 77° 28' 5" E
Profile No	: 57F/S5/19
Physiographic position	: Hill slopes
Elevation (m)	: 360
Rainfall (mm)	: 540-570
Ground water table (m)	: >10
Slope, relief and erosion	: 8-15 per cent slopes; severely eroded
Drainage and permeability	: Excessively drained with rapid permeability.
Surface stoniness/rockiness	: 40-75 per cent stones with 7.5-25 cm diameter
Land use and vegetation	: Forest; acacia, <i>Chigara</i> , <i>kadra</i> , <i>regu</i> .
Geology and soil parent material	: Granite- gneiss; weathered granite
SRM association number	: AP 22, 194
Distribution and extent	: Extensive (28982 ha) Kurnool (14126 ha), Anantapur (10138 ha) and Cuddapah (4718 ha)
Soils associated	: Loamy-skeletal, mixed, isohyperthermic Ustic Haplargids Rock lands
Soil series correlated	: Nil

Typifying pedon: Penakacherla gravelly sandy loam-forested

A	0-7 cm	Reddish brown (5YR 4/3 M) gravelly sandy loam; weak medium subangular blocky structure; firm, slightly sticky and nonplastic; common very fine and fine roots; neutral (pH 7.5); 35 per cent fine quartz gravel; abrupt smooth boundary.
A2	7-27cm	Dark reddish brown (5YR 3/3 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; many very fine and fine roots; 50 per cent fine and coarse quartz gravel; neutral (pH 7.3); abrupt irregular boundary.
R	27 cm	Hard rock-granite.

Interpretation: These are shallow and loamy soils. High subsoil gravelliness, shallow rooting depth, low AWC, moderate to steep slopes, aridity, severe erosion and low nutrient status are the major constraints for crop production; best suited for agroforestry and pasture.

a) Interpretative groupings:

Land capability sub-class : Vles
 Land irrigability sub-class : 6st
 Length of growing period : <90 days
 Productivity potential : Low

b) Yield: Based on data from farmer's field

Larger area is under forest/pasture

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		----->(USDA)<-----						
0-7	A	60.6	19.7	19.7	g sl	7.5	6.4	0.97
7-27	A2	60.4	22.9	16.7	sl	7.3	6.0	0.62

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-7	0.8	6.4	4.9	0.1	0.4	11.8	1.3	0.0	0.0
7-27	0.7	8.9	5.8	0.1	0.1	14.9	2.8	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-7	11.8	13.2	13.1	0.67	089	90
7-27	14.9	13.6	17.7	0.81	110	84

25. CUDDAPAH SOILS (4,12,079 ha)

(Shallow red gravelly loam soils)

Classification	:	Loamy-skeletal, mixed (calcareous), isohyperthermic Paralithic Ustorthents
Type location	:	Village : Emmejipeta ; Tehsil : Guruzala ; District : Guntur ; 16° 34' N 79° 57' E
Profile No	:	56P/S6/14
Physiographic position	:	Lower slopes of hills and elongated ridges
Elevation (m)	:	100
Rainfall (mm)	:	1200-1500
Ground water table (m)	:	>10
Slope, relief and erosion	:	3-8 per cent slopes; moderately eroded
Drainage and permeability	:	Excessively drained with moderately rapid permeability
Surface stoniness/rockiness	:	> 75 per cent stones of 7.5 to 25 cm diameter
Land use and vegetation	:	Degraded forest, pasture
Geology and soil parent material	:	Limestone; weathered limestone
SRM association number	:	AP 58, 181
Distribution and extent	:	Extensive (412079 ha) Cuddapah (219188 ha), Prakasam (47953 ha), Chittoor (43616 ha), Kurnool (24372 ha), Anantapur (19979 ha), Nellore (17630 ha), Mahbubnagar (12614 ha), Guntur (9510 ha), Nizamabad (9441 ha), Rangareddi (3103 ha), Karimnagar (2453 ha) and Adilabad (2220 ha)
Soils associated	:	Fine, smectitic, Vertic Haplustepts Rock lands
Soil series correlated	:	Nil
Typifying pedon: Emmejipeta sandy loam- degraded forest		
A	0-6 cm	Yellowish red (5YR 4/6 M) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine roots; few fine iron nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.6); clear smooth boundary.
A2	6-18 cm	Yellowish red (5YR 4/6 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; few fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); more than 50 per cent coarse gravel; clear smooth boundary.
Cr	18-42 cm	Weathered limestone.

Interpretation: These are shallow and loamy soils. Shallow rooting depth, high gravel content, low AWC, high lime content, moderate slopes, moderate erosion and low nutrient status are the major constraints for crop production; best suited for agro-forestry and pasture.

a) Interpretative groupings:

Land capability sub-class : Vies

Land irrigability sub-class : 6st

Length of growing period :90-120 days

Productivity potential : Low

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	13.09	25
Groundnut	03.72	18
Horse gram	04.77	12

c) Land suitability for crops:

Crops	Horse gram	Groundnut	Bajra
Suitability class	S3g	S3gl	S3gl

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size d'stribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-6	A	52.9	31.9	15.2	sl	8.6	7.9	0.94
6-18	A2	65.3	22.3	12.4	g sl	8.6	8.3	0.65

26. MAHBUBNAGAR SOILS (7,87,987 ha)

(Medium deep red gravelly loam soils)

Classification	: Loamy-skeletal mixed, subactive, isohyperthermic Lithic Ustorthents
Type location	: Village: Kokali; Tehsil: Madakasira; District: Anantapur; 13° 59' 3" N 77° 10' 30" E
Profile No	: 57G/S1/15
Physiographic position	: Undulating interfluvies
Elevation (m)	: 700
Rainfall (mm)	: 570-750
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained
Surface stoniness/rockiness	: 40-70 per cent stones of 2.5 to 7.5 cm diameter
Land use and vegetation	: Groundnut, pigeon pea, horse gram; acacia, neem, prosopis
Geology and soil parent material	: Granite
SRM association number	: AP 06, 33, 55, 82, 158, 164, 195
Distribution and extent	: Extensive (787987 ha) Chittoor (177167 ha), Mahbubnagar (100207 ha), Anantapur (92086 ha), Cuddapah (84389 ha), Khammam (67128 ha), Prakasam (55884 ha), Nalgonda (42124 ha), Kurnool (24576 ha), Karimnagar (23686 ha), Nizamabad (22951 ha), Krishna (21770 ha), Adilabad (20104 ha), Nellore (17545 ha), Warangal (13395 ha), Rangareddi (9665 ha), Guntur (8481 ha), Medak (4311 ha) and West Godavari (2518 ha)
Soils associated	: Loamy-skeletal, mixed, Typic Rhodustalfs Loamy-skeletal, mixed, Lithic Ustorthents Loamy-skeletal, mixed, Lithic Haplustepts Rock lands
Soil series correlated	: • Venkatapur (NBSS Publ. 791, NBSS&LUP, Nagpur) • Velidandla series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Kokali gravelly sandy loam – cultivated

Ap	0-5	Yellowish red (5YR 5/6 D) and (5YR 4/6 M) gravelly sandy loam; weak fine to medium subangular blocky structure; loose, very friable, nonsticky and nonplastic; 15 per cent fine quartz gravel; few fine to medium roots; neutral (pH 6.6); clear smooth boundary.
A2	5-17 cm	Dark reddish brown (2.5YR 3/4 D) and dark red (2.5YR 3/6 M) gravelly sandy loam; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; 60 per cent fine and coarse quartz gravel; few very fine roots; slightly acid (pH 6.4); gradual smooth boundary.
A3	17-32 cm	Reddish brown (2.5YR 4/4 D) and dark reddish brown (2.5YR 3/4 M) gravelly sandy loam; slightly hard, friable, nonsticky and nonplastic; 55 per cent fine and coarse quartz gravel; few very fine roots; slightly acid (pH 6.5); gradual smooth boundary.
Cr	32 cm	Weathered granite.

Interpretation: These are shallow and loamy soils. High gravel content, shallow rooting depth, low AWC, moderate slopes, moderate erosion and low nutrient status are the major constraints for crop production; well suited for agro-forestry and pasture.

a) Interpretative groupings:

Land capability sub-class : I Ves

Land irrigability sub-class : 3st

Length of growing period : 90-120 days

Productivity potential : Low

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Groundnut	3.44	18
Horse gram	2.95	12

c) Land suitability for crops:

Crops	Horse gram	Groundnut
Suitability class	S3g	S3gn

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<------(USDA)----->						
0-5	Ap	80.3	05.7	14.0	g sl	6.6	5.4	0.35
5-17	Bt1	78.4	07.2	14.4	g sl	6.4	4.8	0.37
17-32	Bt2	75.9	11.3	12.8	g sl	6.5	4.8	0.17

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
	Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
							H+Al	Al ³⁺
0-5	1.8	1.0	0.1	0.1	3.0	3.3	0.0	0.0
5-17	3.4	1.5	0.1	0.1	5.1	4.2	0.1	0.0
17-32	3.8	1.6	0.1	0.1	5.6	3.4	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		
0-5	3.0	3.0	6.3	0.21	48
5-17	5.2	2.3	9.3	0.16	55
17-32	5.6	2.1	9.0	0.16	62

27. ADILABAD SOILS (1,49,121 ha)

(Shallow black soils)

Classification	:	Clayey, smectitic, isohyperthermic Lithic Ustorthents
Type location	:	Village: Mahabatpur, Tehsil: Zaheerabad; District: Medak; 17° 53' N 77° 45' E
Profile No	:	56G/S1/22
Physiographic position	:	Summit
Elevation (m)	:	560
Rainfall (mm)	:	930
Ground water table (m)	:	>10
Slope, relief and erosion	:	0-1 per cent slopes; slightly eroded.
Drainage and permeability	:	Moderately well drained.
Surface stoniness/rockiness	:	3-15 per cent stones of <2.5 cm diameter.
Land use and vegetation	:	Pasture
Geology and soil parent material	:	Basalt
SRM association number	:	AP 63
Distribution and extent	:	Extensive (149121 ha) Adilabad (118836 ha), Nizamabad(18217 ha), Medak (7887 ha), Rangareddi (3959 ha) and Mahbubnagar (222 ha)
Soils associated	:	Clayey, smectitic, Paralithic Haplustepts Fine, smectitic, Vertic Haplustepts
Soil series correlated	:	Nil

Typifying pedon: Mahabatpur clay-pasture

A	0-24 cm	Very dark gray (10YR 3/1 D) and very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine to fine roots; few fine iron nodules; slightly alkaline (pH 7.8); clear smooth boundary.
R	24 cm	Basalt rock.

Interpretation: These are shallow and clayey soils. Shallow rooting depth and high stone content at the surface are the major constraints for crop production; well suited for pasture.

a) Interpretative groupings:

Land capability sub-class : Ives

Length of growing period :90-120 days

Land irrigability sub-class: 3s

Productivity potential : Low

b) Yield: Based on data from farmer's field:

Larger area is under scrub forest/pasture

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		(USDA)						
0-24	A	4.7	34.7	60.6	c	7.8	6.2	2.15

28. MADANAPALLE SOILS (1,17,121 ha)

(Deep red colluvio-alluvial loamy soils)

Classification	: Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents
Type location	: Village: Kunderpi; Tehsil: Kalyandurg; District: Anantapur; 14° 15' 49" N 77° 37' 8" E
Profile No	: 57F/S8/12
Physiographic position	: Upper slopes of valleys
Elevation (m)	: 700
Rainfall (mm)	: 570-700
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Paddy, <i>jowar</i> , vegetables
Geology and soil parent material	: Granite; alluvium
SRM association number	: AP 32
Distribution and extent	: Extensive (117121 ha) Anantapur (30144 ha), Chittoor (30929 ha), Mahbubnagar (18105 ha), Medak (10097 ha), Nalgonda (6166 ha), Karimnagar (5515 ha), Nizamabad (5482 ha), Cuddapah (3727 ha), Khammam (3414 ha), Rangareddi (2164 ha) and Adilabad (1378 ha)
Soils associated	: Loamy-skeletal, mixed, Typic Ustorthents
Soil series correlated	: Nil

Typifying pedon: Kunderpi loam-cultivated

Ap	0-21 cm	Strong brown (7.5YR 5/6 D) and dark brown (7.5YR 4/4 M) loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline (pH 8.1); gradual smooth boundary.
A2	21-40 cm	Dark brown (7.5YR 4/4 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline (pH 8.4); gradual smooth boundary.
A3	40-72 cm	Yellowish red (5YR 5/8 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; slightly alkaline (pH 8.2); clear smooth boundary.
C1	72-125 cm	Yellowish red (5YR 4/6 M) sand; single grained structure; very friable, nonsticky and nonplastic; few very fine roots; slightly alkaline (pH 7.7); gradual smooth boundary.
C2	125-157 cm	Yellowish red (5YR 4/6 M) loamy sand; weak medium subangular blocky structure; very friable, nonsticky and non plastic; slightly alkaline (pH 8.4).

Interpretation: These are deep and loamy soils. High potential for growing vegetable and flowers.

a) Interpretative groupings:

Land capability sub-class	: Iles
Land irrigability sub-class	: 2s
Length of growing period	: 120-150 days
Productivity potential	: Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	15.02	25
Groundnut	12.25	18
Horse gram	4.77	12
Red gram	5.85	18
Rice	25.26	60
Sugarcane	912.07	1250

c) Land suitability for crops:

Crops	Bajra	Horse gram	Groundnut	Red gram	Rice
Suitability class	S2z	S2z	S2tz	S3z	S2tw

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		$\longleftrightarrow$ (USDA) $\longleftrightarrow$							
0-21	Ap	43.8	31.5	24.7	l	8.1	7.3	1.73	0.0
21-40	A2	60.8	18.1	21.1	scl	8.4	7.7	0.48	0.0
40-72	A3	56.7	21.1	22.2	scl	8.2	7.7	0.36	0.2
72-125	C1	89.6	01.4	09.0	s	7.7	7.3	0.09	0.0
125-157	C2	89.2	01.1	09.7	ls	8.4	7.7	0.05	0.0

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-21	0.0	23.1	3.0	0.0	0.6	26.7	4.3	0.0	0.0
21-40	0.0	20.6	2.6	0.0	0.1	23.3	5.3	0.0	0.0
40-72	0.9	18.8	2.3	0.1	0.2	21.4	6.0	0.0	0.0
72-125	0.0	04.4	1.1	0.0	0.1	05.6	3.2	0.0	0.0
125-157	0.0	05.6	1.1	0.0	0.1	06.8	5.0	0.0	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-21	26.7	15.1	31.0	0.61	177	86
21-40	23.3	10.0	28.6	0.47	233	81
40-72	21.4	10.8	27.4	0.49	198	78
72-125	05.6	03.6	08.8	0.40	156	64
125-157	06.8	03.7	11.8	0.38	184	58

29. MEDCHAL SOILS (65,681 ha)

(Deep calcareous alluvial clayey soils)

Classification	:	Fine, mixed (calcareous), isohyperthermic Fluvaquentic Epiaquepts
Type location	:	Village: Moda; Tehsil: Hindupur; District: Anantapur; 13° 50' 19" N 77° 22' 16" E
Profile No	:	57G/S2/9
Physiographic position	:	Valleys
Elevation (m)	:	680
Rainfall (mm)	:	570-750
Ground water table (m)	:	> 10
Slope, relief and erosion	:	0-1 per cent slopes; slightly eroded
Drainage and permeability	:	Poorly drained with moderately slow permeability
Surface stoniness/rockiness	:	Nil.
Land use and vegetation	:	<i>Ragi</i> , paddy; acacia, <i>jali</i>
Geology and soil parent material	:	Granite; alluvium
SRM association number	:	AP 34
Distribution and extent	:	Extensive (65681 ha) Rangareddi (54551 ha), Anantapur(10587 ha), Medak (517 ha) and Nalgonda (26 ha)
Soils associated	:	Fine-loamy, mixed, (calc.), Typic Ustifluvents
Soil series correlated	:	Nil
Remark	:	Earlier it was classified as Typic Tropaquepts in SRM-A.P.

Typifying pedon: Moda clay-cultivated

Ap	0-11 cm	Dark gray (10YR 4/1 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; fine to medium roots; few very fine lime nodules; slight effervescence with dilute HCl; moderately alkaline; (pH 8.6); gradual smooth boundary.
Bw1	11-36 cm	Very dark gray (10YR 3/1 M) clay; strong coarse subangular blocky structure; firm, very sticky and very plastic; few fine roots; few very fine lime nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); gradual smooth boundary.
Bw2	36-62 cm	Very dark gray (10YR 3/1 M) clay; moderate coarse subangular blocky structure; very firm, very sticky and very plastic; few very fine roots; few very fine lime nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bw3	62-87 cm	Very dark gray (10YR 3/1 M) clay; moderate coarse subangular blocky structure; firm, very sticky and very plastic; few very fine roots; few very fine lime nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); gradual smooth boundary.
Bw4	87-110 cm	Black (10YR 3/1 M) clay; moderate coarse subangular blocky structure; firm, very sticky and very plastic; few fine lime nodules; strong effervescence with dilute HCl; moderately alkaline (pH 8.6); clear smooth boundary.
Bw5	110-127 cm	Black (10YR 2/1 M) clay; strong medium subangular blocky structure; firm, very sticky and very plastic; few fine nodules; strong effervescence with dilute HCl; moderately alkaline (pH 8.8); gradual smooth boundary.

Bw6 127-150 cm Black (10YR 2/1 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few very fine and fine lime nodules; strong effervescence with dilute HCl; moderately alkaline (pH 8.8).

Interpretation: These are very deep and clayey soils. Poor drainage, suboptimum oxygen availability, high lime content and risk of salinity/sodicity are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIws
 Land irrigability sub-class : 2ds
 Length of growing period : 120-150 days
 Productivity potential : Medium to high

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	3.17	13
Cotton	2.14	11
Groundnut	8.55	18
Jowar	9.14	35
Maize	24.33	45
Red gram	4.15	18
Rice	21.65	60

c) Land suitability for crops:

Crops	Rice	Sorghum	Maize	Black gram	Groundnut
Suitability class	S2w	S2z	S2z	S2z	S2tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←(USDA)→							
0-11	Ap	29.2	26.0	44.8	c	8.4	7.2	0.41	4
11-36	Bw1	30.9	24.1	45.0	c	8.2	7.1	0.33	4
36-62	Bw2	29.8	23.5	46.7	c	8.1	7.0	0.32	3
62-87	Bw3	29.1	22.1	48.8	c	8.2	7.0	0.37	5
87-110	Bw4	24.5	21.0	54.5	c	8.6	7.1	0.38	22
110-127	Bw5	14.7	24.9	60.4	c	8.8	7.4	0.33	7
127-150	Bw6	15.6	24.9	59.5	c	8.8	7.4	0.27	8

30. GIDDALUR SOILS (1,39,704 ha)

(Shallow red gravelly loam soils)

Classification	:	Loamy-skeletal, mixed (calcareous), isohyperthermic Paralitric Haplustepts
Type location	:	Village: Racharla; Tehsil: Giddalur; District: Prakasam; 15° 27' N 78° 58' E
Profile No	:	571/S7/14
Physiographic position	:	Undulating uplands
Elevation (m)	:	240
Rainfall (mm)	:	975
Ground water table (m)	:	>10
Slope, relief and erosion	:	1 to 3 per cent slopes; slightly eroded
Drainage and permeability	:	Some what excessively drained with moderate permeability
Surface stoniness/rockiness	:	15-40 per cent stones of 2.5-25 cm. diameter
Land use and vegetation	:	Cultivated to cotton, chillies
Geology and soil parent material	:	Precambrian
SRM association number	:	AP 159,188
Distribution and extent	:	Extensive (139704 ha) Kurnool (50130 ha), Prakasam (28501 ha), Cuddapah (24400 ha), Chittoor (16680 ha), Guntur (8333 ha), Nalgonda (7352 ha), Nellore (2429 ha) and Krishna (1879 ha)
Soils associated	:	Fine, smectitic, (calc.), Vertic Haplustepts Rock lands
Soil series correlated	:	Nil

Typifying pedon: Racharla gravelly loam-cultivated

Ap	0-7 cm	Dark yellowish brown (10YR 3/4 M) gravelly loam; weak medium subangular blocky structure; very friable, sticky and plastic; common very fine roots; 50-60 per cent quartz gravel; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; slightly alkaline (pH 8.4); abrupt smooth boundary.
Bw1	7-18 cm	Brown (7.5YR 4/3 M) loam; moderate medium subangular blocky structure; friable, sticky and plastic; common very fine roots; 20-30 per cent quartz gravel; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; slightly alkaline (pH 8.5); clear smooth boundary.
Bw2	18-41 cm	Dark reddish brown (5YR 3/4 M) gravelly clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; 60-70 per cent quartz gravel; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; slightly alkaline (pH 8.5); clear smooth boundary.
Cr	41-85 cm	Weathered quartzite.

Interpretation: These are shallow and loamy soils. Shallow rooting depth, subsoil gravelliness, high lime content, low AWC, excessive runoff and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes
 Land irrigability sub-class : 2s
 Length of growing period : 90-120 days
 Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	6.00	25
Blackgram	2.70	13
Cotton	1.87	11
Green gram	2.02	12
Red gram	2.24	18
Rice	19.72	60
Tobacco	8.38	14

c) Land suitability for crops:

Crops	Rice	Red gram	Green gram	Black gram	Bajra
Suitability class	S3gn	N	S3gn	S3gn	S3gr

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)----->							
0-7	Ap	40.9	43.4	15.7	g l	8.4	7.4	0.79	7
7-18	Bw1	34.4	46.8	18.8	l	8.5	7.9	0.53	5
18-41	Bw2	22.0	43.6	34.4	g cl	8.5	7.7	0.46	7

31. JAGTIYAL SOILS (61,702 ha)

(Shallow red gravelly loam soils)

Classification	: Loamy-skeletal, mixed, superactive. isohyperthermic Lithic Haplustepts
Type location	: Village: Kannapalli; Tehsil: Karimnagar; District: Karimnagar; 18° 32' N 79° 2' E
Profile No	: 56N/S3/9
Physiographic position	: Rolling lands
Elevation (m)	: 390
Rainfall (mm)	: 980
Ground water table (m)	: >10
Slope, relief and erosion	: 5-10 per cent slopes, very severely eroded
Drainage and permeability	: Well drained with moderately slow permeability
Surface stoniness/rockiness	: 40-75 per cent stones with 2.5-7.5 cm diameter
Land use and vegetation	: Forest; neem, custard apple
Geology and soil parent material	: Granite- gneiss
SRM association number	: AP 33, 57, 167, 196
Distribution and extent	: Extensive (61702 ha)

Prakasam (21357 ha), Khammam (8483 ha), Guntur (5338 ha), Nizamabad (4309 ha), Rangareddi (3466 ha), Cuddapah (2873 ha), Nalgonda (2376 ha), Karimnagar (1208 ha), West Godavari (688 ha), Chittoor (360 ha), Medak (269 ha) and Mahbubnagar (102 ha)

Soils associated	: Loamy-skeletal, mixed, Lithic Ustorthents Clayey-skeletal, mixed, Typic Rhodustalfs Rock Lands
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Soil series correlated	: Kondapuram series, Lakshmupalle series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]
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Typifying pedon: Kannapalli gravelly sandy loam - forested

A	0-16 cm	Very dark grayish brown (10YR 3/2 M) gravelly sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine roots; neutral (pH 6.6); 40 per cent fine and coarse quartz gravel; clear smooth boundary.
Bw	16-43 cm	Dark brown (7.5 YR 3/2 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; slightly acid (pH 6.5); 70 per cent fine and coarse quartz gravel; abrupt smooth boundary.
R	43 cm	Hard granite rock.

Interpretation: These are shallow loamy soils. High gravel content, shallow rooting depth, low AWC, moderate slopes, severe erosion and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Land irrigability sub-class : 3st

Length of growing period :90-120 days

Productivity potential : Low to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.77	11
Green gram	1.57	12
Groundnut	6.51	18
Maize	14.96	45
Rice	17.43	60

c) Land suitability for crops:

Crops	Green gram	Groundnut
Suitability class	N	S3gr

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		-----<----- (USDA) ----->-----						
0-16	A	76.1	12.6	11.3	g sl	6.6	5.5	1.06
16-43	Bw	78.6	08.1	13.3	g sl	6.5	5.0	0.37

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-16	2.6	4.8	1.8	0.2	0.5	7.3
16-43	1.8	5.0	1.9	0.2	0.3	7.4

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-16	07.8	10.4	0.69	94	70
16-43	10.9	11.3	0.82	68	65

32. MARKAPUR SOILS (5,69,433 ha) (Shallow red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, superactive, isohyperthermic Lithic Haplustepts
Type location	: Village: Mutsukota; Tehsil: Tadapatri; District: Anantapur; 14° 50' 10" N 77° 55' 35" E
Profile No	: 57F/S3/2
Physiographic position	: Hills and ridges
Elevation (m)	: 320
Rainfall (mm)	: 540-570
Ground water table (m)	: >10
Slope, relief and erosion	: 3-8 per cent slopes; severely eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 7.5-25 cm diameter
Land use and vegetation	: Sorghum; prosopis, <i>chigara</i> , <i>ber</i> , <i>narivyapa</i>
Geology and soil parent material	: Shale; Weathered shale
SRM association number	: AP 85, 185, 186
Distribution and extent	: Extensive (569344 ha) Prakasam (180472 ha), Kurnool (143055 ha), Guntur (87671 ha), Cuddapah (78960 ha), Mahbubnagar (19549 ha), Chittoor (17363 ha), Nellore (13523 ha), Nalgonda (12649 ha), Anantapur (10989 ha), Khammam (3937 ha), Warangal (1641 ha) and Karimnagar (299 ha)
Soils associated	: Fine, mixed, Typic Haplustepts Clayey-skeletal, mixed, Lithic Rhodustalfs Rock lands
Soil series correlated	: Gollapalle series, Madakasira series, Mincheri series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Mutsukota gravelly clay loam-cultivated

Ap	0-13 cm	Dark reddish brown (5YR 3/4 M) gravelly clay loam; weak fine subangular blocky structure; friable, sticky and plastic; many very fine roots; 45 per cent fine gravel; slightly alkaline (pH 8.2); abrupt smooth boundary.
Bw	13-41 cm	Dark reddish brown (5YR 3/3 M) gravelly clay loam; weak fine subangular blocky structure; friable, sticky and plastic; common fine roots; 60 per cent fine and coarse gravel; slightly alkaline (pH 8.3); clear wavy boundary.
Cr	41 cm	Stony layer.

Interpretation: These are shallow clayey soils. Subsoils gravelliness, shallow rooting depth, low AWC, moderate slopes, severe erosion and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IVes

Land irrigability sub-class : 3st

Length of growing period : 90-120 days

Productivity potential : Low

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	6.00	25
Blackgram	2.70	13
Cotton	1.77	11
Green gram	1.57	12
Red gram	2.24	18
Rice	17.43	60
Tobacco	8.38	14

c) Land suitability for crops:

Crops	Red gram	Green gram	Black gram	Bajra
Suitability class	N	N	N	S3gr

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		$\xrightarrow{\hspace{10em}}$ (USDA) $\xleftarrow{\hspace{10em}}$						
0-13	Ap	38.7	30.5	30.8	g cl	8.2	7.4	1.00
13-41	Bw	36.6	27.1	36.3	g cl	8.3	7.5	0.85

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹				
	Ca	Mg	Na	K	Total
0-13	21.6	3.9	0.0	0.6	26.1
13-41	23.8	3.4	0.0	0.2	27.4

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-13	21.3	26.8	0.69	123	97
13-41	22.1	31.7	0.61	124	86

33. ASIFABAD SOILS (3,73,295 ha)

(Deep alluvial black soils)

Classification	: Fine, smectitic, isohyperthermic Vertic Haplustepts
Type location	: Village: Chitkul, Taluk: Narsapur, District: Medak; 18° 2' 45" N 78° 8' 40" E
Profile No	: 56K/1/T6/1
Physiographic position	: Very gently sloping broad valleys
Elevation (m)	: 440-580
Rainfall (mm)	: 873
Ground water table (m)	: >10
Slope, relief and erosion	: 0-3 per cent slopes; slightly eroded
Drainage and permeability	: Moderately well drained with slow permeability.
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Mainly cultivated to crops like paddy, sugarcane, jowar; Natural vegetation <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul), <i>Butea frondosa</i> (palas), <i>Eucalyptus</i> spp. (nilgiri).
Geology and soil parent material	: Peninsular gneiss; weathered granite
SRM association number	: AP 58, 60, 65, 86, 87, 88, 114, 136, 137, 138, 146, 187, 217, 225, 229, 230
Distribution and extent	: Extensive (373295 ha) Adilabad (85316 ha), East Godavari (49881 ha), Warangal (37355 ha), West Godavari (37263 ha), Khammam (35503 ha), Guntur (34724 ha), Nizamabad (19078 ha), Visakhapatnam (13611 ha), Kurnool (12132 ha), Cuddapah (11617 ha), Krishna (9661 ha), Vizianagaram (7723 ha) Karimnagar (6743 ha) Medak (3588 ha), Srikakulam (2846 ha), Rangareddi (2069 ha) Anantapur (1519 ha), Mahbubnagar (1313 ha), Prakasam (775 ha), Yanam (294 ha) and Nalgonda (284 ha)
Soils associated	: Fine, smectitic, Typic Haplusterts Fine, mixed, Typic Haplustepts Fine, smectitic, (calc.), Typic Haplusterts Very fine, smectitic, Typic Haplusterts Fine, smectitic, (calc.), Vertic Haplustepts Very fine, smectitic, Entic Haplusterts Very fine, smectitic, Chromic Haplusterts
Soil series correlated	: • Chitkul series, Potpalli series, (NBSS Publ. 791, NBSS&LUP, Nagpur) • Appaiahpalli series (Soil series Handbook, Mahbubnagar district, A.P. NBSS&LUP, Bangalore) • Itigi series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Chitkul clay loam – cultivated.

Ap	0–20 cm	Dark gray (10YR 4/1 M) clay loam; moderate coarse subangular blocky structure; friable, sticky and plastic; fine common roots; few fine calcium carbonate and iron nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.7); gradual smooth boundary.
Bw1	20–40 cm	Dark brown (10YR 3/3 M) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic, few fine roots; few fine calcium carbonate and iron nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.7); gradual smooth boundary.
Bw2	40–60cm	Dark brown (10YR 3/3 M) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; few fine calcium carbonate and iron nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.6); gradual smooth boundary.
Bw3	60–81 cm	Dark brown (10YR 3/3 M) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few fine calcium carbonate and iron nodules; pressure faces; slight effervescence with dilute HCl; slightly alkaline (pH 7.6); gradual smooth boundary.
Bw4	81–113 cm	Dark brown (10YR 3/3 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; few fine calcium carbonate and iron nodules; pressure faces; slight effervescence with dilute HCl; slightly alkaline (pH 7.8); gradual smooth boundary.
Bw5	113–150 cm	Very dark grayish brown (10YR 3/2 M) clay loam; moderate medium subangular blocky structure; slightly firm, sticky and plastic; few very fine roots; few fine calcium carbonate and iron nodules; pressure faces; slight effervescence with dilute HCl; slightly alkaline (pH 8.0).

Range in characteristics: The thickness of the solum ranges from 103 to 155 cm. The A horizon is 7 to 24 cm thick. Its colour is in hue 10YR, value 4 to 3 and chroma 4 to 2. Its texture ranges from clay loam to clay; structure is medium and coarse subangular blocky, slight to violent effervescence with dilute HCl. The B horizon is 90 to 143 cm thick. Its colour is in hue 10YR, value 5 to 3, and chroma 3 to 1. Its texture is clay loam to clay; slight to violent effervescence with dilute HCl.

Interpretation: Imperfectly drained, slow permeability, suboptimum oxygen availability, high shrink-swell potential, poor workability, salinity and sodicity are the major constraints for normal crop husbandry.

a) Interpretative grouping:

Land capability subclass: IIIw5

Land irrigability subclass: 3ds

Length of growing period: 150-210 days

Productivity potential: Medium

b) Yield: Based on data from farmer's fields(Yield q/ha):

Crops	Farmer's practices	Improved practices	Crops	Farmer's practices	Improved practices
Blackgram	5.76	13	Red gram	5.85	18
Cotton	4.02	11	Rice	34.62	60
Green gram	6.47	12	Sugarcane	958.30	1250
Jowar	13.34	35	Tobacco	19.11	14

c) Land suitability for crops:

Crops	Sorghum	Green gram	Black gram	Sugarcane	Cotton	Red gram
Suitability class	S1	S1	S1	S2tk	S1	S2w

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		----->(USDA)<-----							
0-20	Ap	40.4	21.9	37.7	cl	7.7	7.3	1.05	2
20-40	Bw1	41.8	19.2	39.0	cl	7.7	7.0	0.31	0
40-60	Bw2	42.1	21.9	36.0	cl	7.6	7.0	0.30	0
60-81	Bw3	41.8	18.3	39.9	cl	7.6	7.2	0.26	0
81-113	Bw4	39.0	17.9	43.1	c	7.8	7.1	0.24	0
113-150	Bw5	41.4	19.5	39.1	cl	8.1	6.9	0.24	0

Depth (cm)	Exchangeable bases cmol(+) kg ⁻¹					CEC cmol(+) kg ⁻¹	CEC/Clay ratio	Base Saturation (%)
	Ca	Mg	Na	K	Total	NH ₄ OAc (pH 7.0)		
0-20	16.2	6.8	0.9	0.4	24.3	24.2	0.67	100
20-40	16.2	6.7	0.5	0.2	23.6	23.1	0.59	102
40-60	15.5	6.6	0.4	0.2	22.7	22.6	0.59	100
60-81	17.0	6.2	0.4	0.2	23.8	23.3	0.58	102
81-113	17.5	5.5	0.5	0.2	23.7	22.6	0.52	105
113-150	17.2	5.9	0.5	0.2	23.8	21.7	0.55	110

34. KURNOOL SOILS (20,34,944 ha)

(Deep calcareous black soils)

Classification	: Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts
Type location	: Village: Patapadu; Tehsil: Banaganapalli; District: Kurnool; 15° 19' N 78° 9' E
Profile No	: 571/S5/7
Physiographic position	: Valleys
Elevation (m)	: 254
Rainfall (mm)	: 650
Ground water table (m)	: >10
Slope, relief and erosion	: 0-1 per cent slopes; very slightly eroded
Drainage and permeability	: Moderately well drained with moderate permeability
Surface stoniness/rockiness	: <3 per cent stones of 2.5 cm diameter
Land use and vegetation	: Paddy; acacia, neem, <i>thangadi</i>
Geology and soil parent material	: Precambrian; alluvio-colluvium of limestone
SRM association number	: AP 42, 43, 44, 47, 48, 51, 67, 72, 97, 98, 99, 103, 104, 112, 115, 116, 117, 120, 138, 145, 168, 188, 189, 190, 191, 193, 206, 215, 219, 221, 222, 223, 227
Distribution and extent	: Extensive (2034944 ha) Kurnool (351264 ha), Cuddapah (167554 ha), Mahbubnagar (150465 ha), Krishna (140354 ha), Guntur (136937 ha), Medak (129352 ha), Warangal (114838 ha), Nellore (101840 ha), Karimnagar (97980 ha), Prakasam (96336 ha), West Godavari (85020 ha), Adilabad (81513 ha), Nalgonda (66647 ha), East Godavari (66253 ha), Nizamabad (57805 ha), Khammam (39578 ha), Chittoor (36372 ha), Rangareddi (35380 ha), Anantapur (33697 ha), Vizianagaram (24085 ha), Srikakulam (16412 ha), Visakhapatnam (4918 ha) and Yanam (344 ha)
Soils associated	: Fine, smectitic, (calc.), Typic Haplusterts Very fine, smectitic, (calc.), Leptic Haplusterts Fine, smectitic, (calc.), Chromic Haplusterts Fine, mixed, (calc.), Typic Haplustepts Fine, mixed, Typic Haplustepts Fine, smectitic, Vertic Haplustepts Very fine, smectitic, (calc.), Chromic Haplusterts Very fine, smectitic, (calc.), Typic Haplusterts Very fine, smectitic, Typic Haplusterts Very fine, smectitic, (calc.), Vertic Haplustepts
Soil series correlated	: Nil

Typifying pedon: Patapadu clay- cultivated

Ap	0-18 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium subangular blocky structure; friable, very sticky and plastic; many very fine roots; violent effervescence with dilute HCl; moderately alkaline (pH 9.1); clear smooth boundary.
Bw1	18-50 cm	Dark brown (10YR 3/3 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few very fine roots; violent effervescence with dilute HCl; Pressure faces; strongly alkaline (pH 9.8); abrupt smooth boundary.
Bw2	50-79 cm	Dark brown (10YR 3/3 M) clay; moderate medium subangular blocky structure; very firm, sticky and very plastic; non-intersecting slickensides; few very fine roots; violent effervescence with dilute HCl; strongly alkaline (pH 9.6); gradual wavy boundary.
Bw3	79-109 cm	Dark brown (10YR 3/3 M) clay; moderate medium subangular blocky structure; very firm, very sticky and very plastic; few very fine roots; violent effervescence with dilute HCl; strongly alkaline (pH 9.6); gradual wavy boundary.

Bw4 109-151cm

Dark yellowish brown (10YR 3/4 M) clay; strong medium subangular blocky structure; very firm, very sticky and very plastic; non-intersecting slickensides; violent effervescence with dilute HCl; moderately alkaline (pH 9.5).

Interpretation: These are very deep cracking clay soils. Shallow permeability, high shrink-swell potential, poor workability, high lime content, suboptimum oxygen availability, salinity and sodicity are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIws

Land irrigability sub-class : 3ds

Length of growing period : 150-210 days

Productivity potential : High to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	18.43	25
Cotton	2.93	11
Groundnut	22.35	18
Jowar	10.29	35
Red gram	4.35	18
Rice	30.69	60

c) Land suitability for crops:

Crops	Rice	Sorghum	Cotton	Red gram	Groundnut
Suitability class	S2z	S3z	S3z	S3tz	S3tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH Water (1:2.5)	OC (%)	CaCO ₃ (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)					
		←----- (USDA) ----->							
0-18	Ap	32.1	26.2	41.7	c	9.1	0.78	16	0.0
18-50	Bw1	17.3	28.0	54.7	c	9.8	0.37	20	0.0
50-79	Bw2	14.1	27.0	58.9	c	9.6	0.32	18	0.0
79-109	Bw3	12.2	28.2	59.6	c	9.6	0.16	17	1.9
109-151	Bw4	11.6	26.3	62.1	c	9.5	0.23	16	2.2

35. NARAYANKHER SOILS (47,835 ha)

(Medium deep black soils)

Classification	: Very-fine, smectitic, isohyperthermic Vertic Haplustepts
Type location	: Village: Singarbuguda, Taluk: Narayankher, District: Medak; 18° 8' 25" N 77° 43' E
Profile No	: 56F/12/T7/4
Physiographic position	: Summits of gently to very gently sloping plateaus
Elevation (m)	: 500 to 560
Rainfall (mm)	: 900
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Moderately well drained with slow permeability
Surface stoniness/rockiness	: 15-40 per cent cobbles of >25 cm diameter
Land use and vegetation	: Mainly cultivated to sorghum, pigeon pea, chickpea, sunflower, safflower, green gram and sesamum; natural vegetation – <i>Azadirachta indica</i> (neem), <i>Butea frondosa</i> (palas), <i>Acacia</i> spp. (babul).
Geology and soil parent material	: Deccan trap; weathered basalt
SRM association number	: AP 72
Distribution and extent	: Extensive (47835 ha) Medak (32180 ha) and Rangareddi (15655 ha)
Soils associated	: Very fine, smectitic (calc.), Typic Haplustepts
Soil series correlated	: Chinnaloni series(Benchmark Soils of India,1982)

Typifying pedon: Singarbuguda clay – cultivated.

Ap	0–10 cm	Very dark grayish brown (10YR 3/2 M) clay; weak medium subangular blocky structure; firm, sticky and plastic; common fine and very fine roots; neutral (pH 6.9); clear smooth boundary.
Bw1	10–28 cm	Very dark brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; common fine and very fine roots; neutral (pH 6.9); gradual smooth boundary.
Bw2	28–49 cm	Very dark brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; very firm, very sticky and very plastic; pressure faces; few medium and coarse roots; neutral (pH 7.0); abrupt wavy boundary.
Cr	49–69 cm	Weathered basalt

Range in characteristics: The thickness of the solum ranges from 27 to 50 cm. The A horizon is 8 to 18 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 1. Its texture is clay. Coarse fragments range from 10 to 20 per cent. Its structure is fine to medium subangular blocky. The B horizon is 15 to 44 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 1. Its texture is clay. Coarse fragments range from 5 to 15 per cent.

Competing soils: Potpalli series is the competing series. These soils are deeper than 150 cm to bedrock. Potpalli soils have about 70 per cent clay in the control section and are lighter in colour in hues of 7.5YR and 10YR.

Interpretation: Shallow rooting depth, slow permeability, high shrink-swell potential, poor workability, low available phosphorus and moderate erodibility are the major constraints for normal crop husbandry.

a) Interpretative grouping:

Land capability subclass : IIIes

Length of growing period : 120-150 days

Land irrigability subclass : 3ds

Productivity potential : Medium

b) Yield: Based on data from farmer's fields

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.76	13
Cotton	3.31	11
Green gram	5.21	12
Jowar	10.29	35
Maize	67.52	45
Red gram	5.85	18
Rice	30.69	60

c) Land suitability for crops:

Crops	Sorghum	Rice	Cotton	Green gram	Black gram	Maize
Suitability class	S1	S2r/S1	S1	S2t	S2t	S2t

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-10	Ap	4.9	17.1	78.0	c	6.9	5.6	1.17
10-28	Bw1	4.8	17.9	77.3	c	6.9	6.0	1.10
28-49	Bw2	7.1	17.5	75.4	c	7.0	5.8	1.07

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-10	tr	41.8	20.3	0.1	0.3	62.5
10-28	tr	46.0	18.9	0.2	0.2	65.3
28-49	tr	47.0	19.5	0.2	0.2	66.9

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-10	65.0	91.1	0.83	96	69
10-28	69.2	89.7	0.90	94	73
28-49	70.0	90.4	0.93	106	74

36. MAKTHAL SOILS (39,009 ha)

(Alluvial loamy soils)

Classification	:	Fine-loamy, mixed, superactive, isohyperthermic Aquic Haplustepts
Type location	:	Village: Eniganelli, Tehsil: Makthal: District: Mahbubnagar; 16° 36' N 77° 40' E
Profile No	:	56H/S5/2
Physiographic position	:	Valleys
Elevation (m)	:	300-340
Rainfall (mm)	:	600-700
Ground water table (m)	:	5-10
Slope, relief and erosion	:	1-3 per cent slopes; very slight to nil erosion
Drainage and permeability	:	Moderately well drained with slow permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Paddy, maize, vegetables
Geology and soil parent material	:	Granite, alluvium
SRM association number	:	AP 40
Distribution and extent	:	Extensive (39009 ha) Medak (14604 ha), Anantapur (10209 ha), Rangareddi (9218 ha), Mahbubnagar (2602 ha), Nizamabad (2376 ha)
Soils associated	:	Fine, mixed, (calc.), Aquic Ustorthents
Soil series correlated	:	Nil

Typifying pedon: Eniganelli sandy loam- cultivated.

Ap	0-12 cm	Dark brown (10YR 3/2 M) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; many very fine and fine roots; few fine and medium lime nodules; slight effervescence with dil HCl; neutral (pH 7.5); abrupt smooth boundary.
A2	12-40 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; common very fine and fine roots; slightly alkaline (pH 8.3); gradual smooth boundary.
Bw1	40-84 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) sandy clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; slightly alkaline (pH 8.4); clear smooth boundary.
Bw2	84-131 cm	Very dark gray (10YR 3/1 M) sandy clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; moderately alkaline (pH 8.8); clear smooth boundary.
Bw3	131-152 cm	Dark brown to dark yellowish brown (10YR 4/3.5 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; moderately alkaline (pH 9.0).

Interpretation: These are very deep loamy soils. Drainage, salinity and sodicity are the major problems for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : Iiws

Length of growing period : 120-150 days

Land irrigability sub-class : 2ds

Productivity potential : High to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Rice	21.68	60
Sugarcane	607.69	1250
Tobacco	8.38	14

c) Land suitability for crops:

Crops	Rice	Sugarcane
Suitability class	S2tz	S1

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		(USDA)						
0-12	Ap	75.1	13.2	11.7	sl	7.5	6.6	0.47
12-40	A2	81.8	5.4	12.8	sl	8.3	6.9	0.11
40-84	Bw1	64.1	10.4	25.5	scl	8.4	6.8	0.16
84-131	Bw2	64.3	9.6	26.1	scl	8.8	6.8	0.17
131-152	Bw3	69.3	9.1	21.6	scl	9.0	7.0	0.13

Depth (cm)	ECe (1:2.5) dSm ⁻¹	ESP	Exchangeable bases cmol(+) kg ⁻¹				
			Ca	Mg	Na	K	Total
0-12	0.5	15.1	7.3	2.4	1.3	0.5	11.5
12-40	0.0	7.8	3.7	3.6	0.7	0.2	8.2
40-84	0.0	8.4	12.5	4.3	1.4	0.3	18.5
84-131	0.0	12.3	11.9	3.7	2.0	0.3	17.9
131-152	0.0	13.3	10.1	3.0	1.7	0.2	15.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-12	8.6	13.0	0.74	134	88
12-40	9.0	9.5	0.70	91	86
40-84	16.6	22.0	0.65	111	84
84-131	16.2	21.0	0.62	110	85
131-152	12.8	19.4	0.59	117	77

37. KOVVUR SOILS (76,896 ha)

(Alluvial clay soils)

Classification	:	Fine, mixed, active, isohyperthermic Aquic Haplustepts
Type location	:	Village: Chakicherla; Tehsil: Kaveli; District: Nellore; 15° 6' 30" N 80° 2' 30" E
Profile No	:	66 A & E/S1/30
Physiographic position	:	Flat land with pluffy white tones (very gently sloping plains)
Elevation (m)	:	10
Rainfall (mm)	:	1110
Ground water table (m)	:	2-5
Slope, relief and erosion	:	1-3 per cent slopes, slightly eroded
Drainage and permeability	:	Imperfectly drained with slow permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Paddy, green gram, black gram
Geology and soil parent material	:	Deltaic alluvium
SRM association number	:	AP 204, 205, 213, 216, 218
Distribution and extent	:	Extensive (76896 ha) Nellore (37066 ha), Krishna (16723 ha), Prakasam (10511 ha), Guntur (4011 ha), Visakhapatnam (2552 ha), West Godavari (2496 ha), East Godavari (1559 ha), Chittoor (1214 ha) and Srikakulam (764 ha)
Soils associated	:	Mixed, Typic, Ustipsamments Fine-silty, mixed, Aquic Haplustepts Fine, mixed, Typic Haplustepts Fine, smectitic, Typic Haplusterts Fine, smectitic, Typic Sulfaquepts
Soil series correlated	:	Nil

Typifying pedon: Chakicherla sandy loam -cultivated

Ap	0-14 cm	Brown (10YR 5/3 D) and dark grayish brown (10YR 4/2) sandy loam; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; mildly alkaline (pH 7.6); clear smooth boundary.
Bw1	14-46 cm	Dark grayish brown (10YR 4/2 M) sandy clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; moderately alkaline (pH 8.2); gradual smooth boundary.
Bw2	46-81 cm	Yellowish brown (10YR 5/6 M) and gray (2.5Y 6/0 M) clay; strong medium subangular blocky structure; firm, sticky and plastic; moderately alkaline (pH 8.4); abrupt smooth boundary.
Bw3	81-112 cm	Yellowish brown (10YR 5/6 M) and gray (2.5 Y 6/0 M) clay; strong medium subangular blocky structure; firm, sticky and plastic; strongly alkaline (pH 8.8).
	112 cm	Water table.

Interpretation: These are deep clayey soils. Drainage, subsoil heavy textures, salinity and sodicity are the major problems for normal crop production.

a) Interpretative groupings:

Land capability sub-class : Iiws

Length of growing period : 150-210 days

Land irrigability sub-class : 2ds

Productivity potential : High to medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	15.02	25
Blackgram	3.17	13
Cotton	2.36	11
Green gram	3.14	12
Groundnut	8.96	18
Rice	22.60	60
Tobacco	11.71	14

c) Land suitability for crops:

Crops	Rice	Green gram	Black gram	Cotton	Groundnut
Suitability class	S1	S1	S1	S2wt	S3w

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC
		Sand	Silt	Clay		Water	KCl	
		(2-0.05 mm)	(0.05-0.002 mm)	(<0.002 mm)		(1:2.5)	(1:2.5)	
----->(USDA)<-----								
0-14	Ap	80.4	3.7	15.9	sl	7.6	6.6	0.85
14-46	Bw1	57.9	9.0	33.1	scl	8.2	6.8	0.32
46-81	Bw2	45.8	5.8	48.4	sc	8.4	6.9	0.12
81-112	Bw3	36.7	4.6	58.7	c	8.8	6.9	0.14

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-14	7.2	3.7	2.9	0.5	0.6	7.7
14-46	2.5	3.7	5.6	0.4	0.8	10.5
46-81	3.9	4.7	11.1	0.9	1.0	17.7
81-112	2.2	4.1	11.8	0.6	1.1	17.6

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-14	6.9	8.8	0.43	112	88
14-46	16.3	15.5	0.49	64	68
46-81	23.2	22.5	0.48	76	79
81-112	27.6	23.0	0.47	64	77

38. SURYAPET SOILS (5,22,629 ha)

(Alluvial loamy soils)

Classification	: Fine-loamy, mixed, superactive, isohyperthermic Fluventic Haplustepts
Type location	: Village: Issepet, Taluk: Andole-Jogipet, District: Medak; 18° 3' 8" N 78° 8' 7" E
Profile No	: 56J/4/T2/11
Physiographic position	: Very gently sloping valleys
Elevation (m)	: 440 to 520
Rainfall (mm)	: 873
Ground water table (m)	: 5-10
Slope, relief and erosion	: 1-3 per cent slopes; slightly eroded
Drainage and permeability	: Well drained with moderate permeability.
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Mainly cultivated to crops like paddy, sorghum (<i>jowar</i>), sugarcane, pigeon pea (<i>tur</i>), wheat, etc. Natural vegetation <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul).
Geology and soil parent material	: colluvio-alluvium; weathered granite-gneiss
SRM association number	: AP 41,166,200,203,214
Distribution and extent	: Extensive (522629 ha) Nalgonda (144208 ha), Mahbubnagar (88372 ha), Warangal (50243 ha), Karimnagar (34199 ha), Srikakulam (29007 ha), Medak (28105 ha), Nellore (22763 ha), Krishna (22471 ha), Prakasam (20992 ha), Nizamabad (16018 ha), Vizianagaram (14580 ha), Guntur (12203 ha), West Godavari (9970 ha), Khammam (7597 ha), Chittoor (7199 ha), East Godavari (4588 ha), Rangareddi (4405 ha), Anantapur (3478 ha) and Visakhapatnam (2311 ha)
Soils associated	: Fine, mixed, (calc.), Aquic Haplustepts Fine-loamy, mixed, Typic Haplustepts Fine, mixed, Typic Haplustepts Mixed, Ustipsamments
Soil series correlated	: • Issepet series (NBSS Publ. 791, NBSS&LUP, Nagpur) • Mallreddipalle series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Issepet sandy clay loam – cultivated.

Ap	0–16 cm	Very dark grayish brown (10YR 3/2 D & M) sandy clay loam; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few fine common roots; slightly alkaline (pH 7.9); clear smooth boundary.
AC	16–31 cm	Brown (10YR 3/2 M) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; fine common roots; slightly alkaline (pH 7.9); gradual smooth boundary.
Bw1	31–52 cm	Brown (10YR 3/2 M) sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; slightly alkaline (pH 7.9); gradual smooth boundary.
Bw2	52–75 cm	Brown (10YR 4/3 M) sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; slightly alkaline (pH 7.8); gradual smooth boundary.
2Bw3	75–100 cm	Brown (10YR 5/3 M) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; moderately alkaline (pH 8.6); gradual smooth boundary.
2Bw4	100–130 cm	Brown (10YR 5/3 M) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; strong effervescence with dilute HCl; slightly alkaline (pH 8.5).

Range in characteristics: The thickness of the solum ranges from 104 to 150 cm. The A horizon is 9 to 18 cm thick. Its colour is in hue 10YR, value 4 to 3 and chroma 4 to 1. Its texture ranges from sandy loam to clay. Its structure is medium and coarse subangular blocky. The B horizon is 89 to 139 cm thick. Its colour is in hue 10YR, value 5 to 6 and chroma 6 to 2. Texture is gravelly sandy clay loam to gravelly sandy clay.

Interpretation: These are deep, moderately alkaline, sandy and clayey stratified soils and moderate erodibility are the major constraints for normal crop husbandry.

a) Interpretative grouping:

Land capability subclass: Iis
Land irrigability subclass: 2s

Length of growing period: 150-180 days
Productivity potential: High

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	15.02	25
Cotton	2.81	11
Green gram	3.93	13
Groundnut	9.48	18
Jowar	9.14	35
Maize	26.92	45
Red gram	4.17	18
Rice	23.10	85.00

c) Land suitability for crops:

Crops	Maize	Green gram	Groundnut	Sorghum	Rice	Cotton
Suitability class	S1	S1	S2t	S2t	S2tw	S3t

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←-----<USDA>-----→						
0-16	Ap	61.9	15.9	22.2	scl	7.9	6.9	0.78
16-31	AC	70.6	13.1	16.3	sl	7.9	6.8	0.19
31-52	Bw1	50.4	11.8	37.8	sc	7.9	6.7	0.12
52-75	Bw2	56.2	07.9	35.9	sc	7.8	6.6	0.09
75-100	2Bw3	63.6	08.1	28.3	g scl	8.6	7.4	0.16
100-130	2Bw4	55.7	09.5	34.8	g scl	8.5	7.3	0.05

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-16	0.00	14.5	5.3	0.8	0.2	20.8
16-31	0.00	07.0	2.9	0.4	0.2	10.5
31-52	0.00	13.0	4.7	0.8	0.2	18.7
52-75	0.00	15.3	6.0	0.8	0.2	22.3
75-100	0.23	nd	5.3	0.6	0.2	nd
100-130	0.20	nd	4.7	0.7	0.3	nd

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation
	NH ₄ Oac (pH 7.0)	Sum of Cations		CEC (pH 7.0)
0-16	20.6	25.7	0.82	100
16-31	13.3	16.2	0.82	79
31-52	20.8	26.0	0.55	90
52-75	25.5	32.3	0.71	87
75-100	23.1	nd	0.82	nd
100-130	22.0	nd	0.63	nd

39. NAGARKURNUL SOILS (4,15,672 ha)

(Deep red gravelly loam soils)

Classification	: Loamy-skeletal, mixed, semiactive, isohyperthermic Typic Haplustepts
Type location	: Village: Kongatapalle; Tehsil: Mahbubnagar; District: Mahbubnagar; 16° 40' 4" N 77° 52' 6" E
Profile No	: 56 H/S2/21
Physiographic position	: Gently sloping lands
Elevation (m)	: 480
Rainfall (mm)	: 700
Ground water table (m)	: 5-10
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with rapid permeability
Surface stoniness/rockiness	: 8-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Tur, horse gram
Geology and soil parent material	: Granite
SRM association number	: AP 18, 35, 38, 107, 122, 127, 147, 162, 164
Distribution and extent	: Extensive (415672 ha) Mahbubnagar (116986 ha), Warangal (47184 ha), Karimnagar (43624 ha), Rangareddi (33162 ha), Vizainagaram (27476 ha), Nizamabad (22399 ha), Visakhapatnam (18919 ha), Nalgonda (18074 ha), Chittoor (14711 ha), Krishna (14308 ha), Medak (13019 ha), Nellore (12002 ha), Adilabad (10248 ha), East Godavari (6823 ha), Srikakulam (5780 ha), Guntur (4209 ha), Khammam (3468 ha), Cuddapah (538 ha) and Prakasam (309 ha)
Soils associated	: Fine, mixed, Typic Haplustalfs Fine, mixed, Typic Haplustepts Clayey-skeletal, mixed, Typic Rhodustalfs Fine loamy, mixed, Typic Rhodustalfs Fine, mixed, Typic Rhodustalfs Clayey-skeletal, mixed, Typic Paleustalfs Loamy-skeletal, mixed, Lithic Usorthents
Soil series correlated	: Batrepalle series [Soil series of Anantapur district, A.P., (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Kongatapalle gravelly loamy sand – cultivated

Ap	0-19 cm	Dark brown (10YR 4/3 M) gravelly loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 20 per cent fine quartz gravel; many medium to fine roots; slightly acid (pH 5.7); clear smooth boundary.
BA	19-45 cm	Yellowish brown (10YR 5/4 M) gravelly loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 35 to 40 per cent fine and coarse quartz gravel; few fine roots; slightly acid (pH 6.0); gradual smooth boundary.
Bw1	45-75 cm	Reddish yellow (7.5YR 6/6 M) gravelly sandy loam; weak to moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 40 to 45 per cent fine and coarse quartz gravel; slightly acid (pH 6.2); gradual smooth boundary.
Bw2	75-110 cm	Yellowish red (5YR 5/6 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; 40 per cent fine and coarse quartz gravel; slightly acid (pH 6.2); gradual smooth boundary.
C	110-150 cm	Yellowish red (5YR 5/8 M) gravelly sandy loam; moderate medium subangular blocky structure; friable, sticky and plastic; 35-40 per cent fine and coarse gravel; slightly acid (pH 6.4); gradual wavy boundary.
Cr	150 cm	Weathered granite.

Interpretation: These are very deep loamy soils. Subsoil gravelliness, moderate slopes, moderate erosion and low nutrient status are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : IIIes

Length of growing period : 120-150 days

Land irrigability sub-class : 3st

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	11.08	25
Cotton	1.87	11
Green gram	2.08	12
Groundnut	6.59	18
Jowar	9.05	35
Maize	23.51	45
Red gram	2.24	18
Rice	20.31	60

c) Land suitability for crops:

Crops	Groundnut	Bajra	Sorghum	Maize	Red gram	Green gram
Suitability class	S2gl	S2gl	S2tg	S3tg	S3tg	S2tg

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)----->							
0-19	Ap	82.7	12.2	5.1	ls	5.7	4.5	0.12	
19-45	BA	83.1	9.7	7.2	g ls	6.0	4.7	0.08	
45-75	Bw1	80.4	6.4	13.2	g sl	6.2	4.8	0.08	
75-110	Bw2	69.3	10.6	20.1	g scl	6.2	4.9	0.07	
110-150	C	75.2	10.6	14.2	g sl	6.6	5.0	0.11	
150+	Cr	72.3	12.1	15.6	g sl	6.4	4.8	0.06	

Depth (cm)	ECe (1:2.5) dSm ⁻¹	ESP	Exchangeable bases cmol(+) kg ⁻¹				
			Ca	Mg	Na	K	Total
0-19	0.0	0.0	0.5	0.8	0.0	0.1	1.4
19-45	0.0	0.0	0.6	0.8	0.0	0.1	1.5
45-75	0.0	0.0	1.2	1.3	0.0	0.2	2.4
75-110	0.1	1.8	2.4	1.9	0.1	0.2	4.6
110-150	0.0	2.0	2.4	1.9	0.1	0.2	3.8
150+	0.0	1.3	3.1	3.7	0.1	0.3	7.2

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-19	0.6	4.8	0.12		29
19-45	2.5	5.0	0.35	60	30
45-75	2.7	5.8	0.20	89	41
75-110	5.5	9.3	0.27	84	49
110-150	4.9	7.4	0.35	78	51
150+	7.5	0.0	0.48	96	00

40. CHINTUR SOILS (4,64,928 ha)

(Shallow red gravelly clay soils)

Classification	: Clayey-skeletal, mixed, semiactive, isohyperthermic Typic Haplustepts
Type location	: Village: Potampalli; Tehsil: Chintur; District: Khamam; 17° 45' 20" N 81° 25' 57" E
Profile No	: 65G/S5/8
Physiographic position	: Gently sloping lands
Elevation (m)	: 50
Rainfall (mm)	: 900-1000
Ground water table (m)	: >5
Slope, relief and erosion	: 3-8 per cent slopes; moderately eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Forest; palmyra, mahua, tendu
Geology and soil parent material	: Granite, weathered- granite
SRM association number	: AP 11, 14, 56, 79, 92, 109, 121, 169, 171, 212
Distribution and extent	: Extensive (464928 ha)

Adilabad (67823 ha), Khammam (60467 ha), Medak (59934 ha), Karimnagar (49642 ha), Nizamabad (46817 ha), Nalgonda (35569 ha), Warangal (23917 ha), Anantapur (19229 ha), Nellore (15063 ha), Visakhapatnam (12976 ha), Prakasam (12737 ha), Chittoor (11454 ha), Rangareddi (10763 ha), Vizianagaram (9311 ha), Cuddapah (9311 ha), Krishna (7568 ha), East Godavari (3147 ha), Kurnool (3037 ha), Srikakulam (2781 ha), Guntur (2496 ha) and Mahbubnagar (1606 ha)

Soils associated	: Loamy-skeletal, mixed, Typic Haplustalfs Clayey-skeletal, mixed, Typic Haplustalfs Fine, mixed, Typic Paleustalfs Fine, mixed, Typic Haplustepts Rock Lands
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Soil series correlated	: Gooty series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]
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Typifying pedon: Potampalli gravelly sandy clay- forested

A	0-6 cm	Strong brown (7.5 YR 4/6 M) gravelly sandy clay; weak fine subangular blocky structure; friable, sticky and slightly plastic; many fine and medium roots; slightly acid (pH 6.5); 40 per cent fine and coarse quartz gravel; clear smooth boundary.
Bw1	6-22 cm	Reddish brown (5YR 4/4 M) gravelly clay; moderate weak to medium subangular blocky structure; friable, sticky and plastic; common very fine roots; slightly acid (pH 6.5); 50 per cent fine and coarse quartz gravel; gradual smooth boundary.
Bw2	22-43 cm	Yellowish red (5YR 4/6 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; few very fine roots; neutral (pH 6.7); 60 per cent fine and coarse quartz gravel; gradual smooth boundary.
Cr	43-50 cm	Weathered granite.

Interpretation: These are shallow clayey soils. High subsoil gravelliness, shallow rooting depth, low AWC, moderate slopes, moderate erosion and low nutrient status are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIes

Land irrigability sub-class : 3st

Length of growing period : 120-180 days

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	3.17	13
Cotton	1.89	11
Green gram	2.96	12
Jowar	9.05	35
Maize	24.33	45
Red gram	3.50	18
Rice	21.27	60

c) Land suitability for crops:

Crops	Green gram	Black gram	Sorghum	Maize	Rice	Red gram
Suitability class	S3gl	S3gl	S3gl	N	N	N

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)----->						
0-6	A	55.6	6.5	37.9	g sc	6.5	5.3	1.81
6-22	Bw1	36.1	3.3	60.1	g c	6.5	5.2	1.48
22-43	Bw2	31.3	4.9	63.8	g c	6.7	5.4	0.81

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-6	0.7	3.5	2.2	0.1	0.5	6.3
6-22	0.5	4.5	3.6	0.1	0.7	8.9
22-43	1.1	3.1	3.9	0.2	0.7	7.9

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-6	14.9	14.2	0.39	42	44
6-22	20.8	19.4	0.35	43	46
22-43	17.4	17.8	0.27	45	44

41. ASWARAOPET SOILS (5,44,794 ha)

(Deep red loamy soils)

Classification	:	Fine-loamy, mixed, semiactive, isohyperthermic Typic Haplustepts
Type location	:	Village: Utlapalle; Tehsil: Ashwaraopet; District: Khammam 17° 18' N 81° 7' 45" E
Profile No	:	65G/S2/2
Physiographic position	:	Gently sloping lands
Elevation (m)	:	180-200
Rainfall (mm)	:	1220
Ground water table (m)	:	>10
Slope, relief and erosion	:	1-3 per cent slopes; slightly eroded
Drainage and permeability	:	Well drained with moderate permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Forest; teak, cassia, bamboo
Geology and soil parent material	:	Colluvio-alluvium
SRM association number	:	AP 19,39,43,77,110,129,166,199,208
Distribution and extent	:	Extensive (544794 ha) Khammam (73997 ha), Nellore (56619 ha), Anantapur (55349 ha), Guntur (49598 ha), Chittoor (32350 ha), Krishna (30978 ha), Warangal (29201 ha), Prakasam (29119 ha), East Godavari (27284 ha), Adilabad (26910 ha), Karimnagar (24980 ha), Mahbubnagar (22686 ha), Srikakulam (22016 ha), Cuddapah (21463 ha), Rangareddi (11732 ha), Nizamabad (10871 ha), West Godavari (6406 ha), Nalgonda (5769 ha), Visakhapatnam (4911 ha), Kurnool (1122 ha), Medak (641 ha) and Vizianagaram (792 ha)
Soils associated	:	Fine, mixed, Typic Haplustalfs Fine, mixed, (cal.), Typic Haplustepts Fine, mixed, Rhodic Paleustalfs Fine, mixed, Typic Haplustepts Fine-loamy, mixed, Typic Haplustalfs
Soil series correlated	:	Wajrakarur series, Kamalapadu series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore]

Typifying pedon: Utlapalle sand- cultivated

Ap	0-10 cm	Brownish yellow (10YR 6/8 D) and light yellowish brown (10YR 6/4 M) sand; single grain structure; loose, very friable, nonsticky and nonplastic; common very fine to fine roots; slightly acid (pH 6.3); abrupt smooth boundary.
A2	10-24 cm	Yellowish brown (10YR 5/4 M) loamy sand; weak fine granular structure; very friable, nonsticky and nonplastic; few fine roots; neutral (pH 6.9); clear smooth boundary.
Bw1	24-48 cm	Yellowish brown (10YR 5/4 M) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; very few very fine roots; neutral (pH 6.8); clear smooth boundary.
Bw2	48-73 cm	Yellowish brown (10YR 5/6 M) sandy clay loam, moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine lime nodules; neutral (pH 6.9); clear wavy boundary.
Bw3	73-102 cm	Dark yellowish brown (10YR 4/6 M) sandy clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine lime nodules; slightly acid (pH 6.5); gradual wavy boundary.
Bw4	102-134 cm	Dark yellowish brown (10YR 4/6 M) sandy clay; moderate medium, subangular blocky structure; friable, sticky and plastic; few fine lime nodules; slightly acid (pH 6.5); gradual wavy boundary.
Bw5	134-163 cm	Dark yellowish brown (10YR 4/6 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine lime nodules; neutral (pH 6.7).

Interpretation: These are very deep loamy soils. Have high potential for growing mango, cashew and other horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : lies

Length of growing period : 150-180 days

Land irrigability sub-class : 2s

Productivity potential : Medium to high

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	3.17	13
Cotton	2.81	11
Green gram	3.93	12
Maize	27.19	45
Red gram	4.17	18
Rice	23.10	60
Sesamum	1.61	6
Tobacco	15.29	14

c) Land suitability for crops:

Crops	Maize	Rice	Red gram	Green gram	Black gram	Tobacco	Sesamum
Suitability class	S2t	S3t	S2t	S2t	S2t	S2t	S2t

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		<------(USDA)----->						
0-10	Ap	91.8	3.0	05.2	s	6.3	5.6	0.35
10-24	A2	85.9	6.1	08.0	ls	6.9	5.9	0.36
24-48	Bw1	80.8	4.4	14.8	sl	6.8	5.7	0.40
48-73	Bw2	76.3	3.6	20.1	scl	6.9	5.6	0.36
73-102	Bw3	60.5	2.3	37.2	sc	6.5	5.5	0.33
102-134	Bw4	60.6	3.6	35.8	sc	6.5	5.4	0.32
134-163	Bw5	63.8	1.7	34.5	scl	6.7	5.5	0.24

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-10	0.0	0.5	0.8	0.0	0.2	1.5
10-24	0.0	1.0	0.9	0.0	0.2	2.1
24-48	0.0	1.9	0.8	0.0	0.2	2.9
48-73	1.9	2.4	1.3	0.1	0.2	4.1
73-102	2.3	3.6	1.6	0.2	0.5	5.9
102-134	1.2	3.5	1.6	0.1	0.5	5.7
134-163	0.0	3.3	1.6	0.0	0.4	5.3

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ Oac (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-10	1.0	01.7	0.19	150	88
10-24	2.0	02.3	0.25	105	91
24-48	3.7	04.1	0.25	78	71
48-73	5.2	06.0	0.26	79	68
73-102	8.6	08.8	0.23	69	67
102-134	8.6	10.7	0.24	66	53
134-163	8.1	08.8	0.23	65	60

42. WANPARTI SOILS (8,29,390 ha)

(Deep alluvio-colluvial clayey soils)

Classification	:	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts
Type location	:	Village: Lakkavaram; Tehsil: Chintur; District: Khammam; 17° 44' 20" N 81° 31' 4" E
Profile No	:	65G/S5/14
Physiographic position	:	Interhill basin
Elevation (m)	:	70
Rainfall (mm)	:	900-1000 (1220 mm)
Ground water table (m)	:	>10
Slope, relief and erosion	:	1-3 per cent slopes; slightly eroded
Drainage and permeability	:	Moderately well drained with moderately slow permeability
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Paddy, black gram, green gram, vegetables
Geology and soil parent material	:	Granite; weathered granite
SRM association number	:	A.P. 37, 38, 45, 61, 80, 84, 85, 86, 93, 96, 110, 111, 116, 124, 123, 133, 134, 135, 136, 137, 141, 142, 143, 144, 145, 155, 156, 187, 202, 203, 209, 210, 211, 212, 213, 214, 215, 235, 237
Distribution and extent	:	Extensive (829390 ha) Mahbubnagar (200955 ha), Karimnagar (150303 ha), Khammam (124294 ha), Adilabad (105643 ha), Warangal (90326 ha), Chittoor (77551 ha), Nizamabad (39098 ha), Rangareddi (18284 ha), Medak (9727 ha), Cuddapah (7881 ha), Nalgonda (3662 ha) and Anantapur (1666 ha)
Soils associated	:	Fine, mixed, Typic Haplustalfs Loamy-skeletal, Typic Haplustepts Fine-loamy, mixed, (calc.), Fluventic Haplustepts Loamy, mixed, Lithic Ustorthents Fine-loamy, mixed, Typic Haplustalfs Fine, smectitic, Vertic Haplustepts Fine, mixed, Typic Paleustalfs
Soil series correlated	:	Tadamanur series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Lakkavaram sandy loam-cultivated

Ap	0-15 cm	Dark yellowish brown (10YR 3/4 M) sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many very fine roots; slightly acid (pH 5.9); clear smooth boundary.
Bw1	15-40 cm	Dark yellowish brown (10YR 4/4 M) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine roots; few fine lime nodules; slightly acid (pH 5.9); gradual smooth boundary.
Bw2	40-82 cm	Dark reddish brown (10YR 4/6 M) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common fine lime nodules; few very fine roots; slightly acid (pH 6.0); gradual smooth boundary.
Bw3	82-114cm	Dark yellowish brown (10YR 4/4 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine lime nodules; few very fine roots; neutral (pH 6.6); gradual smooth boundary.
Bw4	114-130 cm	Yellowish brown (10YR 5/4 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; common fine to medium lime nodules; neutral (pH 6.7).

Interpretation: These are very deep clayey soils. Have high potential for growing oil palm, mango and other horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : Iis

Length of growing period : 150-210 days

Land irrigability sub-class : 2ds

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	17.17	25
Blackgram	4.42	13
Green gram	5.00	12
Groundnut	13.90	18
Horse gram	12.25	12
Maize	34.76	45
Rice	30.69	60
Sesamum	2.71	6
Sugarcane	889.26	1250

c) Land suitability for crops:

Crops	Maize	Groundnut	Sesamum	Sugarcane	Black gram	Green gram	Rice
Suitability class	S1	S1	S1	S1	S1	S1	S2t

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←------(USDA)-----→						
0-15	Ap	65.7	14.5	19.8	sl	5.9	4.7	0.81
15-40	Bw1	55.2	16.9	27.9	scl	5.9	4.8	0.42
40-82	Bw2	44.5	17.8	37.7	cl	6.0	4.9	0.31
82-114	Bw3	42.0	17.7	40.3	c	6.6	5.2	0.31
114-130	Bw4	37.9	15.2	46.9	c	6.7	5.4	0.34

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-15	0.0	2.0	1.0	0.0	0.3	3.3
15-40	0.0	2.0	1.4	0.0	0.3	3.7
40-82	0.0	3.0	1.5	0.0	0.4	4.9
82-114	0.1	3.8	1.8	0.0	0.4	6.0
114-130	0.1	4.6	2.2	0.0	0.4	7.2

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-15	6.5	7.7	0.33	51	43
15-40	6.3	8.2	0.23	59	45
40-82	7.8	8.7	0.21	63	56
82-114	10.8	11.0	0.27	56	55
114-130	11.5	12.3	0.25	63	59

43. VISAKHAPATNAM SOILS (14,64,221 ha)

(Deep red clayey soils)

Classification	: Fine, mixed, semiactive, isohyperthermic Typic Haplustepts
Type location	: Village: Raur; Tehsil: Kaveli; District: Nellore; 15° 1' N 80° 1' E
Profile No	: 66A & E/S1/22
Physiographic position	: Flat lands
Elevation (m)	: 20
Rainfall (mm)	: 1110
Ground water table (m)	: 1-3
Slope, relief and erosion	: 1-3 per cent slopes, slightly eroded
Drainage and permeability	: Well drained with moderately slow permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Mango plantation
Geology and soil parent material	: Lateritic alluvium
SRM association number	: A.P. 37, 38, 45, 61, 80, 84, 85, 86, 93, 96, 110, 111, 116, 124, 123, 133, 134, 135, 136, 137, 141, 142, 143, 144, 145, 155, 156, 187, 202, 203, 209, 210, 211, 212, 213, 214, 215, 235, 237
Distribution and extent	: Extensive (1464221 ha) Visakhapatnam (321537 ha), Nellore (263972 ha), Prakasam (174643 ha), Srikakulam (172824 ha), West Godavari (135795 ha), East Godavari (132946 ha), Vizianagaram (109634 ha), Guntur (77206 ha) and Krishna (75664 ha)
Soils associated	: Fine-loamy, mixed, Typic Haplustepts Fine, smectitic, (calc.), Vertic Haplustepts Fine, mixed, Rhodic Paleustalfs Fine, mixed, Typic Rhodustalfs Fine-loamy, mixed, Fluventic Haplustepts Fine, mixed, Aerit Tropaquepts Fine, mixed, Aquic Haplustepts
Soil series correlated	: Tadamanur series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Raur sandy clay loam-cultivated

Ap	0-10 cm	Yellowish brown (10YR 5/6 D) and strong brown (7.5 YR 4/6 M) sandy clay loam; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; slightly acid (pH 6.5); clear smooth boundary.
Bw1	10-36 cm	Strong brown (7.5YR 4/6 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common fine iron nodules; neutral (pH 6.8); gradual smooth boundary.
Bw2	36-60 cm	Strong brown (7.5YR 4/6 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; common fine iron nodules; 75 per cent fine and coarse gravel; neutral (pH 7.0); abrupt smooth boundary.
Bw3	60-90 cm	Yellowish red (5YR 4/6 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; common fine iron nodules; 25 per cent fine and coarse gravel; slightly alkaline (pH 7.7); gradual smooth boundary.
Bw4	90-100 cm	Yellowish red (5YR 4/6 M) gravelly clay; moderate medium subangular blocky structure; friable, sticky and plastic; common fine iron nodules; 50 per cent fine and coarse gravel; slightly alkaline (pH 7.8).

Interpretation: These are deep clayey soils. Have high potential for growing mango, cashew and other horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : Iis

Length of growing period : 150-180 days

Land irrigability sub-class : 2ds

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	17.17	25
Blackgram	4.42	13
Green gram	5.00	12
Groundnut	13.90	18
Horse gram	12.25	12
Maize	34.76	45
Rice	30.69	60
Sesamum	2.71	6
Sugarcane	889.26	1250

c) Land suitability for crops:

Crops	Maize	Bajra	Green gram	Black gram	Horse gram	Sesamum	Sugarcane	Rice	Groundnut
Suitability class	S1	S1	S1	S1	S1	S1	S1	S2t	S2t

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<------(USDA)----->							
0-10	Ap	68.9	10.7	20.4	scl	6.5	5.5	0.65	2
10-36	Bw1	41.5	7.3	51.2	c	6.8	5.4	0.67	2
36-60	Bw2	33.9	3.7	62.4	g c	7.0	5.9	0.42	0
60-90	Bw3	21.4	2.2	76.4	g c	7.7	6.3	0.32	2
90-100	Bw4	18.1	3.7	78.2	g c	7.8	6.6	0.18	1

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-10	3.1	3.5	1.5	0.2	0.6	5.8
10-36	1.2	7.2	2.4	0.2	0.5	10.3
36-60	2.4	9.3	3.0	0.4	0.5	13.2
60-90	1.0	11.9	3.1	0.2	0.7	15.9
90-100	1.6	12.9	2.7	0.3	0.6	16.5

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-10	6.4	9.1	0.31	91	64
10-36	16.3	15.4	0.32	63	67
36-60	16.7	19.3	0.27	79	68
60-90	19.5	22.0	0.26	82	72
90-100	18.9	21.3	0.24	87	77

44. ADDANKI SOILS (44,705 ha)

(Alluvial calcareous clayey soils)

Classification	: Fine, mixed, (calcareous), isohyperthermic Typic Haplustepts
Type location	: Village: Anumalavidu; Tehsil: Giddalur; District: Prakasam; 15° 28' N 78° 59' E
Profile No	: 571/S7/18
Physiographic position	: Valley
Elevation (m)	: 240
Rainfall (mm)	: 975
Ground water table (m)	: 5-10
Slope, relief and erosion	: 1 to 3 per cent slopes; slightly eroded
Drainage and permeability	: Moderately well drained with moderate permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Cultivated to groundnut, pulses, rice
Geology and soil parent material	: Precambrian
SRM association number	: AP 39,100,112,115,157,165
Distribution and extent	: Extensive (44705 ha)

Khammam (23376 ha), Prakasam (10580 ha), Mahbubnagar (5770 ha), Kurnool (3922 ha), Krishna (706 ha) and Nalgonda (351 ha)

Soils associated	: Fine-loamy, mixed, Typic Haplustepts Fine, smectitic, (calc.), Leptic Halusterts Fine, smectitic, (calc.), Vertic Haplustepts Loamy-skeletal, (calc.), Lithic Ustorthents
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Soil series correlated : Nil

Typifying pedon: Anumalavidu loam-cultivated

Ap	0-11 cm	Brown (10YR 4/3 M) loam; weak medium subangular blocky structure; very friable, sticky and plastic; common very fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.9); abrupt smooth boundary.
Bw1	11-36 cm	Dark brown (10YR 3/3 M) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few very fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; strongly alkaline (pH 9.9); clear smooth boundary.
Bw2	36-82 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; strongly alkaline (pH 9.7); clear smooth boundary.
Bw3	82-113 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; violent effervescence with dilute HCl; strongly alkaline (pH 9.6); gradual smooth boundary.
Cr	113-145 cm	Weathered quartz

Interpretation: These are deep clayey soils with high lime content. Have potential for growing horticultural, medicinal and aromatic plants.

a) Interpretative groupings:

Land capability sub-class : 11s
 Land irrigability sub-class : 2ds
 Length of growing period : 150-180 days
 Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	15.02	25
Blackgram	4.42	13
Cotton	2.93	11
Green gram	3.93	12
Maize	27.28	45
Red gram	4.20	18
Rice	27.38	60
Tobacco	15.33	14

c) Land suitability for crops:

Crops	Rice	Maize	Red gram	Green gram	Black gram
Suitability class	S2tw	S3z	S3z/N	S3z/N	S3z/N

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-11	Ap	30.7	48.3	21.0	l	8.9	8.0	0.53	7
11-36	Bw1	20.8	43.1	36.1	cl	9.9	8.0	0.29	6
36-82	Bw2	19.6	37.3	43.1	c	9.7	8.0	0.20	6
82-113	Bw3	11.5	39.0	49.5	c	9.6	7.9	0.26	nd

45. SRUNGAVARAPUKOTA SOILS (2,39,351 ha)

(Forest brown gravelly loam soils)

Classification	:	Loamy-skeletal, mixed, semiactive, isohyperthermic Pachic Argiustolls
Type location	:	Village: Vothgadda; Tehsil: Ellavaram; District: East Godavari; 17° 39' N 81° 57' E
Profile No	:	65G/S8/7
Physiographic position	:	Rolling land
Elevation (m)	:	360
Rainfall (mm)	:	1260
Ground water table (m)	:	>10
Slope, relief and erosion	:	15 to 30 per cent slopes; severely eroded
Drainage and permeability	:	Well drained with moderate permeability
Surface stoniness/rockiness	:	40-75 per cent stones of >25 cm diameter
Land use and vegetation	:	Forest
Geology and soil parent material	:	Khondalites (Dharwars)
SRM association number	:	AP 139
Distribution and extent	:	Extensive (239351 ha) Visakhapatnam (108420 ha), East Godavari (77010 ha), Srikakulam (29555 ha) and Vizianagaram (2536 ha)
Soils associated	:	Clayey-skeletal, mixed, Pachic Argiustolls
Soil series correlated	:	Nil
Remarks	:	Earlier it was classified as Typic Argiustolls in SRM-A.P.

Typifying pedon: Vothugadda gravelly sandy loam-forest

A	0-23 cm	Very dark gray (5YR 3/1 M) gravelly sandy loam; weak medium subangular blocky structure; 15 per cent fine gravel; very friable, nonsticky and nonplastic; many fine roots; slightly acid (pH 6.3); abrupt smooth boundary.
Bt1	23-50 cm	Dark reddish brown (5YR 3/3 M) gravelly sandy clay loam; moderate medium subangular blocky structure; 60 per cent fine gravel; friable, slightly sticky and slightly plastic; many fine roots; slightly acid (pH 6.1); clear smooth boundary.
Bt2	50-76 cm	Dark reddish brown (5YR 3/4 M) gravelly sandy clay loam; weak medium subangular blocky structure; 70 per cent fine gravel; friable, slightly sticky and slightly plastic; many fine roots; slightly acid (pH 6.2); abrupt smooth boundary.
Cr	76 cm	Weathered khondalites.

Interpretation: These are medium deep loamy soils. High subsoil gravelliness, steep hill slopes, erosion hazard are the major constraints. Presently under dense reserve forest.

a) Interpretative groupings:

Land capability sub-class : Vles
 Land irrigability sub-class : 6st
 Length of growing period : 150-210 days
 Productivity potential : High for forestry only

b) Yield: Based on data from farmer's field:

Large area under reserved forest

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←----->(USDA)<-----						
0-23	A	71.3	12.9	15.8	g sl	6.3	5.5	2.16
23-50	Bt1	50.5	15.0	34.5	g scl	6.1	5.0	1.55
50-76	Bt2	54.7	15.5	29.8	g scl	6.2	4.9	1.13

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-23	0.9	6.1	2.2	0.1	0.5	8.9	6.2	0.1	0.0
23-50	0.0	5.1	1.8	0.0	0.4	7.3	8.0	0.1	0.0
50-76	0.0	4.4	1.5	0.0	0.2	6.1	6.9	0.1	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-23	9.0	10.9	15.1	0.69	82	59
23-50	7.4	11.5	15.3	0.33	63	48
50-76	6.2	10.6	13.0	0.36	58	47

46. RAMPACHODAVARAM SOILS (1,79,942 ha)

(Forest brown gravelly clay soils)

Classification	: Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls
Type location	: Village: Musupallikonda; Tehsil: Rampa Chowdavaram; District: East Godavari; 17° 23' N 81° 46' E
Profile No	: 65G/S7/25
Physiographic position	: Steeply to very steeply sloping hill ranges
Elevation (m)	: 140
Rainfall (mm)	: 1260
Ground water table (m)	: >10
Slope, relief and erosion	: 30 to 50 per cent slopes; severely eroded
Drainage and permeability	: Well drained with moderate permeability
Surface stoniness/rockiness	: 15-40 per cent stones of 7.5-25 cm diameter
Land use and vegetation	: Forest
Geology and soil parent material	: Khondalites
SRM association number	: AP 140
Distribution and extent	: Extensive (179942 ha) East Godavari (64243 ha), Visakhapatnam (52587 ha), Khammam (22463 ha), West Godavari (20525 ha), Vizianagaram (16447 ha) and Srikakulam (3677 ha)
Soils associated	: Rock land
Soil series correlated	: Baureddipalle series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)
Remark	: Earlier it was classified as Typic Argiustolls in SRM-A.P.

Typifying pedon: Musupallikonda gravelly sandy loam - forest

A	0-15cm	Dark reddish brown (5YR 3/2 M) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 50-60 per cent fine quartz gravel; common fine to medium iron concretions; many fine roots; neutral (pH 6.8); clear smooth boundary.
Bt1	15-46 cm	Very dusky red (2.5YR 2.5/2 M) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; 30-40 per cent fine quartz gravel; common fine to medium iron concretions; patchy thin clay cutans; common fine to coarse roots; slightly acid (pH 5.9); clear smooth boundary.
Bt2	46-60 cm	Dusky red (2.5 YR 3/2 M) gravelly sandy clay; weak medium subangular blocky structure; friable, sticky and plastic; 70-75 per cent fine quartz gravel; common fine to medium iron concretions; patchy thin clay cutans; common fine to medium roots; slightly acid (pH 5.8); abrupt smooth boundary.
R	60 cm	Hard bed rock (khondalite)

Interpretation: These are medium deep clayey soils. They are presently under dense reserve forest. Steep hill slopes, subsoil gravelliness and erosion and erosion hazard the major constraints.

a) Interpretative groupings:

Land capability sub-class : Vles

Land irrigability sub-class : 6st

Length of growing period :150-210 days

Productivity potential : High for forestry only

b) Yield: Based on data from farmer's field:

Large area under reserved forest

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)	
		←----->(USDA)<-----						
0-15	A	66.4	13.8	19.8	g sl	6.8	6.0	2.15
15-46	Bt1	55.8	09.4	34.8	g scl	5.9	4.9	1.03
46-60	Bt2	53.1	05.1	41.8	g sc	5.8	4.7	0.68

Depth (cm)	ESP	Exchangeable bases cmol(+) kg ⁻¹					Extractable acidity cmol(+) kg ⁻¹		
		Ca	Mg	Na	K	Total	BaCl ₂ -TEA	1.0 N KCl	
								H+Al	Al ³⁺
0-15	0.0	11.1	3.8	0.0	0.8	15.7	08.5	0.1	0.0
15-46	1.1	06.7	4.0	0.2	0.3	11.2	10.6	0.1	0.0
46-60	0.6	06.6	3.5	0.1	0.2	10.4	10.8	0.1	0.0

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	ECEC	NH ₄ OAc (pH 7.0)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-15	15.8	15.4	24.2	0.78	102	65
15-46	11.3	18.6	21.8	0.53	60	51
46-60	10.5	16.0	21.2	0.38	65	49

47. BANGANAPALLE SOILS (23,520 ha)

(Deep calcareous black soils)

Classification	: Very fine, smectitic (calcareous), isohyperthermic Ardic Haplusterts
Type location	: Village: Kanakadripalli; Tehsil: Banaganpalle; District: Kurnool; 15° 3' N 78° 3' E
Profile No	: 571/S6/27
Physiographic position	: Very gently sloping plains
Elevation (m)	: 300
Rainfall (mm)	: 650
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes, moderately eroded
Drainage and permeability	: Imperfectly drained with slow permeability
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Sorghum, cotton, pigeon pea
Geology and soil parent material	: Precambrian; colluvio-alluvium of quartzite
SRM association number	: AP 101, 102
Distribution and extent	: Minor extent (23520 ha) Anantapur (20508 ha) and Kurnool (3012 ha)
Soils associated	: Fine, smectitic, (calc.), Ustertic Haplocambids Fine, mixed, (calc.), Ustic Haplocambids
Soil series correlated	: Nil

Typifying pedon: Kanakadripalli clay-cultivated

Ap	0-19 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; friable, very sticky and plastic; common very fine and fine roots; fine to very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.7); abrupt smooth boundary.
Bss1	19-51 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium angular blocky structure; friable, very sticky and very plastic; intersecting slickensides; common very fine and fine roots; few very fine and calcium nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.1); clear smooth boundary.
Bss2	51-79 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) clay; strong coarse angular blocky structure; firm, very sticky and very plastic; intersecting slickensides; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.0); gradual smooth boundary.
Bss3	79-105 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) clay; strong medium subangular blocky structure; firm, very sticky and very plastic; intersecting slickensides; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.9); gradual smooth boundary.
Bss4	105-127 cm	Very dark gray to very dark grayish brown (10YR 3/1.5 M) clay; strong medium angular blocky structure; firm, very sticky and very plastic; intersecting slickensides; few very fine roots; few very fine lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 9.0); abrupt smooth boundary.
R	127 cm	Quartzite.

Interpretation: These are deep cracking clay soils. Slow permeability, high lime content, high shrink-swell potential, suboptimum oxygen availability, poor workability, aridity and low available phosphorus are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIIes

Land irrigability sub-class : 3ds

Length of growing period : 120-150 days

Productivity potential : Medium

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	8.12	25
Cotton	1.89	11
Groundnut	3.72	18
Jowar	10.30	35
Red gram	1.96	18
Rice	27.30	60
Tobacco	13.36	14

c) Land suitability for crops:

Crops	Rice	Cotton	Sorghum	Tobacco	Bajra	Red gram	Groundnut
Suitability class	S2z	S2wz	S1	S2tz	S3tz	S2tz	S3tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-19	Ap	16.5	27.1	56.4	c	8.7	7.4	0.92	10
19-51	Bss1	12.6	29.4	58.0	c	9.1	7.4	0.92	12
51-79	Bss2	11.4	27.7	60.9	c	9.0	7.4	1.01	11
79-105	Bss3	10.6	27.2	62.2	c	8.9	7.5	0.94	39
105-127	Bss4	09.4	23.4	67.2	c	9.0	7.5	1.10	10

48. EMMIGANURU SOILS (2,27,525 ha)

(Medium deep calcareous black soils)

Classification	: Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts
Type location	: Village: Entapalli; Taluk: Sangareddy; District: Medak; 17° 43' 80" N 77° 49' 15" E;
Profile No	: 56G/14/T1/2
Physiographic position	: Very gently sloping uplands
Elevation (m)	: 520 to 570
Rainfall (mm)	: 873
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent; moderately eroded
Drainage and permeability	: Moderately well drained with slow permeability.
Surface stoniness/rockiness	: <3 per cent stones of <2.5 cm diameter
Land use and vegetation	: Mainly cultivated to sorghum, pigeon pea (<i>tur</i>), chillies, oilseed crops like sunflower, linseed, mustard, safflower, etc. Natural vegetation- <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul).
Geology and soil parent material	: Peninsular gneiss; granite-gneiss
SRM association number	: AP 49,50,100,168
Distribution and extent	: Extensive (227525 ha) Kurnool (63204 ha), Karimnagar (52553 ha), Guntur (37561 ha), Anantapur (23345 ha), Mahbubnagar (20034 ha), Medak (10561 ha), Khammam (8478 ha), Warangal (7364 ha) and Nellore (4425 ha)
Soils associated	: Fine, smectitic, (calc.), Ustertic Haplocambids Fine, mixed, (calc.), Typic Haplustepts Fine, smectitic, (calc.), Vertic Haplustepts
Soil series correlated	: Entapalli series (NBSS Publ.791, NBSS&LUP, Nagpur)

Typifying pedon: Entapalli clay loam – cultivated.

Ap	0–11 cm	Very dark grayish brown (10YR 4/2 M) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; neutral (pH 7.0); clear smooth boundary.
BA	11–40 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium subangular blocky structure; very firm, very sticky and very plastic; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.9); gradual smooth boundary.
Bss1	40–69 cm	Very dark grayish brown (10YR 4/2 M) clay; strong medium angular blocky structure; very firm, very sticky and very plastic; intersecting slickensides; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.4); gradual smooth boundary.
Bss2	69–85 cm	Very dark grayish brown (10YR 4/2 M) clay; strong medium angular blocky structure; prominent intersecting slickensides; very firm, very sticky and very plastic; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.5).
Cr	85 cm	Weathered granite-gneiss.

Range in characteristics: The thickness of the solum ranges from 78 to 93 cm. The A horizon is 10 to 20 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 1. Its texture is clay and structure is moderate medium subangular blocky. The B horizon is 70 to 85 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 1. Its texture is clay.

Interpretation: Slow permeability, high lime content, high shrink-swell potential, suboptimum oxygen availability, poor workability and low available phosphorus are the major constraints for crop production.

a) Interpretative grouping:

Land capability subclass: Iiws

Land irrigability subclass: 3ds

Length of growing period: 150-210 days

Productivity potential: High

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.89	11
Green gram	2.06	12
Groundnut	3.72	18
Maize	22.47	45
Rice	27.30	60

c) Land suitability for crops:

Crops	Rice	Green gram	Cotton	Groundnut	Maize
Suitability class	S2z	S1	S2t	S3tz	S2w

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<----->(USDA)<----->							
0-11	Ap	40.5	19.8	39.7	cl	7.0	6.3	0.55	0
11-40	BA	35.7	18.8	45.5	c	7.9	6.5	0.46	0
40-69	Bss1	31.4	15.3	53.3	c	8.4	7.1	0.49	4
69-85	Bss2	29.9	18.2	51.9	c	8.5	7.4	0.45	6

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-11	tr	21.5	5.4	0.1	0.6	27.6
11-40	tr	28.3	5.0	0.1	0.4	33.9
40-69	0.13	nd	nd	0.2	0.3	nd
69-85	0.13	nd	nd	0.1	0.2	nd

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹			CEC/Clay ratio	Per cent Base Saturation	
	NH ₄ OAc (pH 7.0)	NaOAc (pH 8.2)	Sum of Cations		CEC (pH 7.0)	CEC (pH 8.2)
0-11	38.2	nd	51.0	0.96	72	54
11-40	44.0	nd	47.1	0.97	77	72
40-69	nd	42.6	nd	0.80	nd	nd
69-85	nd	36.5	nd	0.70	nd	nd

49. NANDYAL SOILS (1,85,711 ha)

(Deep calcareous black soils)

Classification	: Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts
Type location	: Village: Konidedy; Tehsil: Nandyal; District: Kurnool; 15° 30' N 78° 18' E
Profile No	: 571/S3/29
Physiographic position	: Valleys
Elevation (m)	: 220
Rainfall (mm)	: 650
Ground water table (m)	: 2-5
Slope, relief and erosion	: 0-1 per cent slopes, very slightly eroded
Drainage and permeability	: Moderately well drained with slow permeability
Surface stoniness/rockiness	: <3 per cent stones of <2.5 cm diameter
Land use and vegetation	: Cotton , red gram
Geology and soil parent material	: alluvium
SRM association number	: AP 103, 104, 120, 189, 223
Distribution and extent	: Extensive (185711 ha) Kurnool (91439 ha), Cuddapah (32415 ha), Mahbubnagar (18156 ha), Guntur (16623 ha), Krishna (12033 ha), Anantapur (9377 ha), Nalgonda (3565 ha) and Prakasam (2103 ha)
Soils associated	: Fine, smectitic, (calc.), Vertic Haplustepts
Soil series correlated	: Jajapur series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Nagpur)

Typifying pedon: Konidedy sandy clay loam-cultivated

Ap	0-18 cm	Dark yellowish brown (10YR 4/4 M) sandy clay loam; strong medium subangular blocky structure; friable, sticky and plastic; common fine and medium roots; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); clear smooth boundary.
BA	18-38 cm	Dark brown (10YR 3/3 M) clay loam; weak medium subangular blocky structure; firm, sticky and plastic; few very fine and fine roots; common fine and medium lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.7); clear smooth boundary.
Bss1	38-61 cm	Dark brown (10YR 3/3 M) clay; weak medium subangular blocky structure; firm, very sticky and very plastic; few very fine roots; prominent intersecting slickensides; many fine and medium lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.7); clear smooth boundary.
Bss2	61-85 cm	Brown to dark brown (10YR 4/3 M) clay loam; weak medium subangular blocky structure; firm, sticky and plastic; few very fine roots; intersecting slickensides; many fine and medium lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.7); gradual smooth boundary.

Bss3	85-113cm	Brown to dark brown (10YR 4/3 M) clay loam; weak medium subangular blocky structure; firm, sticky and plastic; few very fine roots; intersecting slickensides; common fine and medium lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.8); gradual smooth boundary.
Bss4	113-150 cm	Brown to dark brown (10YR 4/3 M) silty clay loam; weak medium subangular blocky structure; firm sticky and plastic; intersecting slickensides; common fine and medium lime nodules; violent effervescence with dilute HCl; moderately alkaline (pH 8.9); gradual smooth boundary.

Interpretation: These are very deep cracking clay soils. Slow permeability, high shrink-swell potential, high lime content, suboptimum oxygen availability, poor workability and low available phosphorus are the major constraints for crop production.

a) Interpretative groupings:

Land capability sub-class : II_s
Land irrigability sub-class : 3ds
Length of growing period : 150-210 days
Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Bajra	17.17	25
Cotton	2.81	11
Groundnut	13.90	18
Jowar	13.34	35
Red gram	4.20	18
Rice	27.38	60

c) Land suitability for crops:

Crops	Sorghum	Rice	Red gram	Cotton	Groundnut
Suitability class	S1	S ₂ l	S ₂ z	S ₂ tz	S ₃ tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-18	Ap	50.0	19.3	30.7	scl	8.8	7.9	0.60	12
18-38	BA	34.5	27.1	38.4	cl	8.7	7.8	0.51	19
38-61	Bss1	30.3	29.6	40.1	c	8.7	7.7	0.55	23
61-85	Bss2	27.6	38.6	33.8	cl	8.7	7.6	0.59	28
85-113	Bss3	24.2	41.2	34.6	cl	8.8	7.7	0.50	31
113-150	Bss4	19.8	49.1	31.1	sicl	8.9	7.6	0.73	43

50. MUMMADIVARAM SOILS (65,626 ha)

(Deep calcareous black soils)

Classification	: Very fine, smectitic (calcareous), isohyperthermic Halic Haplusterts
Type location	: Village: Matlatippa; Tehsil: Mummadvaram; District: East Godavari ; 16° 40' N 82° 17' E
Profile No	: 65L/R1/2
Physiographic position	: Low lands
Elevation (m)	: <5
Rainfall (mm)	: 1250
Ground water table (m)	: 2-5
Slope, relief and erosion	: 0-1 per cent slopes; very slightly eroded
Drainage and permeability	: Moderately well drained with very slow permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Paddy, black gram, green gram
Geology and soil parent material	: Deltaic alluvium
SRM association number	: AP 193
Distribution and extent	: Extensive (65626 ha) Cuddapah (33806 ha), East Godavari (14500 ha), Anantapur (13988 ha), Guntur (1688 ha) and Nellore (1644 ha)
Soils associated	: Fine, smectitic, (calc.), Vertic Haplustepts
Soil series correlated	: Padra series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)
Remarks	: Earlier it was classified as Chromic Haplusterts in SRM-A.P.

Typifying pedon: Matlatippa loam-cultivated

Ap	0-9 cm	Pale brown (10YR 6/3 D) and dark grayish brown (10 YR 4/2 M) loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; violent effervescence with dilute HCl; many fine medium roots; slightly alkaline (pH 8.1); clear smooth boundary.
BA	9-25 cm	Very dark grayish brown (10YR 3/2 M) silty clay; moderate medium subangular blocky structure; firm, sticky and plastic; strong effervescence with dilute HCl; common fine to medium roots; slightly alkaline (pH 8.4); gradual smooth boundary.
Bss1	25-43 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; intersecting slickensides; strong effervescence with dilute HCl; few medium roots; slightly alkaline (pH 8.3); gradual smooth boundary.
Bss2	43-62 cm	Very dark grayish brown (10YR 3/2 M) silty clay; moderate medium angular blocky structure; firm, sticky and plastic; intersecting slickensides; strong effervescence with dilute HCl; very fine many roots; slightly alkaline (pH 8.2); gradual smooth boundary.
Bss3	62-84 cm	Dark grayish brown (10YR 4/2 D) clay; strong medium angular blocky structure; very firm, very sticky and very plastic; prominent intersecting slickensides; slight effervescence with dilute HCl; few fine roots; slightly alkaline (pH 8.2); gradual smooth boundary.
Bss4	84-110 cm	Dark grayish brown (10YR 4/2 M) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; prominent intersecting slickensides; few fine roots; slightly alkaline (pH 8.0); gradual smooth boundary.

Interpretation: These are deep cracking clay soils. Slow permeability, high shrink-swell potential, suboptimum oxygen availability, poor workability and low available phosphorus are the major constraints for normal crop husbandry.

a) Interpretative groupings:

Land capability sub-class : IIs

Land irrigability sub-class : 3ds

Length of growing period : 150-210 days

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Cotton	1.89	11
Groundnut	6.59	18
Jowar	13.34	35
Red gram	4.20	18
Rice	27.30	60

c) Land suitability for crops:

Crops	Sorghum	Rice	Cotton	Red gram	Groundnut
Suitability class	S1	S1	S1	S3tz	S2tw

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH Water (1:2.5)	OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)				
		←------(USDA)-----→						
0-9	Ap	36.7	43.3	20.0	l	8.1	1.12	4.6
9-25	BA	02.0	43.5	54.5	sic	8.4	0.92	6.3
25-43	Bss1	01.8	38.8	59.4	c	8.4	0.90	9.0
43-62	Bss2	01.6	26.3	72.1	c	8.3	0.92	16.0
62-84	Bss3	04.0	17.3	78.7	c	8.2	0.97	20.0
84-110	Bss4	08.0	15.9	76.1	c	8.0	1.00	27.0

51. AMALAPURAM SOILS (2,10,143 ha)

(Deep black soils)

Classification	:	Fine, smectitic, isohyperthermic Typic Haplusterts
Type location	:	Village: Tanplur, Taluk: Andole-Jogipet, District: Medak; 17° 59' N 77° 59' E
Profile No	:	56G/13/R4/1
Physiographic position	:	Summits of plateaus
Elevation (m)	:	440-560
Rainfall (mm)	:	850-920
Ground water table (m)	:	>10
Slope, relief and erosion	:	0-1 per cent slopes; moderately eroded
Drainage and permeability	:	Moderately well drained with slow permeability.
Surface stoniness/rockiness	:	Nil
Land use and vegetation	:	Mainly cultivated to crops like sorghum, pigeon pea. Natural vegetation <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul), <i>Zizyphus jujuba</i> (ber).
Geology and soil parent material	:	Deccan trap; weathered basalt
SRM association number	:	AP 46, 64, 65, 146, 216, 220, 226
Distribution and extent	:	Extensive (210143 ha) West Godavari (42771 ha), Rangareddi (37213 ha), Medak (30646 ha), Adilabad (27471 ha), Guntur (26228 ha), Krishna (12573 ha), East Godavari (11996 ha), Nalgonda (10542 ha), Nizamabad (4846 ha), Mahbubnagar (2383 ha), Anantapur (1199 ha), Srikakulam (1145 ha) and Prakasam (1145 ha)
Soils associated	:	Fine, smectitic, Chromic Haplusterts Clayey, smectitic, (calc.), Lithic Ustorthents Fine, smectitic, Vertic Haplustepts Fine, mixed, Aquic Haplustepts Fine, smectitic, (calc.), Typic Haplusterts Very fine, smectitic, (calc.), Typic Haplusterts
Soil series correlated	:	Tanplur series (NBSS Publ. 791, NBSS&LUP, Nagpur)

Typifying pedon: Tanplur clay-cultivated.

Ap	0-10 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; many fine and medium roots; few very fine and medium calcium carbonate nodules; neutral (pH 7.4); clear smooth boundary.
BA	10-43 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; friable, sticky and plastic; many fine and medium roots; few fine and medium calcium carbonate nodules; neutral (pH 7.1); gradual smooth boundary.
Bss1	43-72 cm	Very dark gray (10YR 3/1 M) clay; moderate medium angular blocky structure; friable, sticky and plastic; common fine and medium roots; few fine and medium calcium carbonate nodules; intersecting slickensides; slightly alkaline (pH 7.8); gradual smooth boundary.
Bss2	72-116 cm	Very dark gray (10YR 3/1 M) clay; moderate medium angular blocky structure; friable, sticky and plastic; strong effervescence with dilute HCl; common fine and medium calcium carbonate nodules; intersecting slickensides; slightly alkaline (pH 7.7); gradual smooth boundary.
Bss3	116-150 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium angular blocky structure; friable, sticky and plastic; strong effervescence with dilute HCl; common fine and medium calcium carbonate nodules; intersecting slickensides; slightly alkaline (pH 8.0).

Range in characteristics: The thickness of the solum ranges from 150 to 175 cm. The A horizon is 11 to 20 cm thick. Its colour is in hue 10YR, value 3 and chroma 2. Its texture is clay. Its structure is medium subangular blocky. The B horizon is 132 to 153 cm thick. Its colour is in hue 10YR, value 4 to 3 and chroma 2 to 1. Its texture is clay. There are prominent intersecting slickensides in Bss horizon.

Interpretation: Slow permeability, very high shrink-swell potential, suboptimum oxygen availability, poor workability and moderate erodibility are the major constraints for normal crop husbandry.

a) Interpretative grouping:

Land capability subclass: Iles

Length of growing period: 150-210 days

Land irrigability subclass: 3ds

Productivity potential: High

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.46	13
Maize	66.67	45
Rice	32.79	60
Sugarcane	889.20	1250
Tobacco	15.90	14

c) Land suitability for crops:

Crops	Rice	Black gram	Sugarcane	Maize	Tobacco
Suitability class	S1	S2t	S2t	S2t	S2t

ANLYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		<----- (USDA) ----->							
0-16	AP	30.3	19.7	50.0	c	7.4	6.1	0.56	nd
16-43	BA	25.8	21.5	52.7	c	7.1	6.1	0.45	nd
43-72	Bss1	24.9	21.6	53.5	c	7.8	6.2	0.45	nd
72-116	Bss2	19.3	19.7	61.0	c	7.7	6.8	0.50	4
116-150	Bss3	15.9	18.6	65.5	c	8.0	7.0	0.38	5

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-16	0.08	41.7	7.3	0.2	0.7	49.9
16-43	tr	45.0	8.0	0.2	0.4	53.6
43-72	tr	44.5	8.7	0.2	0.4	53.8
72-116	0.13	44.3	8.6	3.1	0.2	56.2
116-150	0.14	44.0	8.2	2.8	0.2	55.2

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹		CEC/Clay ratio	Per cent Base Saturation
	NH ₄ OAc (pH 7.0)	Sum of Cations		
0-16	48.0	49.9	0.96	103
16-43	54.2	53.6	1.03	99
43-72	53.8	53.8	1.01	100
72-116	53.8	56.2	0.88	102
116-150	55.0	55.2	0.79	100

52. SANGAREDDI SOILS (5,45,335 ha)

(Deep calcareous black soils)

Classification	:	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts
Type location	:	Village: Elaram; Taluk: Sangareddy; District: Medak; 17° 39' 30" N 77° 55' 45" E
Profile No	:	56G/14/T1/8
Physiographic position	:	Very gently sloping uplands
Elevation (m)	:	520-550
Rainfall (mm)	:	873
Ground water table (m)	:	>10
Slope, relief and erosion	:	1-3 per cent slopes; moderately eroded
Drainage and permeability	:	Moderately well drained with slow permeability.
Surface stoniness/rockiness	:	<3 per cent stones of <2.5 cm diameter
Land use and vegetation	:	Mainly cultivated to sorghum, safflower, sunflower and pigeon pea (<i>tur</i>). Natural vegation- <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul).
Geology and soil parent material	:	Peninsular gneiss; granite-gneiss
SRM association number	:	AP 47,48,66,67,88,98,99,117,119,219,220,221,222
Distribution and extent	:	Extensive (545335 ha) Medak (114394 ha), Karimnagar (86224 ha), Nizamabad (82053 ha), Adilabad (72984 ha), Mahbubnagar (64187 ha), Rangareddy (42483 ha), Kurnool (30795 ha), Warangal (28434 ha), Khammam (20484 ha) and Anantapur (3297 ha)
Soils associated	:	Fine, smectitic (calc.), Haplustepts Fine, smectitic, Haplustepts Fine, smectitic (calc.), Entic Haplusterts Fine, smectitic, Typic Haplusterts
Soil series correlated	:	- Kadirabad series (NBSS Publ. 791, NBSS&LUP, Nagpur) - Telgi series, Velamakur series, Bogalkatta series, Hugalur series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore] - Dindi series (Soil series Handbook, Mahbubnagar, A.P., NBSS&LUP, Bangalore)

Typifying pedon: Elaram clay -- cultivated

Ap	0-13 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); clear smooth boundary.
BA	13-37 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; firm, very sticky and very plastic; few fine roots; common very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); clear smooth boundary.
Bss1	37-74 cm	Very dark grayish brown (10YR 3/2 M) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; few fine roots; common fine calcium carbonate nodules; prominent intersecting slickensides; strong effervescence with dilute HCl; moderately alkaline (pH 8.7); gradual smooth boundary.
Bss2	74-108 cm	Very dark grayish brown (10YR 3/2 M) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; common very fine calcium carbonate nodules; prominent intersecting slickensides; strong effervescence with dilute HCl; slightly alkaline (pH 8.4); clear smooth boundary.
Bss3	108-120 cm	Very dark grayish brown (10YR 3/2 M) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; common very fine calcium carbonate nodules; prominent intersecting slickensides; strong effervescence with dilute HCl; moderately alkaline (pH 9.2); gradual smooth boundary.
Bss4	120-150 cm	Very dark grayish brown (10YR 3/2) clay; strong coarse angular blocky structure; very firm, very sticky and very plastic; common very fine calcium carbonate nodules; strong effervescence with dilute HCl; intersecting slickensides; moderately alkaline (pH 9.2).

Range in characteristics: The thickness of the solum ranges from 102 to 150 cm. The A horizon is 10 to 20 cm thick. Its colour is in hue 10YR value 3 and chroma 3 to 2. Its texture ranges from clay to clay loam. Its structure is moderate and strong medium subangular blocky. The B horizon is 83 to 140 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 2. Its texture is clay; it is slightly to strongly calcareous.

Interpretation: Slow permeability, high lime content, high shrink-swell potential, suboptimum oxygen availability and poor workability are the major limitations for crop production.

a) Interpretative grouping:

Land capability subclass: Iiws

Length of growing period: 150-210 days

Land irrigability subclass: 3ds

Productivity potential: High

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.40	13
Cotton	6.60	11
Green gram	2.52	12
Jowar	14.84	35
Maize	34.76	45
Rice	22.26	60
Sugarcane	879.91	1250

c) Land suitability for crops:

Crops	Sorghum	Rice	Cotton	Green gram	Black gram	Sugarcane	Maize
Suitability class	S1	S1	S1	S2tz	S2tz	S2tz	S2tz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←-----(USDA)-----→							
0-13	Ap	23.2	24.1	52.7	c	8.2	7.3	0.59	4
13-37	BA	24.8	19.6	55.6	c	8.2	7.3	0.45	4
37-74	Bss1	26.1	18.4	55.5	c	8.7	7.2	0.33	5
74-108	Bss2	24.3	17.5	58.2	c	8.4	7.3	0.33	5
108-120	Bss3	20.5	18.9	60.6	c	9.2	7.4	0.29	5
120-150	Bss4	15.0	22.6	62.4	c	9.2	7.5	0.21	9

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹				
		Ca	Mg	Na	K	Total
0-13	0.21	nd	nd	0.4	0.7	---
13-37	tr	nd	nd	0.8	0.4	---
37-74	tr	nd	nd	2.9	0.4	---
74-108	tr	nd	nd	2.7	0.4	---
108-120	tr	nd	nd	5.3	0.4	---
120-150	tr	nd	nd	7.0	0.5	---

Depth (cm)	Cation exchange capacity cmol(+) kg ⁻¹	CEC/Clay ratio
	NaOAc (pH 8.2)	
0-13	38.6	0.73
13-37	38.7	0.70
37-74	40.1	0.72
74-108	44.5	0.76
108-120	42.5	0.70
120-150	48.8	0.78

53. TENALI SOILS (1,35,703 ha)

(Deep calcareous black soils)

Classification	: Fine, smectitic (calcareous), isohyperthermic Halic Haplusterts
Type location	: Village: Matlatippa; Tehsil: Mummadivaram; District: East Godavari; 16° 40' N 82° 18' E
Profile No	: 65L/R1/1
Physiographic position	: Delta plain
Elevation (m)	: <5
Rainfall (mm)	: 1250
Ground water table (m)	: 2-5
Slope, relief and erosion	: 1-3 per cent slopes, slightly eroded
Drainage and permeability	: Moderately well drained with slow permeability
Surface stoniness/rockiness	: Nil
Land use and vegetation	: Degraded forest; thorny bushes, pasture, salt-resistant bushes
Geology and soil parent material	: Deltaic alluvium
SRM association number	: AP 47,48,66,67,88,98,99,117,119,219,220,221,222
Distribution and extent	: Extensive (135703 ha) Krishna (82685 ha), Guntur (52981 ha) and Prakasam (37 ha)
Soils associated	: Fine, smectitic (calc.), Vertic Haplustepts Fine, smectitic, Vertic Haplustepts Fine, smectitic (calc.), Entic Haplusterts Fine, smectitic, Typic Haplusterts
Soil series correlated	: • Kadirabad series (NBSS Publ. 791, NBSS&LUP, Nagpur) • Telgi series, Velamakur series, Bogalkatta series, Hugalur series [Soil series of Anantapur district, A.P. (Unpubl.), NBSS&LUP, Bangalore] • Dindi series (Soil series Handbook, Mahbubnagar, A.P., NBSS&LUP, Bangalore)
Remarks	: Earlier it was classified as Typic Haplusterts in SRM-A.P.

Typifying pedon: Matlatippa loam-degraded forest

A	0-9 cm	Dark brown (10YR 4/3 D) and very dark grayish brown (10 YR 3/2 M) loam; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; violent effervescence with dilute HCl; many fine to medium roots; slightly alkaline (pH 7.8); clear smooth boundary.
BA	9-22 cm	Very dark gray (10YR 3/1 M) silty clay; moderate medium subangular blocky structure; friable, sticky and plastic; strong effervescence with dilute HCl; common many roots; slightly alkaline (pH 8.2); gradual smooth boundary.
Bss1	22-40 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium, subangular blocky structure; very firm, very sticky and very plastic; prominent intersecting slickensides; strong effervescence with dilute HCl; common many roots; slightly alkaline (pH 8.3); gradual smooth boundary.
Bss2	40-61 cm	Very dark grayish brown (10YR 3/1 M) clay; moderate medium angular blocky structure; very firm, very sticky and very plastic; prominent intersecting slickensides; strong effervescence with dilute HCl; common medium roots; slightly alkaline (pH 8.3); gradual smooth boundary.
Bss3	61-75 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium angular blocky structure; very firm, very sticky and very plastic; prominent intersecting slickensides; strong effervescence with dilute HCl; slightly alkaline (pH 8.3) gradual smooth boundary.
	75 cm	Water table

Interpretation: These are deep cracking clay soils. Slow permeability, high lime content, high shrink-swell potential, suboptimum oxygen availability and low available phosphorus are the major constraints for normal crop production.

a) Interpretative groupings:

Land capability sub-class : IIs

Land irrigability sub-class : 3ds

Length of growing period : 150-210 days

Productivity potential : High

b) Yield: Based on data from farmer's field:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.40	13
Cotton	6.60	11
Green gram	2.52	12
Jowar	14.84	35
Maize	34.76	45
Rice	32.26	60
Sugarcane	879.91	1250

c) Land suitability for-crops:

Crops	Sorghum	Maize	Rice	Green gram	Black gram	Cotton	Sugarcane
Suitability class	S1	S2tz	S2t	S2tz	S2tz	S2rz	S2rz

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH Water (1:2.5)	OC (%)	ECe (1:2.5) dSm ⁻¹
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)				
		----->(USDA)<-----						
0-9	A	30.1	43.8	26.1	l	7.8	1.92	9.0
9-22	BA	4.9	42.5	52.6	sic	8.2	1.04	13.0
22-40	Bss1	5.6	35.7	58.7	c	8.3	0.98	14.0
40-61	Bss2	4.8	31.6	63.6	c	8.3	0.95	12.0
61-75	Bss3	12.4	32.8	54.8	c	8.3	0.88	16.0

54. BHIMAVARAM SOILS (2,34,143 ha)

(Deep black soils)

Classification	: Very-fine, smectitic, isohyperthermic Typic Haplusterts	
Type location	: Village: Tornal, Taluk: Narayankher; District: Medak;	17° 58' 45" N
	77° 40' 30" E	
Profile No	: 56G/9/T1/13	
Physiographic position	: Very gently sloping plateaus	
Elevation (m)	: 480-540	
Rainfall (mm)	: 850-920	
Ground water table (m)	: >10	
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded	
Drainage and permeability	: Moderately well drained with slow permeability.	
Surface stoniness/rockiness	: 3-15 per cent cobbles of 2.5-7.5 cm diameter	
Land use and vegetation	: Mainly cultivated to sorghum, safflower, pigeon pea (red gram). Natural vegetation <i>Azadirachta indica</i> (neem), <i>Acacia</i> spp. (babul), <i>Zizyphus jujuba</i> (ber).	
Geology and soil parent material	: Deccan trap; weathered basalt	
SRM association number	: AP 68, 114, 227	
Distribution and extent	: Extensive (234143 ha) West Godavari (78171 ha), East Godavari (65867 ha), Medak (20076 ha), Nizamabad (15787 ha), Adilabad (12539 ha), Rangareddi (11821 ha), Krishna (10215 ha), Warangal (10129 ha), Kurnool (8088 ha), Mahbubnagar (875 ha), Yanam (516 ha) and Karimnagar (59 ha)	
Soils associated	: Very fine, smectitic, Chromic Haplusterts Fine, smectitic, Vertic Haplustepts Fine, smectitic, (calc.), Vertic Haplustepts	
Soil series correlated	: • Pusalpahad series, Tornal series, (NBSS Publ. 791, NBSS&LUP, Nagpur) • Kasturpalli series, Rawalpalli series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)	

Typifying pedon: Tornal clay – cultivated.

Ap	0–18 cm	Very dark grayish brown (10YR 3/2 D) clay, dark brown (10YR 3/3 M); moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; many fine and very fine roots; common fine and very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.9); clear smooth boundary.
BA	18–41 cm	Very dark grayish brown (10YR 3/2 M) clay; moderate medium subangular blocky structure; nonintersecting slickensides; firm, sticky and plastic; common very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bss1	41–64 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; common very fine roots; few very fine and fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.0); gradual smooth boundary.
Bss2	64–98 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse angular blocky structure; very firm, very sticky and very plastic, few very fine roots; few very fine and fine calcium carbonate nodules; intersecting slickensides; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bss3	98–123 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine to fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bss4	123–150 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine and fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.0).

Range in characteristics: The thickness of the solum ranges from 150 to 180 cm. The A horizon is 12 to 19 cm thick. Its colour is in hue 10YR, value 3 and chroma 3 to 1. Its texture is clay. Its structure is moderate medium subangular blocky. The B horizon is 131 to 160 cm thick. Its colour is in hue 10YR, value 3 and chroma 2 to 1. Its texture is clay, slight effervescence with dilute hydrochloric acid.

Interpretation: Very slow permeability, high lime content, high shrink-swell potential, poor workability and suboptimum oxygen availability are the major constraints for crop production.

a) Interpretative grouping:

Land capability subclass : Iles
 Land irrigability subclass : 3ds
 Length of growing period : 150-210 days
 Productivity potential : High

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)	
	Farmer's practices	Improved practices
Blackgram	5.40	13
Green gram	7.42	12
Maize	66.67	45
Rice	32.77	60
Sugarcane	879.91	1250
Tobacco	14.74	14

c) Land suitability for crops:

Crops	Rice	Green gram	Black gram	Sugarcane	Maize	Tobacco
Suitability class	S1	S2wt	S2tw	S2tw	S3tw	S3tw

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		$\longleftrightarrow$ (USDA) $\longleftrightarrow$							
0-18	Ap	2.3	18.4	79.3	c	7.9	6.8	0.84	3
18-41	BA	2.0	18.6	79.4	c	8.1	6.8	0.67	4
41-64	Bss1	0.7	21.1	78.2	c	8.0	6.8	0.64	4
64-98	Bss2	1.2	19.7	79.1	c	8.1	6.8	0.65	0
98-123	Bss3	1.3	17.5	81.2	c	8.1	7.3	0.49	7
123-150	Bss4	1.2	17.0	81.8	c	8.0	7.2	0.45	8

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹					CEC cmol(+) kg ⁻¹	CEC/Clay ratio
		Ca	Mg	Na	K	Total	NaOAc (pH 8.2)	
0-18	tr	50.2	11.5	0.1	0.9	62.7	66.0	0.83
18-41	tr	51.1	12.5	0.1	0.7	64.4	65.2	0.82
41-64	tr	50.0	12.3	0.1	0.7	63.1	64.7	0.83
64-98	tr	49.1	11.8	0.1	0.7	61.7	67.9	0.86
98-123	0.17	48.0	13.0	0.1	0.7	61.8	70.0	0.86
123-150	0.17	47.0	12.8	0.2	0.6	60.6	64.2	0.79

55. JAMMALAMADUGU SOILS (2,42,715 ha)

(Deep calcareous black soils)

Classification	: Very-fine, smectitic (calcareous), isohyperthermic Typic Haplusterts
Type location	: Village: Giripalli; Taluk: Gajwel; District: Medak; 17° 52' 25" N 78° 38' 5" E
Profile No	: 56K/9/T1/1
Physiographic position	: Very gently sloping uplands
Elevation (m)	: 430-570
Rainfall (mm)	: 873
Ground water table (m)	: >10
Slope, relief and erosion	: 1-3 per cent slopes; moderately eroded
Drainage and permeability	: Moderately well drained with slow permeability.
Surface stoniness/rockiness	: 3-15 per cent stones of 2.5-7.5 cm diameter
Land use and vegetation	: Mainly cultivated to paddy, sorghum, pigeon pea (<i>tur</i>), maize. Natural vegetation <i>Acacia</i> spp. (babul), <i>Butea frondosa</i> (palas), <i>Azadirachta indica</i> (neem).
Geology and soil parent material	: Peninsular gneiss; weathered granite-gneiss
SRM association number	: AP 118, 190, 191, 206, 226, 227
Distribution and extent	: Extensive (242715 ha) Cuddapah (59795 ha), Krishna (44794 ha), Kurnool (35610 ha), West Godavari (29043 ha), Medak (14623 ha), Guntur (13762 ha), East Godavari (12512 ha), Rangareddi (9393 ha), Nalgonda (9351 ha), Adilabad (7236 ha), Anantapur (4685 ha), Nellore (1194 ha) and Karimnagar (717 ha)
Soils associated	: Clayey over sandy, mixed, (calc.), Vertic Ustifluvents Fine, smectitic, (calc.), Vertic Haplustepts Fine, smectitic, Typic Haplusterts Very fine, smectitic, (calc.), Vertic Haplustepts
Soil series correlated	: • Kasireddipalli series (Benchmark soils of India, 1982, NBSS&LUP, Nagpur) • Kaveli series, Ranjoli series, Wasar series (NBSS Publ. 791, NBSS&LUP, Nagpur) • Manopad series (Soil series Handbook, Mahbubnagar district, A.P., NBSS&LUP, Bangalore)

Typifying pedon: Giripalli clay— cultivated.

Ap	0-21 cm	Very dark grayish brown (10YR 4/2 D and M) clay; moderate medium subangular blocky structure; slightly hard, firm, very sticky and very plastic; many fine and very fine roots; many fine and very fine calcium carbonate nodules; strong effervescence with dilute HCl; slightly alkaline (pH 8.1); clear smooth boundary.
BA	21-48 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse subangular blocky structure; very firm, very sticky and very plastic; common very fine roots; common very fine calcium carbonate nodules; strong effervescence with dilute HCl; slightly alkaline (pH 8.0); gradual smooth boundary.
Bss1	48-71 cm	Very dark grayish brown (10YR 4/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; common very fine calcium carbonate nodules; strong effervescence with dilute HCl; slightly alkaline (pH 8.0); gradual smooth boundary.
Bss2	71-91 cm	Very dark grayish brown (10YR 3/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 7.9); gradual smooth boundary.
Bss3	91-117 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; prominent intersecting slickensides; firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bss4	117-138 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); gradual smooth boundary.
Bss5	138-150 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1).

Range in characteristics: The thickness of the solum ranges from 107 to 150 cm. The A horizon is 9 to 24 cm thick. Its colour is in hue 10YR, value 4 to 3 and chroma 3 to 1. Its texture is clay. Its structure is weak and moderate, and medium and coarse subangular blocky. The B horizon is 116 to 141 cm thick. Its colour is in hue 10YR, value 4 to 3 and chroma 3 to 1. Its texture is clay with intersecting slickensides tilted at 45°, slight to strong effervescence with dilute HCl, few to common very fine and fine calcium nodules.

Interpretation: Moderately alkaline, slow permeability, high shrink-swell potential, suboptimum oxygen availability, poor workability and moderate erodibility are the major constraints for normal crop production.

a) Interpretative grouping:

Land capability subclass : IIws

Land irrigability subclass : 3ds

Length of growing period : 150-210 days

Productivity potential : High or medium

b) Yield: Based on data from farmer's fields:

Crops	Yield (q/ha)		Crops	Yield (q/ha)	
	Farmer's practices	Improved practices		Farmer's practices	Improved practices
Blackgram	2.73	13	Maize	34.59	45
Cotton	4.02	11	Rice	32.26	60
Green gram	2.08	12	Sugarcane	244.46	1250
			Tobacco	13.36	14

c) Land suitability for crops:

Crops	Rice	Cotton	Green gram	Black gram	Sugarcane	Tobacco	Maize
Suitability class	S1	S1	S2tz	S2tz	S2tz	S2tz	S2tw

ANALYTICAL DATA

Depth (cm)	Horizon	Particle size distribution (%)			Texture	pH		OC (%)	CaCO ₃ (%)
		Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)		Water (1:2.5)	KCl (1:2.5)		
		←------(USDA)-----→							
0-21	Ap	20.1	23.5	56.4	c	8.1	7.2	0.67	4
21-48	BA	19.6	20.3	60.1	c	8.0	7.2	0.54	6
48-71	Bss1	18.4	19.2	62.4	c	8.0	7.2	0.51	5
71-91	Bss2	19.1	19.8	61.1	c	7.9	7.2	0.50	5
91-117	Bss3	17.3	19.8	62.9	c	8.1	7.2	0.47	5
117-138	Bss4	13.8	26.2	60.0	c	8.2	7.2	0.44	7
138-150	Bss5	14.5	18.4	67.1	c	8.1	7.2	0.49	7

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹					CEC cmol(+) kg ⁻¹	CEC/Clay ratio
		Ca	Mg	Na	K	Total	NaOAc (pH 8.2)	
0-21	tr	38.5	10.1	0.1	0.7	49.4	46.1	0.82
21-48	0.14	37.2	12.1	0.1	0.5	49.9	50.2	0.84
48-71	0.18	36.5	11.6	0.1	0.5	48.7	47.1	0.75
71-91	0.13	35.7	11.5	0.1	0.5	47.8	48.2	0.79
91-117	0.13	36.0	12.0	0.2	0.6	48.8	51.4	0.82
117-138	0.13	37.1	11.9	0.2	0.6	49.8	49.3	0.82
138-150	0.13	36.1	11.9	0.1	0.6	48.7	49.6	0.74

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Bss1	48-71 cm	Very dark grayish brown (10YR 4/2 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; common very fine calcium carbonate nodules; strong effervescence with dilute HCl; slightly alkaline (pH 8.0); gradual smooth boundary.
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Bss3	91-117 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; prominent intersecting slickensides; firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1); gradual smooth boundary.
Bss4	117-138 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.2); gradual smooth boundary.
Bss5	138-150 cm	Very dark gray (10YR 3/1 M) clay; strong medium and coarse angular blocky structure; intersecting slickensides; very firm, very sticky and very plastic; few very fine roots; few very fine calcium carbonate nodules; slight effervescence with dilute HCl; slightly alkaline (pH 8.1).

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			Tobacco	13.36	14

c) Land suitability for crops:

Crops	Rice	Cotton	Green gram	Black gram	Sugarcane	Tobacco	Maize
Suitability class	S1	S1	S2tz	S2tz	S2tz	S2tz	S2tw

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48-71	Bss1	18.4	19.2	62.4	c	8.0	7.2	0.51	5
71-91	Bss2	19.1	19.8	61.1	c	7.9	7.2	0.50	5
91-117	Bss3	17.3	19.8	62.9	c	8.1	7.2	0.47	5
117-138	Bss4	13.8	26.2	60.0	c	8.2	7.2	0.44	7
138-150	Bss5	14.5	18.4	67.1	c	8.1	7.2	0.49	7

Depth (cm)	ECe (1:2.5) dSm ⁻¹	Exchangeable bases cmol(+) kg ⁻¹					CEC cmol(+) kg ⁻¹	CEC/Clay ratio
		Ca	Mg	Na	K	Total	NaOAc (pH 8.2)	
0-21	tr	38.5	10.1	0.1	0.7	49.4	46.1	0.82
21-48	0.14	37.2	12.1	0.1	0.5	49.9	50.2	0.84
48-71	0.18	36.5	11.6	0.1	0.5	48.7	47.1	0.75
71-91	0.13	35.7	11.5	0.1	0.5	47.8	48.2	0.79
91-117	0.13	36.0	12.0	0.2	0.6	48.8	51.4	0.82
117-138	0.13	37.1	11.9	0.2	0.6	49.8	49.3	0.82
138-150	0.13	36.1	11.9	0.1	0.6	48.7	49.6	0.74

DISTRICTWISE OCCURRENCE OF SOIL FAMILIES-ANDHRA PRADESH

Soil No.	Soils	Classification (Soil Taxonomy)	Area (ha)
1	2	3	4
1. ADILABAD DISTRICT			
1	Zaheerabad	Clayey-skeletal, kaolinitic, isohyperthermic Kandic Paleustalfs	1541
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	43585
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	27003
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	54651
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	36248
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	34792
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	4257
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	11034
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	59758
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	39833
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	5476
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	110731
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	2220
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	20104
27	Adilabad*	Clayey, smectitic, isohyperthermic Lithic Ustorthents	118836
28	Madanapalle	Loamy-skeletal, mixed, active, isohyperthermic Typic Ustorthents	1378
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	85516
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	81513
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	10248
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	67823
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	26910
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	105643
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	27471
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	72984
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	12539
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	7236
2. ANANTAPUR DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	47410
3	Anantapur*	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	208012
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	10581
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	23890
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	58137
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	175168
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	39512
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	15158

1	2	3	4
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	4732
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	41524
18	Badvel	Fine, mixed (calcareous), isohyperthermic Ustic Paleargids	68152
19	Rayadurg	Loamy-skeletal, mixed (calcareous), isohyper-thermic Ustic Haplargids	98697
20	Alur	Fine, smectitic (calcareous), isohyperthermic Ustertic Haplocambids	39844
21	Kalyandurg	Fine, mixed, (calcareous), isohyperthermic Ustic Haplocambids	56363
24	Pattikonda	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Ustic Torriorthents	10138
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	19979
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	92086
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	30144
29	Medchal	Fine, mixed (calcareous), isohyperthermic Fluvaquentic Epiaquepts	10587
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	10989
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	1519
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	33697
36	Makthal	Fine-loamy, mixed, superactive, isohyper-thermic Aquic Haplustepts	10209
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	3478
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	19229
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	55349
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	1666
47	Bangaganapalle	Very fine, smectitic (calcareous), isohyper-thermic Aridic Haplusterts	20508
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	23345
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	9377
50	Mummadivaram	Very fine, smectitic (calcareous), isohyper-thermic Halic Haplusterts	13988
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	1199
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	3297
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	4685
3. CHITTOOR DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	18759
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	25691
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	25365
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	23231
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	27542
11	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	49464
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	112065
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	20828
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	12686
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	112191
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	43616
26	Mahbubnagar*	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	177167
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	30929
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	16680

1	2	3	4
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	17363
34	Kumool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	36372
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	1214
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	7199
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	14711
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	11454
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	32350
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	77551
4. CUDDAPAH DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	20660
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	2816
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	34273
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	48850
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	56628
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	14021
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	10593
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	254
18	Badvel	Fine, mixed (calcareous) isohyperthermic Ustic Paleargids	15464
19	Rayadurg	Loamy-skeletal, mixed (calcareous), isohyper-thermic Ustic Haplargids	32192
21	Kalyandurg	Fine, mixed (calcareous) isohyperthermic Ustic Haplocambids	5708
24	Pattikonda	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Ustic torriorthents	4718
25	Cuddapah*	Loamy-skeletal, mixed (calcareous), isohyper-thermic Parallithic Ustorthents	219188
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	84389
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	3727
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Parallithic Haplustepts	24400
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	2873
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	78960
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	11617
34	Kumool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	167554
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	538
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	9311
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	21463
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	7881
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	32415
50	Mummadivaram	Very fine, smectitic (calcareous), isohyper-thermic Halic Haplusterts	33806
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	59795
5. EAST GODAVARI DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	74536
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	17552

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11	Kanigiri	Clayey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	37944
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	31028
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	80291
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	8812
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	9793
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	49881
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	66253
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	1559
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	4588
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	6823
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	3147
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	27284
43	Visakhapatnam*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	132946
45	Srungavarapukota	Loamy-skeletal, mixed, semiactive, isohyper-thermic Pachic Argiustolls	77010
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	64243
50	Mummadivaram	Very fine, smectitic (calcareous), isohyper-thermic Halic Haplusterts	14500
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	11996
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	65867
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	12512
6. GUNTUR DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	33189
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	292
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	4791
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	41591
11	Kanigiri	Clayey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	73066
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	24292
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	50244
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	5108
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	4216
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	9510
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	8481
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	8333
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	5338
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	87671
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	34724
34	Kurnool*	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	136937
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	4011
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluentic Haplustepts	12203
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	4209
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	2496
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	49598

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43	Visakhapatnam	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	77206
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	37561
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	16623
50	Mummadivaram	Very fine, smectitic (calcareous), isohyper-thermic Halic Haplusterts	1688
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	26228
53	Tenali	Fine, smectitic (calcareous), isohyperthermic Halic Haplusterts	52981
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	13762

7. KARIMNAGAR DISTRICT

2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	32530
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	5182
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Palustalfs	26151
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Palustalfs	2475
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	9202
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	2728
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	36809
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	11596
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	18746
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	41103
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	18631
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	104834
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Palalithic Ustorthents	2453
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	23686
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	5515
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	1208
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	6743
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	97980
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	34199
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	43624
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	49642
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	24980
42	Wanparti*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	150303
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	52553
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	86224
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	717

8. KHAMMAM DISTRICT

2	Nalgonda	Loamy-skeletal, mixed, active isohyperthermic Rhodic Paleustalfs	34919
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Palustalfs	2309
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Palustalfs	45912
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Palustalfs	343
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	30089
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	54408
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	41514
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	12420

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11	Kanigiri	Clayey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	53403
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	113384
13	Nizamabad	Loamy-skeletal, mixed, active, isohyper-thermic Typic Haplustalfs	35645
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	48425
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	43679
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	72127
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	67128
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	3414
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	8483
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	3937
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	35503
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	39578
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	7597
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	3468
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	60467
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	73997
42	Wanparti*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	124294
44	Addanki	Fine, mixed (calcareous), isohyperthermic Typic Haplustepts	23376
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	22463
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	8478
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	20484
9. KRISHNA DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	28763
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	7197
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	15975
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	10735
11	Kanigiri	Clayey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	15779
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	18080
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	10533
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	10163
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	1184
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	83094
22	Kavali	Mixed, isohyperthermic Typic Ustipsamments	18250
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	21770
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	1879
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	9661
34	Kurnool*	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	140354
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	16723
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	22471
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	14308

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40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	7568
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	30978
43	Visakhapatnam	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	75664
44	Addanki	Fine, mixed (calcareous), isohyperthermic Typic Haplustepts	706
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	12033
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	12573
53	Tenali	Fine, smectitic (calcareous), isohyperthermic Halic Haplusterts	82685
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	10215
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	44794
10. KURNOOL DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	52446
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	2778
7	Nuzvid	Finnne, mixed, semiactive, isohyperthermic Typic Paleustalfs	5883
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	10998
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	65754
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	68377
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	2606
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	45585
18	Badvel	Fine, mixed (calcareous), isohyperthermic Ustic Paleargids	12571
19	Rayadurg	Loamy-skeletal, mixed (calcareous), isohyper-thermic Ustic Haplargids	4453
20	Alur	Fine, smectitic (calcareous), isohyperthermic Ustertic Haplocambids	38494
21	Kalyandurg	Fine, mixed (calcareous), isohyperthermic Ustic Haplocambids	22432
24	Pattikonda	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Ustic Torriorthents	14126
25	Cuddapah	Loamy-skeletal, mixed (calcareous) isohyper-thermic Paralithic Ustorthents	24372
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	24576
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	50130
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	143055
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	12132
34	Kurnool*	Fine, smectitic (calcareous), isohyperthermic Vertic haplustepts	351264
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	3037
41	Aswraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	1122
44	Addanki	Fine, mixed (calcareous), isohyperthermic Typic Haplustepts	3922
47	Banganapalle	Very fine, smectitic (calcareous), isohyper-thermic Aridic Haplusterts	3012
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	63204
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	91439
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	30795
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	8088
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	35610
11. MAHBUBNAGAR DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	100034
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	25865
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	700
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	52639

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7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	3506
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	19936
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	79648
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	12009
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	625
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	16746
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	7417
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	101970
25	Cuddappah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	12614
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	100207
27	Adilabad	Clayey, smectitic, isohyperthermic Lithic Ustorthents	222
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	18105
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	19549
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	1313
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	150465
36	Makthal	Fine-loamy, mixed, superactive, isohyper-thermic Aquic Haplustepts	2602
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	88372
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	116986
40	Chintur	Clayey-skeletal, mixed semiactive, isohyper-thermic Typic Haplustepts	1606
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	22686
42	Wanparti*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	200955
44	Addanki	Fine, mixed (calcareous), isohyperthermic Typic Haplustepts	5770
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	20034
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	18156
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	2383
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	64187
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	875
12. MEDAK DISTRICT			
1	Zaheerabad	Clayey-skeletal, kaolinitic, isohyperthermic Kandic Paleustalfs	36787
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Palustalfs	54640
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	11546
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	459
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	2970
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	12372
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	10740
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	21566
23	Ibrahimpatan	Fine-loamy, mixed (calcareous), isohyper-thermic Typic Ustifluvents	345
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	4311
27	Adilabad	Clayey, smectitic, isohyperthermic Lithic Ustorthents	7887
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	10097
29	Medchal	Fine, mixed (calcareous), isohyperthermic Fluvaquentic Epiaquepts	517
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	3588
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	129352
35	Narayankher	Very fine, smectitic, isohyperthermic Vertic Haplustepts	32180

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36	Makthal	Fine-loamy, mixed, superactive, isohyper-thermic Aquic Haplustepts	14604
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	28105
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	13019
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	59934
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	641
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	9727
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	10561
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	30646
52	Sangareddi*	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	114394
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	20076
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	14623

13. NALGONDA DISTRICT

2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	114132
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	17075
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	15445
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	12675
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	1083
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	111583
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	121892
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	58254
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	84071
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	107793
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	40795
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	42124
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	6166
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	7352
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	2376
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	12649
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	66647
38	Suryapet*	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	144208
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Fluventic Haplustepts	18074
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	35569
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	5769
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	3662
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	3565
51	Amalapuram	Fine smectitic, isohyperthermic Typic Haplusterts	10542
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	9351

14. NELLORE DISTRICT

4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	23610
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	10968
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	6764

9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	9257
11	Kanigiri	Clavey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	53666
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	4592
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	5417
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	78628
17	Srika-kulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	100646
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	15950
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	17630
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	17545
30	Giddalur	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	2429
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	13523
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	101840
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	37066
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	22763
39	Nagarkurnul	Loamy-skeletal mixed, semiactive, isohyper-thermic Typic Haplustepts	12002
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	15063
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	56619
43	Visakkapatnam*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	263972
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplusterts	4425
50	Mummadivaram	Very fine, smectitic (calcareous), isohyper-thermic Halic Haplusterts	1644
55	Jammalmadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	1194

15. NIZAMABAD DISTRICT

3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	753
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	6150
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	2738
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	3037
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	66030
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	14277
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	31263
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	35757
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	9441
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	22951
27	Adilabad	Clayey, smectitic, isohyperthermic Lithic Ustorthents	18217
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	5482
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	4309
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	19078
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	57805
36	Makthal	Fine-loamy, mixed, superactive, isohyper-thermic Aquic Haplustepts	2376
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	16018

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39	Nagarkurnul	Loamy skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	22399
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	46817
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	10871
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	39098
51	Amalapuram	Fine smectitic, isohyperthermic Typic Haplusterts	4846
52	Sangareddi*	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	82053
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	15787

16. PRAKASAM DISTRICT

4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	1509
5	Nellore	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Paleustalfs	1070
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	433
8	Warangal	Clayey-skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	40683
11	Kanigiri	Clayey- skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	81352
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	289
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	160104
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	33005
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	7599
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	47953
26	Mahbubnagar	Loamy-skeletal, mixed subactive, isohyper-thermic Lithic Ustorthents	55884
30	Giddalur	Loamy- skeletal, mixed (calcareous), isohyper-thermic Paralithic Haplustepts	28501
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	21357
32	Markapur*	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	180472
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	775
34	Kumool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	96336
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	10511
38	Suryapet	Fine loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	20992
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	12737
41	Aswaraopet	Fine- loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	29119
43	Visakhapatnam	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	174643
44	Addanki	Fine, mixed (calcareous), isohyperthermic Typic Haplustepts	10580
49	Nandyal	Fine, smectitic (calcareous), isohyperthermic Chromic Haplusterts	2103
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	1145

17. RANGAREDDI DISTRICT

1	Zaheerabad	Clayey-skeletal, kaolinitic, isohyperthermic Kandic Paleustalfs	36888
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	9932
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	36444
9	Bhongir	Loa ny- skeletal, mixed, semiactive isohyper-thermic Typic Rhodustalfs	17423
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	31410
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	35440
13	Nizamabad	Loamy-skeletal, mixed, active, isohyperthermic Typic Haplustalfs	5846
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	18346
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	44220

1	2	3	4
23	Ibrahimpattan	Fine-loamy, mixed (calcareous), isohyper-thermic Typic Ustifluvents	36367
25	Cuddapah	Loamy-skeletal, mixed (calcareous), isohyper-thermic Paralithic Ustorthents	3103
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	9665
27	Adilabad	Clayey, smectitic, isohyperthermic Lithic Ustorthents	3959
28	Madanapalle	Coarse-loamy, mixed, active, isohyperthermic Typic Ustorthents	2164
29	Medchal*	Fine, mixed (calcareous), isohyperthermic Fluvaquentic Epiaquepts	54551
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	3466
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	2069
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	35380
35	Narayankher	Very fine, smectitic, isohyperthermic Vertic Haplustepts	15655
36	Makthal	Fine-loamy, mixed, superactive, isohyper-thermic Aquic Haplustepts	9218
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	4405
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	33162
40	Chintur	Clayey-skeletal, mixed semiactive isohyper-thermic Typic Haplustepts	10763
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	11732
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	18284
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	37213
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	42483
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	11821
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	9393
18. SRIKAKULAM DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	18089
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	41759
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	1276
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	29541
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	24234
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	108512
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	5525
33	Asifabad	Fine, smectic, isohyperthermic Vertic Haplustepts	2846
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	16412
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	764
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	29007
39	Nagarkurnool	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	5780
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	2781
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	22016
43	Visakhapatnam*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	172824
45	Srungavarapukota	Loamy-skeletal, mixed, semiactive, isohyper-thermic, Pachic Argiustolls	29555
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	3677
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	1145
19. VISAKHAPATNAM DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	53165
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	9409
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	16655
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	77483

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15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	47594
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	52536
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	3186
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	13611
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	4918
37	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	2552
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	2311
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	18919
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	12976
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	4911
43	Visakhapatnam*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	321537
45	Srungavarapukota	Loamy-skeletal, mixed, semiactive, isohyper-thermic, Pachic Argiustolls	108420
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	52587
20. VIZIANAGARAM DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	62975
6	Sirpur	Fine- loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	6989
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	31797
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	6955
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	65523
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	48105
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	30586
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	11189
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	7723
34	Kurnool	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	24035
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	14580
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	27476
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	9311
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	792
43	Visakhapatnam*	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	109634
45	Srungavarapukota	Loamy-skeletal, mixed, semiactive, isohyper-thermic, Pachic Argiustolls	2536
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	16447
21. WARANGAL DISTRICT			
2	Nalgonda	Loamy-skeletal, mixed, active, isohyperthermic Rhodic Paleustalfs	94337
3	Anantapur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Rhodic Paleustalfs	15419
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	8088
6	Sirpur	Fine- loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	20230
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	27190
8	Warangal	Clayey- skeletal, mixed, semiactive, isohyper-thermic Lithic Rhodustalfs	43148
9	Bhongir	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Rhodustalfs	35887
10	Penukonda	Clayey-skeletal, mixed, active, isohyperthermic Typic Rhodustalfs	73768
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	39910
13	Nizamabad	Loamy-skeletal, mixed, active, isohypethermic Typic Haplustalfs	17468
14	Ramannapeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	23924

1	2	3	4
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	11154
16	Chittoor	Fine, mixed, active, isohyperthermic Typic Haplustalfs	93044
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	13395
32	Markapur	Clayey-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	1641
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	37355
34	Kurnool*	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	114838
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	50243
39	Nagarkurnul	Loamy-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	47184
40	Chintur	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustepts	23917
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	29201
42	Wanparti	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	90326
48	Emmiganuru	Fine, smectitic (calcareous), isohyperthermic Leptic Haplustepts	7364
52	Sangareddi	Fine, smectitic (calcareous), isohyperthermic Typic Haplusterts	28434
54	Bhimavaram	Very fine, smectitic, isohyperthermic, Typic Haplusterts	10129
22. WEST GODAVARI DISTRICT			
4	Peddapuram	Fine, mixed, subactive, isohyperthermic Rhodic Paleustalfs	78467
6	Sirpur	Fine-loamy, mixed, subactive, isohyperthermic Typic Paleustalfs	8998
7	Nuzvid	Fine, mixed, semiactive, isohyperthermic Typic Paleustalfs	2277
11	Kanigiri	Clayey-skeletal, mixed, subactive, isohyper-thermic Typic Rhodustalfs	16870
12	Khammam	Fine, mixed, semiactive, isohyperthermic Typic Rhodustalfs	19736
14	Ramannapeeta	Clayey-skeletal, mixed, semiactive, isohyper-thermic Typic Haplustalfs	1872
15	Prakasam	Fine-loamy, mixed, subactive, isohyperthermic Typic Haplustalfs	8019
17	Srikakulam	Fine, mixed, semiactive, isohyperthermic Typic Haplustalfs	50819
22	Kaveli	Mixed, isohyperthermic Typic Ustipsamments	5950
26	Mahbubnagar	Loamy-skeletal, mixed, subactive, isohyper-thermic Lithic Ustorthents	2518
31	Jagtiyal	Loamy-skeletal, mixed, superactive, isohyper-thermic Lithic Haplustepts	688
33	Asifabad	Fine, smectitic, isohyperthermic Vertic Haplustepts	37263
34	Kurnool*	Fine, smectitic (calcareous), isohyperthermic Vertic Haplustepts	85020
36	Kovvur	Fine, mixed, active, isohyperthermic Aquic Haplustepts	2496
38	Suryapet	Fine-loamy, mixed, superactive, isohyper-thermic Fluventic Haplustepts	9970
41	Aswaraopet	Fine-loamy, mixed, semiactive, isohyper-thermic Typic Haplustepts	6406
43	Visakhapatnam	Fine, mixed, semiactive, isohyperthermic Typic Haplustepts	135795
46	Rampachodavaram	Clayey-skeletal, mixed, active, isohyperthermic Pachic Argiustolls	20525
51	Amalapuram	Fine, smectitic, isohyperthermic Typic Haplusterts	42771
54	Bhimavaram	Very fine, smectitic, isohyperthermic Typic Haplusterts	78171
55	Jammalamadugu	Very fine, smectitic (calcareous), isohyper-thermic Typic Haplusterts	29043

* Most extensively occurring soil in the district.

LIST OF SOIL SERIES CORRELATED-

B.M. Soil No.	Soils	Soil Series Correlated	Report No./Year	Organization
1	Zaheerabad	Algol	NBSS & LUP Publ. 791,2005	NBSS&LUP
2	Nalgonda	-	-	-
3	Anantapur	-	-	-
4	Peddapuram	- Butpur - Uplingapur	NBSS Publ.791, 2005	NBSS & LUP
5	Nellore	Upparguda	NBSS Publ. 791, 2005	NBSS & LUP
6	Sirpur	-	-	-
7	Nuzvid	Tadarpalli	NBSS Publ. 791, 2005	NBSS & LUP
8	Warangal	-	-	-
9	Bhongir	Vayalpad	Soil Series of Anantapur District, A.P.,(Unpubl.)	NBSS & LUP
10	Penukonda	- Chandubatl - Peddamarur - Thimmanenipalle - Garnimitta - Ramapuram	Soil Series Handbook, Mahbubnagar District, A.P. Soil Series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP NBSS & LUP
11	Kanigiri	- Chandubatl - Peddamarur - Thimmanenipalle - Garnimitta - Ramapuram	Soil Series Handbook, Mahbubnagar District, A.P. Soil Series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP NBSS&LUP
12	Khamam	Kalwkurthy	Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP
13	Nizamabad	- Masanpalli - Tanigandla - Patancheru	NBSS Publ. 791, 2005 Benchmark Soils of India, 1982	NBSS & LUP NBSS&LUP
14	Ramannapeta	- Palem - Gadwal - Peddadarpalli	DSS of ANGRAU Farm, ZARS, Palem (Unpubl.) Soil Series Handbook, Mahbubnagar District, A.P.	NBSS&LUP NBSS & LUP
15	Prakasam	- Kottacheruvu - Satarpalle	Soil Series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP
16	Chittoor	- Kondalaswamy - Kaukuntla	NBSS .Publ.791, 2005 Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP

17	Srikakulam	- Kondalswamy - Kaukuntla	NBSS Publ. 791,2005 Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP
18	Badvell	-	-	-
19	Rayadurg	-	-	-
20	Alur	-	-	-
21	Kalyandurg	-	-	-
22	Kaveli	-	-	-
23	Ibrahimpatan	- Chandur - Ibrahimbabad - Chitravathi - Hagari - Manesamudram - Utakallu	NBSS Publ. 791,2005 Soil Series Handbook, Mahbubnagar District, A.P. Soil Series of Anantapur District. A.P. (Unpubl.)	NBSS & LUP
24	Pattikonda	-	-	-
25	Cuddapah	-	-	-
26	Mahbubnagar	Venkatapur	NBSS Publ. 791,2005	NBSS & LUP
27	Adilabad	-	-	-
28	Madanapalle	-	-	-
29	Medchal	-	-	-
30	Giddalur	-	-	-
31	Jagtiyal	- Kondapuram - Lakshmupalle	Soil Series of Anantapur District, A.P. (Unpubl.)	NBSS & LUP
32	Markapur	- Gollapalle - Madakasira - Mincheri	Soil Series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP
33	Asifabad	- Chitkul - Appaiahpalli	NBSS Publ. 791, 2005 Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP
34	Kurnool	-	-	-
35	Narayankher	Chinnaloni	Benchmark Soils of India, 1982	NBSS & LUP
36	Makthal	-	-	-
37	Kovvur	-	-	-
38	Suryapet	- Issepet - Mallreddipalle	NBSS Publ. 791, 2005 Soil Series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP
39	Nagarkurnul	Batrepelle	Soil series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP
40	Chintur	Gooty	Soil series of Anantapur District, A.P., (Unpubl.)	NBSS & LUP
41	Aswaraopet	Wajarakarur	Soil Series of Anantapur	NBSS & LUP

		• Kamalapadu	District, A.P.,(Unpubl.)	
42	Wanparti	Tadamanur	NBSS Publ. 791.2005	NBSS & LUP
43	Visakha-patnam	Tadamanur	NBSS Publ. 791,2005	NBSS & LUP
44	Addanki	-	-	-
45	Srunga- varapukota	-	-	-
46	Rampa- chodavaram	Baureddipalle	Soil Series Handbook, Mahbubnagar District, A.P.	NBSS&LUP
47	Banganapalle	-	-	-
48	Emmiganuru	-	-	-
49	Nandyal	Jajapur	Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP
50	Mummadi-varam	Padra	Soil Series Habdbook, Mahbubnagar District, A.P.	NBSS & LUP
51	Amalapuram	Tanplur	NBSS Publ. 791, 2005	NBSS & LUP
52	Sangareddi	• Kadirabad	Benchmark Soils of India, 1982	NBSS & LUP
		• Teligi	Soil Series of Anantapur District, A.P. (Unpubl.)	
		• Velamakur		
		• Bogalkatta		
		• Hugalur		
53	Tenali	-	-	-
54	Bhimavaram	• Pusalpahad	NBSS Publ. 791, 2005	NBSS & LUP
		• Tornal		
		• Kasturpalli	Soil Series Handbook, Mahbubnagar District, A.P.	
		• Rawalpalli		
55	Jammala- madugu	• Kasireddipalli	Benchmark Soils of India, 1982	NBSS & LUP
		• Kaveli	NBSS Publ. 791, 2005	
		• Ranjol		
		• Manopad	Soil Series Handbook, Mahbubnagar District, A.P.	NBSS & LUP

EXPLANATION OF THE PARAMETERS USED

AWC	Available-water capacity (mm m^{-1})
MAST	Mean annual soil temperature ($^{\circ}\text{C}$)
MSST	Mean summer soil temperature
MWST	Mean winter soil temperature
LGP	Length of growing period

Land Capability Class

I	Very good cultivable land	V	Not arable, well suited for grazing
II	Good cultivable land	VI	Not arable, well suited for grazing or forestry
III	Moderately good cultivable land	VII	Not arable, fairly well suited for grazing or forestry
IV	Fairly good land for occasional cultivation	VIII	Suited only for wildlife, recreation or tourism

Subclass

'e'	Problems caused by water erosion	'w'	Problems due to drainage, wetness or overflow
's'	Soil limitations affecting plant growth	'c'	Climate limitation

Land Irrigability Class

1	Very good irrigable lands with slight or no limitations	4	Marginal irrigable lands with very severe limitations
2	Good irrigable lands with moderate limitations	5	Temporarily not suitable for irrigation
3	Moderately good irrigable lands with severe limitations	6	Permanently not suitable for irrigation

Subclass

's'	Soil limitations; 'w'	Drainage problems; 't'	Topography limitations
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Suitability for crops (FAO Guidelines) Class

S1	Highly suitable	S3	Marginally suitable
S2	Moderately suitable	N	Not suitable

Subclass

c	Climate hazard	n	Nutrient availability
e	Erosion hazard	q	Surface crusting
f	Flooding hazard	r	Shallow rooting depth
g	Gravelliness/stoniness	t	Texture limitation
k	Soil workability	w	Drainage problem
l	Topography limitation	z	Excess of salts/calcareousness
m	Moisture limitation		

PROFILE PHOTOGRAPHS OF SOME BENCHMARK PEDONS



Plate 1 Typic Haplustalfs (Alfisol)



Plate 2 Rhodic Paleustalfs (Alfisol)



Plate 3 Lithic Rhodustalfs (Alfisol)

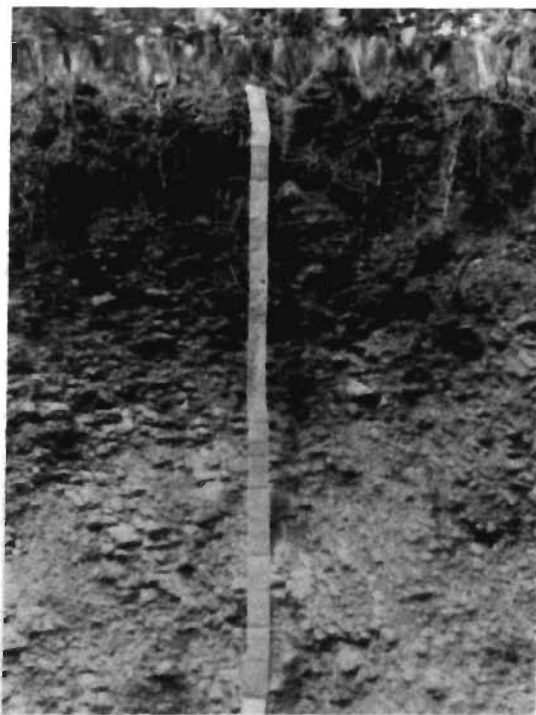


Plate 4 Pachic Argiustolls (Mollisol)