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LAND RESOURCE INVENTORY AND SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS FOR WATERSHED PLANNING AND DEVELOPMENT

BANDEHALLI-3 (4D2D6O2c) MICROWATERSHED

Sydhapur Hobli, Yadgir Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

The ICAR-National Bureau of Soil Survey and Land Use Planning (ICAR-NBSS&LUP), Nagpur, a premier Institute of the Indian Council of Agricultural Research (ICAR), was set up during 1976 with the objective to prepare soil resource maps at national, state and district levels and to provide research inputs in soil resource mapping and its applications, land evaluation, land use planning, land resource management, and database management using GIS for optimising land use on different kinds of soils in the country.

The Bureau has been engaged in carrying out soil resource survey, agro-ecological and soil degradation mapping at the country, state and district levels for qualitative assessment and monitoring the soil health towards viable land use planning. The research activities have resulted in identifying the soil potentials and problems, and the various applications of the 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 the soil survey agencies in the area of soil survey, land evaluation and soil survey interpretations for land use planning. The Bureau in collaboration with Panjabrao Krishi Vidyapeeth, Akola is running post-graduate teaching and research programme in land resource management, leading to M.Sc. and Ph.D. degrees.

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PREFACE

In Karnataka, as in other Indian States, the livelihoods of rural people are intertwined with farming pursuits. Thechallenges in agriculture are seriously threatening the livelihood of a large number of farmers as they have been practicing farming in contextual factors beyond their control. Climatic factors are the most important ones and have become much more significant in recent times due to rapid climate changes induced by intensive anthropogenic activities affecting our ecosystem in multiple ways. Climate change has become the reality, it is happening and efforts to evolve and demonstrate climate resilient technologies have become essential. Due to the already over stressed scenario of agrarian sector, the climate change is resulting in manifold increase in the complexities, pushing the rural mass to face more and more unpredictable situations. The rising temperatures and unpredictable rainfall patterns are going to test seriously the informed decisions farmers have to make in order to survive in farming and sustain their livelihood.

It is generally recognized that impacts of climate change shall not be uniform across the globe. It is said that impact of climate change is more severe in South Asia. Based on the analysis of meteorological data, it is predicted that in India, there will be upward trend in mean temperature, downward trend in relative humidity, annual rainfall and number of wet days in a year. Also, in general, phenomena like erratic monsoon, spread of tropical diseases, rise in sea levels, changes in availability of fresh water, frequent floods, droughts, heat waves, storms and hurricanes are predicted. Each one of these adverse situations are already being experienced in various parts of India and also at the global level. Decline in agricultural productivity of small and marginal farmers becoming more vulnerable is already witnessed.

In Karnataka, more than 60 per cent of the population live in rural areas and depend on agriculture and allied activities for their livelihood. Though the state has achieved significant progress in increasing the yield of many crops, there is tremendous pressure on the land resources due to the growing and competing demands of various land uses. This is reflected in the alarming rate of land degradation observed. Already more than 50 per cent of the area is affected by various forms of degradation. If this trend continues, the sustainability of the fragile ecosystem will be badly affected. The adverse effects of change in the climatic factors are putting additional stress on the land resources and the farmers dependent on this.

The natural resources (land, water and vegetation) of the state need adequate and constant care and management, backed by site-specific technological interventions and investments particularly by the government. Detailed database pertaining to the nature of

the land resources, their constraints, inherent potentials and suitability for various land based rural enterprises, crops and other uses is a prerequisite for preparing location-specific action plans, which are in tune with the inherent capability of the resources. Any effort to evolve climate resilient technologies has to be based on the baseline scientific database. Then only one can expect effective implementation of climate resilient technologies, monitor the progress, make essential review of the strategy, and finally evaluate the effectiveness of the implemented programs. The information available at present on the land resources of the state are of general nature and useful only for general purpose planning. Since the need of the hour is to have site-specific information suitable for farm level planning and detailed characterization and delineation of the existing land resources of an area into similar management units is the only option.

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component-1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of Bandehalli-3 Microwatershed, Yadgir Taluk, and District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the micro-watershed. The project report with the accompanying maps for the microwatershed will provide required detailed database for evolving effective land use plan, alternative land use options and conservation plans for the planners, administrators, agricutural extention personnel, KVK officials, developmental departments and other land users to manage the land resources in a sustainable manner.

It is hoped that this database will be useful to the planners, administrators and developmental agencies working in the area in not only for formulating location specific developmental schemes but also for their effective monitoring at the village/watershed level.

Nagpur
Date:04.05.2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Bandehalli-3 microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behaviour and use potentials of the soils in the microwatershed.

The present study covers an area of 697 ha in Bandehalli-3 microwatershed in Yadgir taluk and district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 866 mm, of which about 652 mm is received during south–west monsoon, 138 mm during north-east and the remaining 76 mm during the rest of the year. An area of about 96 per cent is covered by soils and 4 per cent by habitation and water bodies. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 13 soil series and 16 soil phases (management units) and 8 land use classes.*
- *The length of crop growing period is 120-150 days starting from the 1st week of June to 4th week of October.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.*
- *Land suitability for growing 26 major agricultural and horticultural crops were assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire land area of the microwatershed is suitable for agriculture.*
- *About 11 per cent soils are very shallow (<25 cm), 19 per cent soils are shallow (25-50 cm), 15 per cent soils are moderately shallow (50-75 cm), 48 per cent soils are moderately deep (75-100 cm) and 3 per cent soils are deep (100-150 cm) soils.*
- *About 14 per cent of the area has clayey soils, 56 per cent loamy soils and 27 per cent has sandy soils at the surface.*
- *An area of about 94 per cent has non-gravelly and 2 per cent gravelly (15-35%) soils.*
- *About <1 per cent of the area has soils that are very high (>200 mm/m) in available water capacity, 32 per cent medium (101-150 mm/m), 33 per cent*

low (51-100 mm/m) and about 30 per cent very low (<50 mm/m) in available water capacity.

- *Entire area of the microwatershed has very gently sloping (1-3%) lands.*
- *About 94 per cent has soils that are moderately eroded (e2) and 2 per cent has severely eroded (e3) soils.*
- *An area of about 33 per cent is slightly alkaline (pH 7.3-7.8), 37 per cent soils are moderately alkaline (pH 7.8 to 8.4) and about 10 per cent soils are strongly alkaline (pH 8.4 – 9.0) in soil reaction.An area of 16 per cent is under neutral reaction.*
- *The Electrical Conductivity (EC) of the soils are <2 dS m^{-1} indicating that the soils are non-saline.*
- *About 38 per cent is low (<0.5%), 39 per cent medium (0.5-0.75%) and 19 per cent high (>0.75%) in organic carbon.*
- *An area of 38 per cent has soils that are low (<23 kg/ha), 47 per cent medium (23-57 kg/ha) and 11 per cent high (>57 kg/ha) in available phosphorus.*
- *About 13 per cent low (<145 kg/ha) and 83 per cent is medium (145-337 kg/ha) in available potassium.*
- *Available sulphur is low (<10 ppm) in about 24 per cent, medium (10-20 ppm) in 66 per cent and high (>20 ppm) in about 6 per cent area of the microwatershed.*
- *Available boron is low (<0.5 ppm) in 33 per cent and about 63 per cent area is medium (0.5-1.0 ppm) in the microwatershed.*
- *About 23 per cent area has soils that are deficient (<4.5 ppm) in available iron and 73 per cent sufficient (>4.5 ppm).*
- *Available manganese is sufficient in all the soils of the microwatershed.*
- *About 1 per cent area has soils that are deficient (<0.2 ppm) in available copper and 95 per cent sufficient (>0.2 ppm).*
- *Almost area of the microwatershed is deficient (<0.6 ppm) in available zinc, except for a small area of 4 ha)1%) that are sufficient.*
- *The land suitability for 26 major agricultural and horticultural crops grown in the microwatershed was assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the Bandehalli-3 microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*5 (<1)*	*456 (65)*	*Sapota*	*-*	*153 (22)*
Maize	*-*	*341 (49)*	*Guava*	*-*	*153 (22)*
Red gram	*-*	*358 (51)*	*Pomegranate*	*-*	*358 (51)*
Bajra	*91 (13)*	*364 (52)*	*Jackfruit*	*-*	*153 (22)*
Ground nut	*-*	*175 (25)*	*Jamun*	*-*	*21(3)*
Sunflower	*5 (<1)*	*353 (51)*	*Musambi*	*5 (<1)*	*353 (51)*
Cotton	*5 (<1)*	*340 (49)*	*Lime*	*5 (<1)*	*353 (51)*
Bengalgram	*5 (<1)*	*341 (49)*	*Cashew*	*-*	*22 (3)*
Chilli	*-*	*455 (65)*	*Custard apple*	*243 (35)*	*216 (31)*
Tomato	*-*	*251 (36)*	*Amla*	*42 (6)*	*418 (60)*
Drumstick	*-*	*358 (51)*	*Tamarind*	*-*	*21 (3)*
Mulberry	*-*	*153 (22)*	*Marigold*	*-*	*460 (66)*
Mango	*-*	*16 (2)*	*Chrysanthemum*	*-*	*460 (66)*

Apart from the individual crop suitability, a proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops that helps in maintaining the ecological balance in the microwatershed.

- *Maintaining soil-health is vital for crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested for these problematic soils like saline/alkali, highly eroded, sandy soils etc.,*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. This would help in supplementing the farm income, provide fodder and fuel, and generate lot of biomass which in turn would help in maintaining the ecological balance and contribute to mitigating the climate change.*

Chapter 1

INTRODUCTION

Soil being a vital natural resource on whose proper use depends the life supporting systems of a country and the socioeconomic development of its people. Soils provide food, fodder, fibre and fuel for meeting the basic human and animal needs. With the ever increasing growth in human and animal population, the demand on soil for more food and fodder production is on the increase. The area available for agriculture is about 51 per cent of the total geographical area and more than 60 per cent of the people are still dependant on agriculture for their livelihood. However, the capacity of a soil to produce is limited and the limits to the production are set by its intrinsic characteristics, agro-climatic setting, and, use and management. There is, therefore, tremendous pressure on land and water resources, which is causing decline in soil-health and stagnation in productivity. The soils have been degrading at an estimated rate of one million hectares per year and ground water levels have been receding at an alarming rate resulting in decline in the ground water resource. Further, land degradation has emerged as a serious problem which has already affected about 38 lakh ha of cultivated area in the State. Soil erosion alone has degraded about 35 lakh ha. Almost all the uncultivated areas are facing various degrees of degradation, particularly soil erosion; salinity and alkalinity has emerged as a major problem in more than 3.5 lakh ha in the irrigated areas of the State. Nutrient depletion and declining factor productivity is common in both rainfed and irrigated areas. The degradation is continuing at an alarming rate and there appears to be no systematic effort among the stakeholders to contain this process. In recent times, an aberration of weather due to climate change phenomenon has added another dimension leading to unpredictable situation to be tackled by the farmers.

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state. Added to this, every year there is a significant diversion of farm lands and water resources for non-agricultural purposes. Thus, developing strategies to slow down the degradation process or reclaim the soils to normal condition and ensure sustainability of production system are the major issues today. These, demand a systematic appraisal of our soil and land resources with respect to their extent, geographic distribution, characteristics, behaviour and use potential, which is very important for developing an effective land use and cropping systems for augmenting agricultural production on a sustainable basis.

The soil and land resource inventories made so far in Karnataka had limited utility because the surveys were of different types, scales and intensities carried out at different times with specific objectives. Hence, there is an urgent need to generate detailed site-

specific farm level database on various land resources for all the villages/watersheds in a time bound manner that would help to protect the valuable soil and land resources and also to stabilize the farm production. Therefore, the land resource inventory required for farm level planning is the one which investigates all the parameters which are critical for productivity *viz.*, soils, site characteristics like slope, erosion, gravelliness and stoniness, climate, water, topography, geology, hydrology, vegetation, crops, land use pattern, animal population, socio-economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the government etc. From the data collected at farm level, the specific problems and potentials of the area can be identified and highlighted, conservation measures required for the area can be planned on a scientific footing, suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land holding can be prescribed.

The Land Resource Inventory is basically done for identifying potential and problem areas, developing sustainable land use plans, estimation of surface run off and water harvesting potential, preparation of soil and water conservation plans, land degradation/desertification etc. The Bureau is presently engaged in developing an LRI methodology using high resolution satellite remote sensing data and Digital Elevation Model (DEM) data to prepare Landscape Ecological Units (LEU) map representing agro-ecosystem as a whole. The LEU is preferred over landform as the base map for LRI. LEU is the assemblage of landform, slope and land use. An attempt has already been made to upscale the soil resource information from 1:250000 and 1:50000 scale to the LEU map in Goa and in some other states.

The land resource inventory aims to provide site-specific database for Bandehalli-3 microwatershed in Yadgir Taluk and Yadgir District, Karnataka State for the Karnataka Watershed Development Department. The database was generated by using cadastral map of the village as a base along with high resolution IRS LISS IV and Cartosat-1 merged satellite imagery. Later, an attempt will be made to uplink this LRI data generated at 1:7920 scale under Sujala-III Project to the proposed Landscape Ecological Units (LEUs) map.

The study was organized and executed by the ICAR- National Bureau of Soil Survey and Land Use Planning, Regional Centre, Bangalore under Generation of Land Resource Inventory Data Base Component-1 of the Sujala-III Project funded by the World Bank.

Chapter 2

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Bandehalli-3 micro-watershed is located in the northeastern part of Karnataka in Yadgir Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of Baddepalli, Balacheda and Sowrashtralli villages. It lies between 16^0 33' and 16^0 34' north latitudes and 77^0 21' and 77^0 22' east longitudes and covers an area of 697 ha. It is about 36 km from Yadgir town and is surrounded by Baddepalli village on the east, west, north, Balacheda on the west and Sowrashtralli village on the southern side.

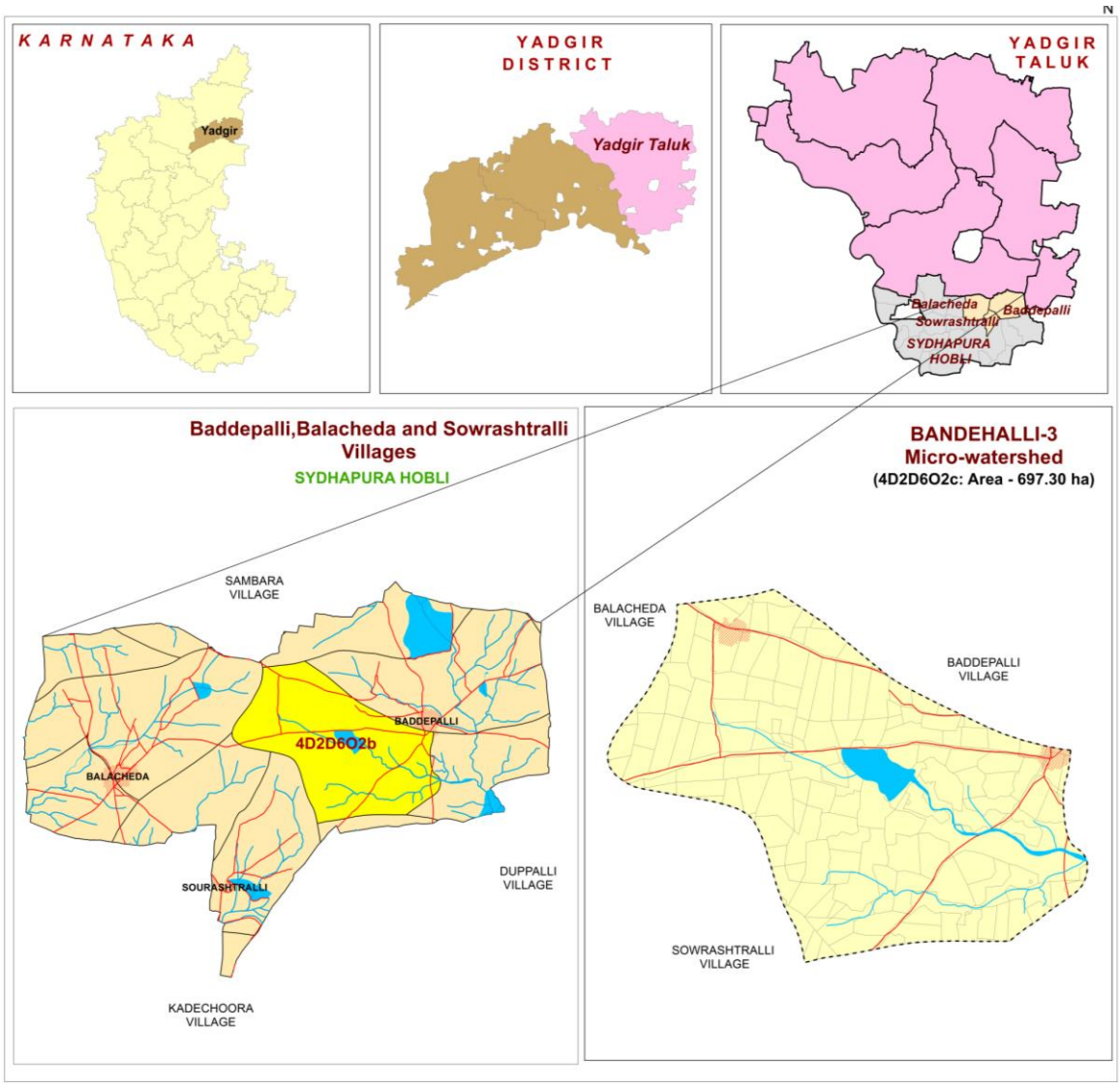


Fig. 2.1 Location map of Bandehalli-3 microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs. 2.2a and b). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The

gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in the village. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soils originally formed at higher elevation, but now occupying river valleys.

Fig. 2.2 a Granite and granite gneiss rocks

Fig. 2.2 b Alluvium

2.3 Physiography

Physiographically, the area has been identified as granite gneiss and alluvial landscapes based on geology. The microwatershed area has been further divided into mounds/ridges, summits, very gently sloping uplands, plains and valleys based on slope and its relief features. The elevation ranges from 378-390 m above MSL.

2.4 Drainage

The area is drained by several parallel streams like Bori, Amerja and Kanga which finally join the river Bhima along its course. Though, they are not perennial, during rainy season they carry large quantities of rain water. The microwatershed has only few small tanks which are not capable of storing the water that flows during the rainy season. Due to this, the ground water recharge is very much affected. This is reflected in the failure of many bore wells in the villages. If the available rain water is properly harnessed by constructing new tanks and recharge structures at appropriate places in the villages, then the drinking and irrigation needs of the area can be easily met. The drainage network is parallel to sub parallel and dendritic.

2.5 Climate

The Yadgir district lies in the northern plains of Karnataka and falls under semiarid tract of the state and is categorized as drought-prone with total annual rainfall of 866 mm (Table 2.1). Of the total rainfall, maximum of 652 mm is received during the south–west monsoon period from June to September, the north-east monsoon from October to early December contributes about 138 mm, and the remaining 76 mm during the rest of the year. The summer season starts during the middle of February and continues up to the first week of June. The period from December to the middle of February is the cold season. December is the coldest month with mean daily maximum and minimum temperatures being 29.5^0C and 10^0C respectively. During peak summer, temperature shoots up to 45^0C. Relative humidity varies from 26% in summer to 62% in winter. Rainfall distribution is shown in Figure 2.3. The average Potential Evapo-Transpiration (PET) is 141 mm and varies from a low of 81 mm in December to 199 mm in the month of May. The PET is always higher than precipitation in all the months except July to end of September. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from 1st week of June to 4th week of October.

Table 2.1 Mean Monthly Rainfall, PET, 1/2 PET at Yadgir Taluk

Sl. no.	Months	Rainfall	PET	1/2 PET
1	January	4.30	86.0	43.0
2	February	2.30	125.5	62.7
3	March	15.10	166.0	83.0
4	April	18.50	179.8	89.9
5	May	36.0	198.8	97.9
6	June	118.0	175.1	87.5
7	July	171.80	156.3	78.1
8	August	182.9	150.3	75.1
9	September	179.7	142.0	71.0
10	October	105.3	138.5	69.2
11	November	26.4	97.60	48.6
12	December	6.0	80.90	40.4
Total		**866.3**	**141.4**	

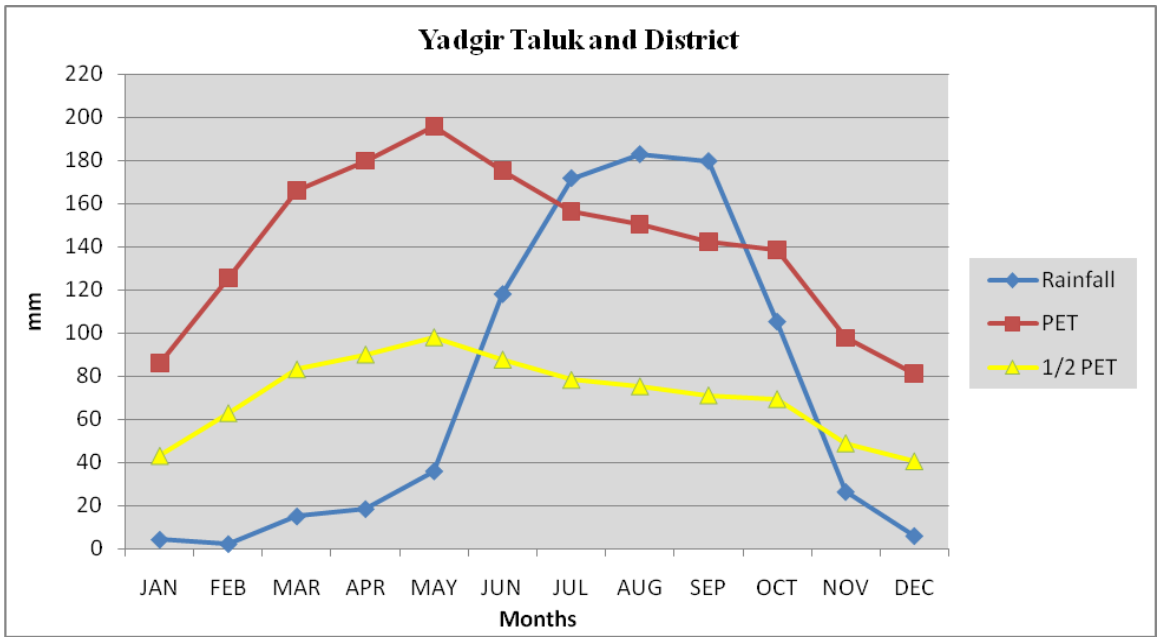


Fig 2.3 Rainfall distribution in Yadgir Taluk

2.6 Natural Vegetation

The natural vegetation is sparse comprising few tree species, shrubs and herbs. The mounds, ridges and boulders occupy very sizeable area which is under thin to moderately thick forest vegetation. Still, there are some remnants of the past forest cover which can be seen in patches in some ridges and hillocks in the microwatershed.

Apart from the continuing deforestation, the presence of large population of goats, sheep and other cattle in the microwatershed is causing vegetative degradation of whatever little vegetation left in the area. The uncontrolled grazing has left no time for the regeneration of the vegetative cover. This leads to the accelerated rate of erosion on the hill slopes resulting in the formation of deep gullies in the foot slopes that eventually result in the heavy siltation of tanks and reservoirs in the microwatershed.

2.7 Land Utilization

About 72 per cent area (Table 2.2) in Yadgir taluk is cultivated at present. An area of about 2 per cent is permanently under pasture, 20 per cent under current fallows and 6 per cent under non-agricultural land and 5 per cent under currently barren. Forests occupy an area of about 7 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, sunflower, groundnut, mango, pomegranate and marigold. The different crops and cropping systems adopted in the microwatershed is presented in the Figures 2.4 a & b. While carrying out land resource inventory, the land use/land cover particulars are collected from all the survey numbers and a current land use map of the microwatershed is prepared. The current land use map prepared shows the arable and non-arable lands, other land uses and different types of crops grown in the area. The current land use map of Bandehalli-3 microwatershed is presented in Fig. 2.5.

Simultaneously, enumeration of wells (bore wells and open wells) and other conservation structures in the microwatershed was made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and other water bodies in the Bandehalli-3 microwatershed is given in Fig. 2.6.

Table 2.2 Land Utilization in Yadgir Taluk

Sl. no.	Agricultural land use	Area (ha)	Per cent
1.	Total geographical area	516088	-
2.	Total cultivated area	373617	72.4
3.	Area sown more than once	74081	14.3
4.	Trees and grooves	737	0.14
5.	Forest	33773	6.54
6.	Cultivable wasteland	2385	0.46
7.	Permanent Pasture land	11755	2.28
8.	Barren land	27954	5.41
9.	Non- Agriculture land	29623	5.73
10.	Current Fallows	105212	20.4

Fig. 2.4 a. Different Crops and Cropping Systems in Bandehalli-3 microwatershed

Fig. 2.4 b. Different Crops and Cropping Systems in Bandehalli-3 microwatershed

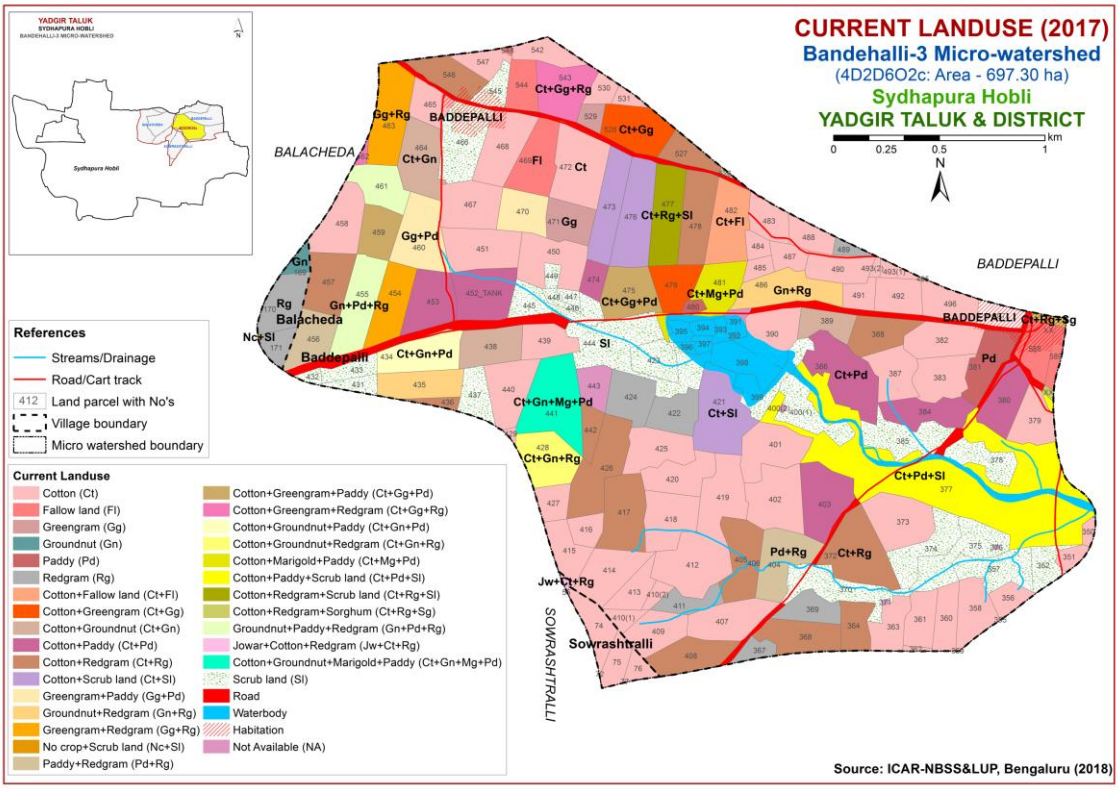


Fig. 2.5 Current Land Use map of Bandehalli-3 microwatershed

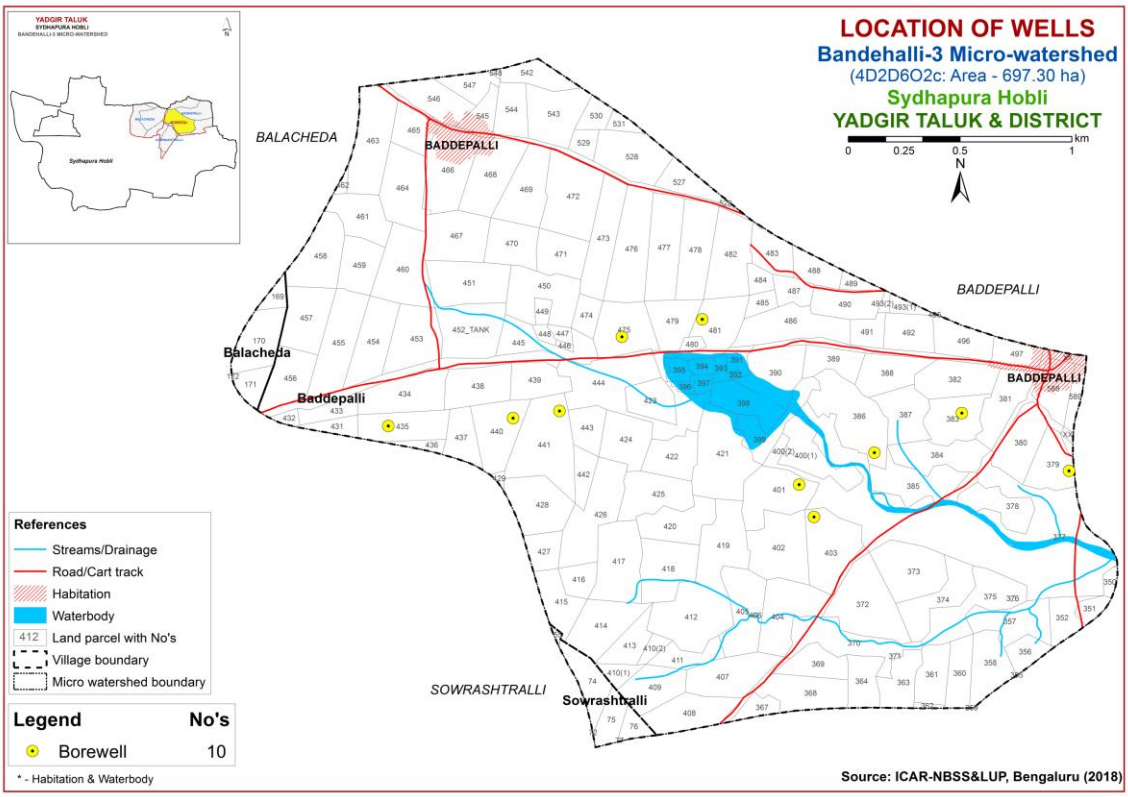


Fig. 2.6 Location of wells -Bandehalli-3 microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Bandehalli-3 microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope of the land, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units and showing area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in 697 ha area. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

3.1 Base Maps

The detailed survey of the land resources occurring in the microwatershed was carried out by using digitized cadastral map and satellite imagery as base supplied by the KSRSAC. The cadastral map shows field boundaries with their survey numbers, location of tanks, streams and other permanent features of the area (Fig. 3.1). Apart from the cadastral map, remote sensing data products from Cartosat-1 and LISS-IV merged at the scale of 1:7920 were used in conjunction with the cadastral map to identify the rock types, the landscapes, landforms and other surface features. The imagery helped in the identification and delineation of boundaries between hills, uplands and lowlands, water bodies, forest and vegetated areas, roads, habitations and other cultural features of the area (Fig. 3.2). The cadastral map was overlaid on the satellite imagery (Fig. 3.3) that helps to identify the parcel boundaries and other permanent features. Apart from cadastral maps and images, toposheets of the area (1:50,000 scale) were used for initial traversing, identification of geology and landforms, drainage features, present land use and also for selection of transects in the microwatershed.

3.2 Image Interpretation for Physiography

False Colour Composites (FCCs) of Cartosat-I and LISS-IV merged satellite data covering microwatershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, the area has been identified as granite gneiss and alluvial landscapes and is divided into mounds/ridges, summits and very gently sloping uplands and lowlands based on slope and image characteristics. They were further subdivided into physiographic/image interpretation units based on image characteristics. The image interpretation legend for physiography is given below.

Image Interpretation Legend for Physiography

G- Granite Gneiss Landscape

- G1 Hills/ Ridges/ Mounds
  - G11 Summits
  - G12 Side slopes
    - G121 Side slopes with dark grey tones
- G2 Uplands
  - G21 Summits
  - G22 Gently sloping uplands
    - G221 Gently sloping uplands, yellowish green (eroded)
    - G222 Gently sloping uplands, yellowish white (severely eroded)
  - G23 Very gently sloping uplands
    - G231 Very gently sloping uplands, yellowish green
    - G232 Very gently sloping uplands, medium green and pink
    - G233 Very gently sloping uplands, pink and green (scrub land)
    - G234 Very gently sloping uplands, medium greenish grey
    - G235 Very gently sloping uplands, yellowish white (eroded)
    - G236 Very gently sloping uplands, dark green
    - G237 Very gently sloping uplands, medium pink (coconut garden)
    - G238 Very gently sloping uplands, pink and bluish white (eroded)
- G3 Valleys/ lowlands
  - G31 Valleys, pink tones
  - G32 Valleys gray mixed with pink tones

DSe Alluvial landscape

DSe 1 Summit

- DSe 11 Nearly level Summit with dark grey tone
- DSe 12 Nearly level Summit with medium grey tone
- DSe 13 Nearly level Summit with whitish grey tone
- DSe 14 Nearly level Summit with whitish tone (Calcareousness)
- DSe 15 Nearly level Summit with pinkish grey tone
- DSe 16 Nearly level Summit with medium pink tone
- DSe 17 Nearly level Summit with bluish white tone
- DSe 18 Nearly level Summit with greenish grey tone

DSe 2 Very genetly sloping

- DSe 21 Very gently sloping, whitish tone
- DSe 22 Very gently sloping, greyish pink tone
- DSe 23 Very gently sloping, whitish grey tone
- DSe 24 Very gently sloping, medium grey tone
- DSe 25 Very gently sloping, medium pink tone
- DSe 26 Very gently sloping, dark grey tone
- DSe 27 Very gently sloping, bluish grey tone
- DSe 28 Very gently sloping, greenish grey tone
- DSe 29 Very gently sloping, Pinkish grey

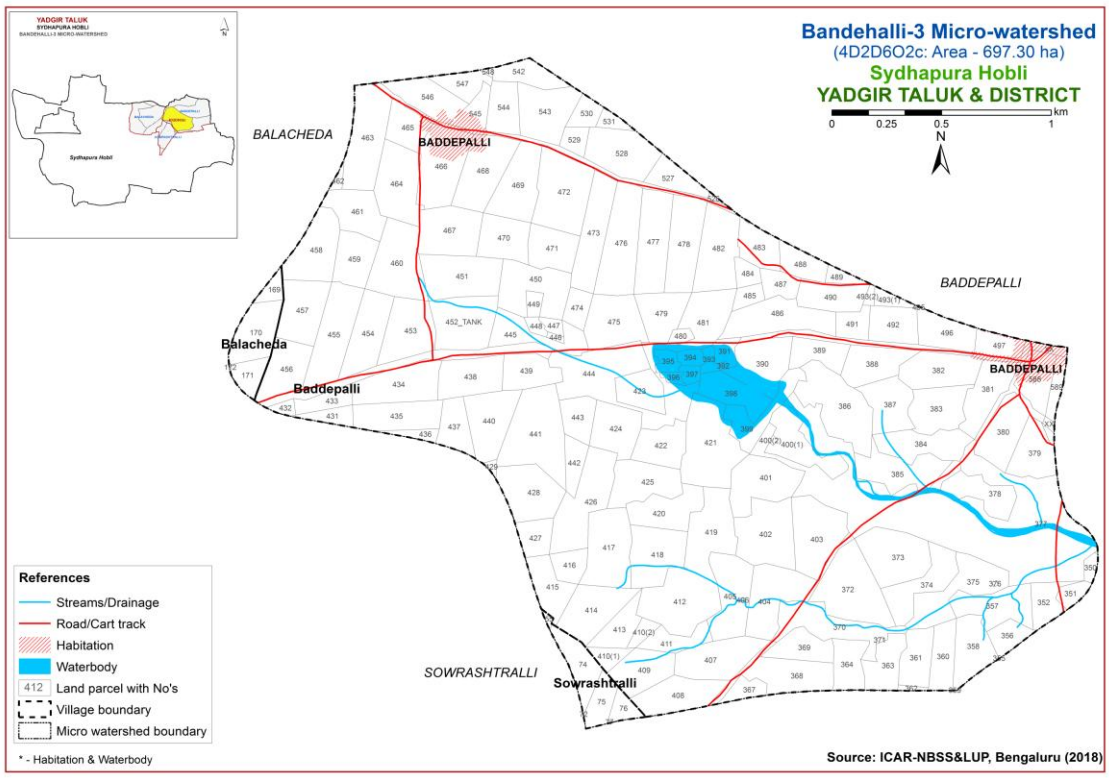


Fig. 3.1 Scanned and Digitized Cadastral map of Bandehalli-3 microwatershed

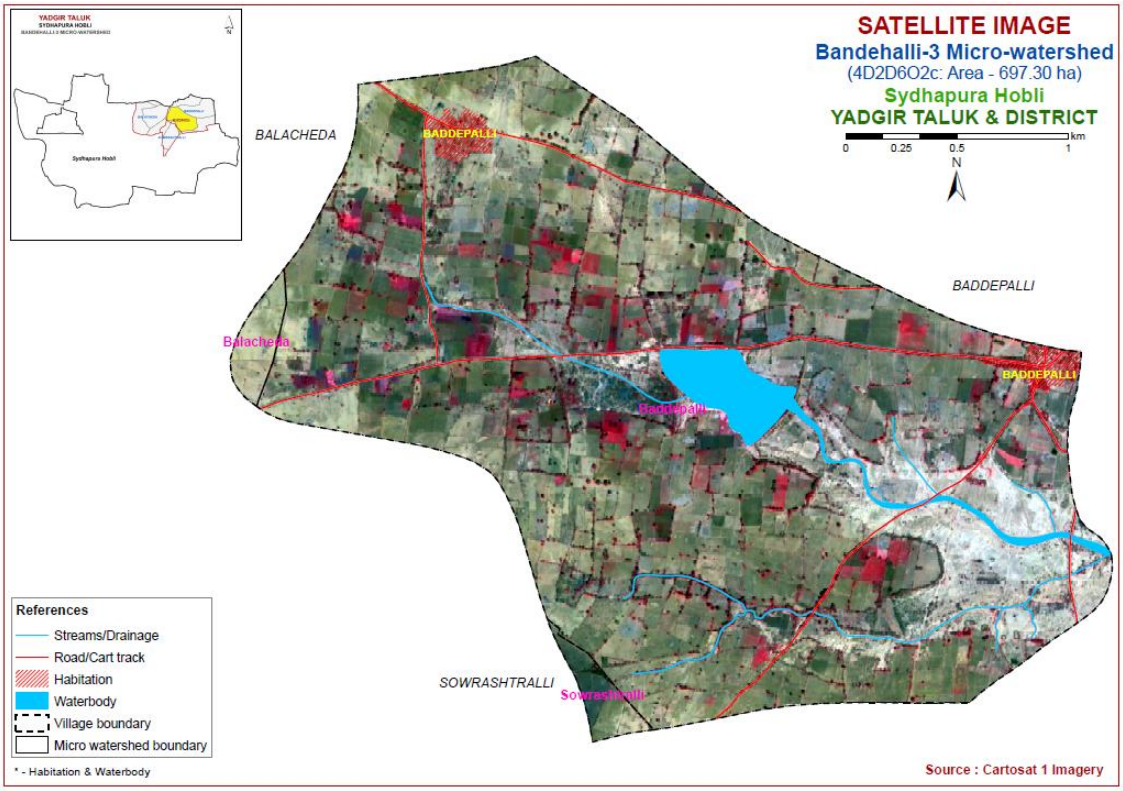


Fig. 3.2 Satellite Image of Bandehalli-3 microwatershed

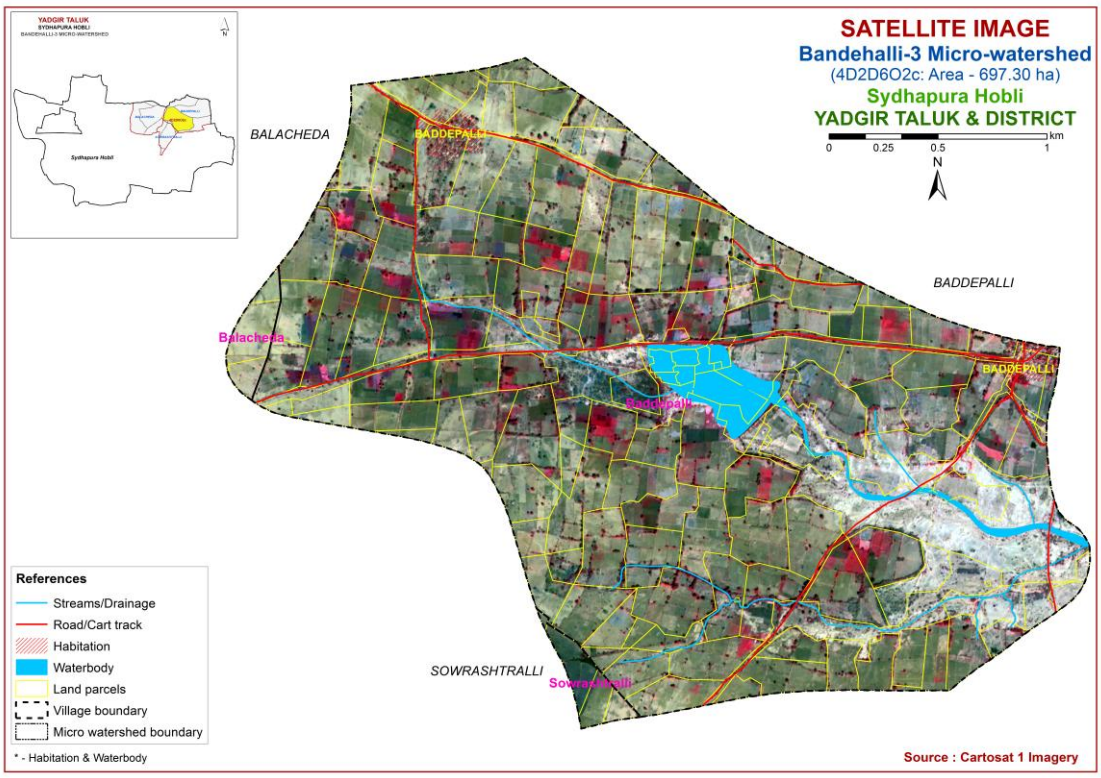


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Bandehalli-3 microwatershed

3.3 Field Investigation

The field boundaries and survey numbers given on the cadastral sheet were located on the ground by following permanent features like roads, cart tracks, *nallas*, streams, tanks etc., and wherever changes were noticed, they were incorporated on the microwatershed cadastral map. Preliminary traverse of the microwatershed was carried out with the help of cadastral map, imagery and toposheets. While traversing, landforms and physiographic units identified were checked and preliminary soil legend was prepared by studying soils at few selected places. Then, intensive traversing of each physiographic unit like hills, ridges, uplands and valleys was carried out. Based on the variability observed on the surface, transects (Fig. 3.4) were selected across the slope covering all the landform units in the microwatershed (Natarajan and Dipak Sarkar, 2010)

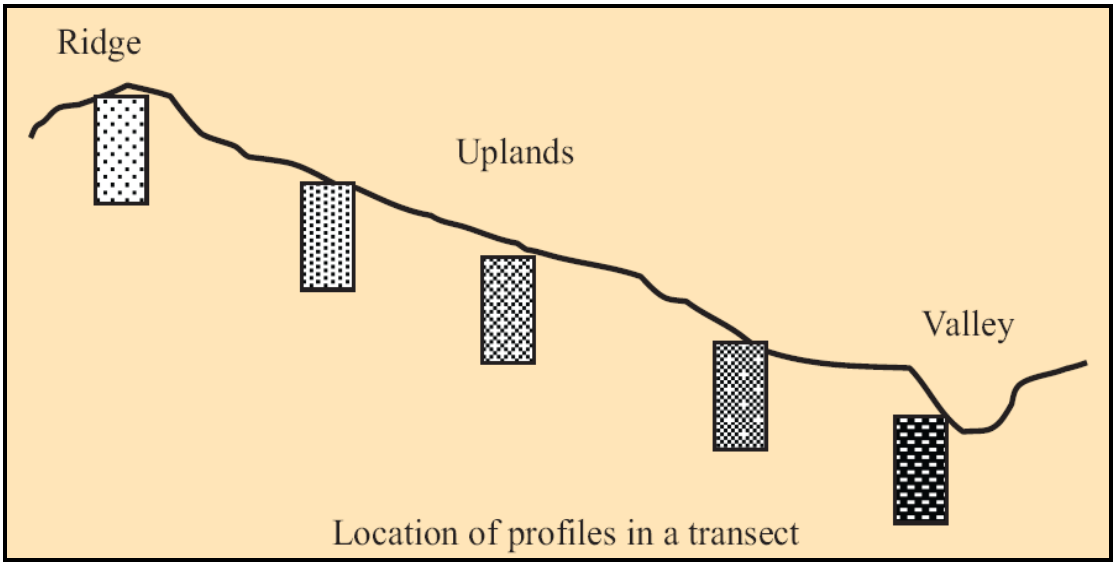


Fig: 3.4. Location of profiles in a transect

In the selected transect, soil profiles were located (Fig. 3.4) at closely spaced intervals to take care of any change in the land features like break in slope, erosion, gravel, stones etc. In the selected sites, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas.

Based on the soil-site characteristics, the soils were grouped into different soil series (soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management). Soil depth, texture, colour, kind of horizon and horizon sequence, amount and nature of gravel present, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying soil series are given in Table 3.1. Based on the above characteristics, 13 soil series were identified in the Bandehalli-3 microwatershed.

Table 3.1 Differentiating Characteristics used for Identifying Soil Series (Characteristics are of Series Control Section)

SOILS OF GRANITE GNEISS LANDSCAPE							
Sl. No.	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcare ousness**
1	Baddeppalli (BDP)	<25	7.5YR 3/2,3/4, 5YR 3/4	scl	-	Ap-Ac	es
2	Badiyala (BDL)	25-50	7.5YR 2.5/3, 2.5/2,3/3 10YR 3/4,4/3	sl	-	Ap-Bw	e
3	Dastharabad (DSB)	25-50	7.5YR 3/3	g c	35-60	Ap-Bt-Cr	-
4	Vanakanahalli (VNK)	25-50	2.5YR 3/4	sc	-	Ap-Bt-Cr	-
5	Jinkera (JNK)	50-75	10YR 3/1,3/2 7.5YR 3/4	scl	-	Ap-Bw	e
6	Yalleri (YLR)	50-75	2.5YR 3/4,4/4 5YR 3/4 7.5 YR4/4	c	15-35	Ap-Bt	-
7	Balichakra (BLC)	75-100	2.5YR 5/3, 2.5/4 5YR 4/3,3/3	scl	-	Ap-Bt	e
8	Gowdagera (GWD)	75-100	10YR 3/1, 3/2, 4/2	scl	-	Ap-Bw	es
9	Hosalli (HSL)	75-100	10YR 5/4,4/4, 4/6	sc	-	Ap-Bw	e
10	Anur (ANR)	100-150	10YR 4/3,4/1	c	-	Ap-Bw	es
11	Gondedagi (GDG)	100-150	5YR 4/2 7.5YR 4/2	scl	-	Ap-Bt	e
SOILS OF ALLUVIAL LANDSCAPE							
12	Rampur (RMP)	50-75	10 YR 3/1,5/4	scl	-	Ap-Bt	-
13	Sowrashtrahalli (SWR)	100-150	10YR 4/1,3/2, 3/1	c	-	Ap-Bss	es

3.4 Soil Mapping

The area under each soil series was further separated into 16 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey many soil profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map.

The soil map shows the geographic distribution of 16 soil mapping units representing 13 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 16 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2017 from farmer's fields (68 samples) for fertility status (major and micronutrients) at 320 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using Kriging method for the microwatershed.

Table 3.2 Soil Map Unit description of Bandehalli-3 microwatershed

Soil Map unit No.	Soil Series	Soil phase	Soil Map Unit	Mapping Unit Description	Area in ha (%)
	Soil of Granite gneiss Landscape				
	BDP	Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous, sandy clay loam red soils occurring on very gently sloping uplands under cultivation			**76 (10.85)**
120		BDPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion		76 (10.85)
	BDL	Badiyala soils are shallow (25-50 cm), well drained, have dark brown to very dark brown and dark yellowish brown, slightly calcareous, sandy loam soils occurring on very gently to gently sloping uplands under cultivation			**78 (11.14)**
2		BDLbB2	Loamy sand surface, slope 1-3%, moderate erosion		56 (8.04)
4		BDLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion		22 (3.1)
	DSB	Dastharabad soils are shallow (25-50 cm), well drained, have dark brown to very dark brown, gravelly clay soils occurring on very gently to gently sloping uplands under cultivation			**53 (7.6)**
121		DSBcB2	Sandy loam surface, slope 1-3%, moderate erosion		53 (7.6)
	VNK	Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown, sandy clay red soils occurring on very gently sloping uplands under cultivation			**3 (0.48)**

9		VNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	3 (0.48)
	JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**75 (10.72)**
20		JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	75 (10.72)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, gravelly clay red soils occurring on very gently to gently sloping uplands under cultivation		**22 (3.14)**
27		YLRbB2	Loamy sand surface, slope 1-3%, moderate erosion	22 (3.14)
	BLC	Balichakra soils are moderately deep (75-100 cm), well drained, have reddish brown to dark reddish brown, slightly calcareous sandy clay red soils occurring on very gently sloping uplands under cultivation		**22 (3.1)**
37		BLCcB2	Sandy loam surface, slope 1-3%, moderate erosion	22 (3.1)
	GWD	Gowdagera soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown, calcareous sandy clay loam black soils occurring on very gently sloping uplands under cultivation		**201 (28.78)**
34		GWDcB2	Sandy loam surface, slope 1-3%, moderate erosion	109 (15.64)
35		GWDiB2	Sandy clay surface, slope 1-3%, moderate erosion	92 (13.14)
	HSL	Hosalli soils are moderately deep (75-100 cm), well drained, have yellowish brown to dark yellowish brown, slightly calcareous sandy clay soils occurring on very gently sloping uplands under cultivation		**115 (16.52)**
111		HSLbB2	Loamy sand surface, slope 1-3%, moderate erosion	91 (13.05)
126		HSLhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	24 (3.47)
	ANR	Anur soils are deep (100-150 cm), moderately well drained, have dark gray to brown, calcareous clay soils occurring on very gently sloping uplands under cultivation		**1 (0.09)**
51		ANRbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	1 (0.09)
	GDG	Gondedagi soils are deep (100-150 cm), well drained, have brown to dark reddish gray, slightly calcareous sandy clay loam soils occurring on very gently sloping uplands under cultivation		**16 (2.3)**
45		GDGbB3g1	Loamy sand surface, slope 1-3%, severe erosion, gravelly (15-35%)	16 (2.3)

Soils of Alluvial Landscape				
	RMP	Rampur soils are moderately shallow (50-75 cm), moderately well drained, have yellowish brown to very dark gray, sandy clay loam alluvial soils occurring on very gently sloping plains under cultivation		**5 (0.68)**
70		RMPcB2	Sandy loam surface, slope 1-3%, moderate erosion	5 (0.68)
	SWR	Sowrashtrahalli soils are deep (100-150 cm), moderately well drained, have dark gray to very dark grayish brown, calcareous black cracking clay soils occurring on very gently sloping plains under cultivation		**4 (0.61)**
91		SWRmB2	Clay surface, slope 1-3%, moderate erosion	4 (0.61)
1000	Other	Habitation and Water bodies		**28 (4.01)**

3.6 Land Management Units (LMU's)

The 16 soil phases identified and mapped in the microwatershed were grouped into 8 Land Management Units(LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units(LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been chosen for identification and delineation of LMUs. For Bandehalli-3 microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Unitsare expected to behave similarly for a given level of management.

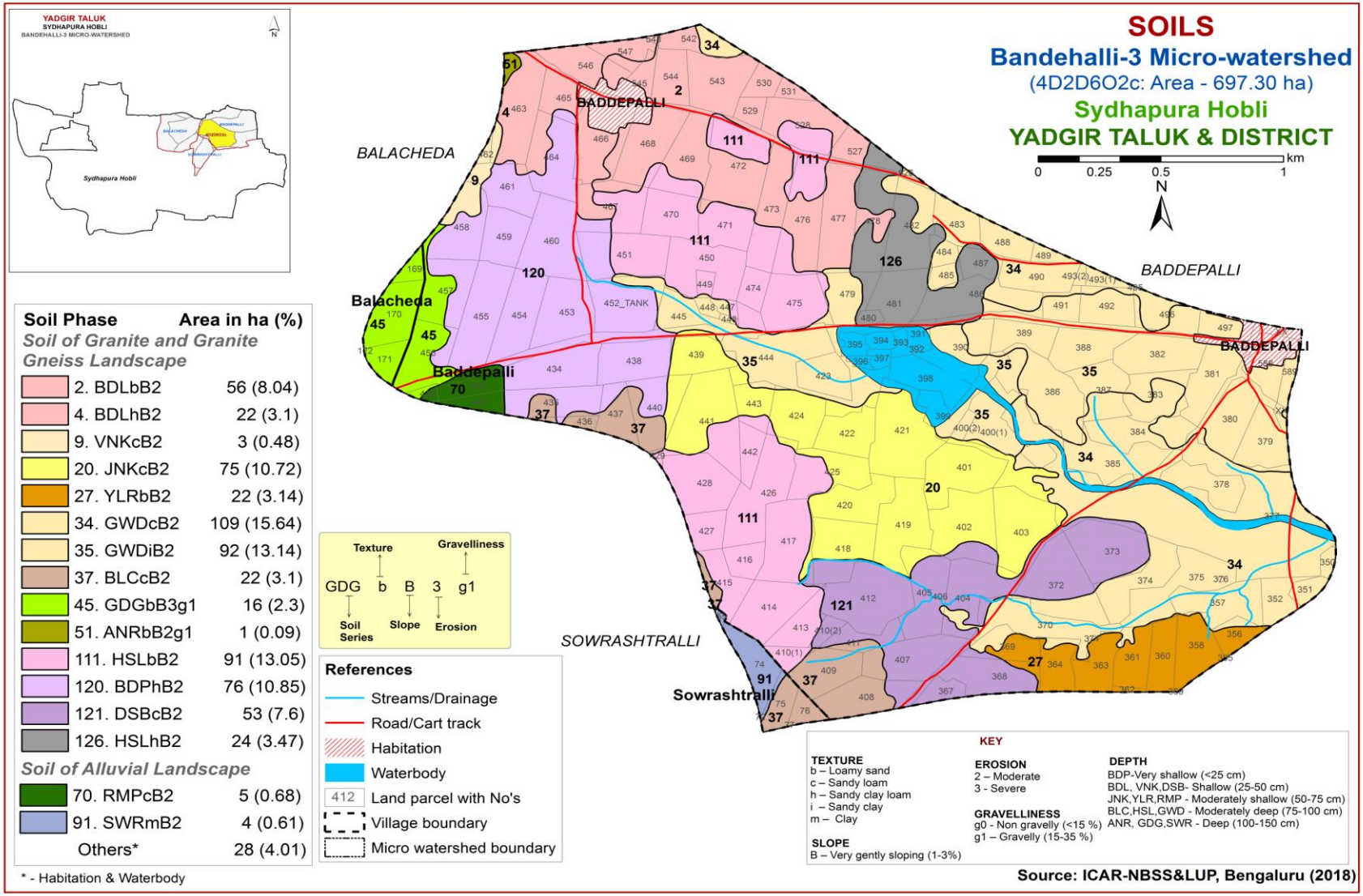


Fig 3.5 Soil phase or management units map of Bandehalli-3 microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Bandehalli-3 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 13 soil series were identified in this landscape. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. In these landscapes, it is by parent material, relief, time and climate.

A brief description of each of the 13 soil series identified followed by 16 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Bandehalli-3 microwatershed are given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristics that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss Landscape

In this landscape, 11 soil series are identified and mapped. The Gowdagera (GWD) series cover a maximum area of 201 ha (29%) followed by Hosalli (HSL) 115 ha (17%), Badiyala (BDL) 78 ha (11%), Baddeppalli (BDP) 76 ha (11%), Jinkera (JNK) 75 ha (11%), Dastharabad (DSB) 53 ha (8%), Yalleri (YLR) 22 ha (3%), Balichakra (BLC) 22 ha (3%), Gondedagi (GDG) 16 ha (2%), Rampur (RMP) 5 ha (<1%), Sowrashtrahalli (SWR) 4 ha (<1%) and others occupy minor area in the microwatershed. The brief description of these series along with the soil phases identified and mapped is given below.

4.1.1 Baddeppalli (BDP) Series: Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Baddepalli series has been classified as a member of the loamy, mixed, (calcareous), isohyperthermic family of Lithic Ustorthents.

The thickness of the soil is less than 25 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 2 to 4. The texture varies from sandy clay loam to sandy clay and is calcareous. The available water capacity is very low (<50 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Baddeppalli (BDP) Series

4.1.2 Badiyala (BDL) Series: Badiyala soils are shallow (25-50 cm), well drained, have very dark brown, dark yellow brown and dark brown, slightly calcareous sandy loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Badiyala series has been classified as a member of the coarse-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum ranges from 28 to 50 cm. The thickness of A horizon ranges from 4 to 12 cm. Its colour is in 10YR hue with value 3 to 4 and chroma 3 to 4. The texture is loamy sand, sandy clay loam and sandy clay. The thickness of B horizon ranges from 27 to 45 cm. Its colour is in 10 YR and 7.5 YR hue with value 2 to 4 and chroma 3 to 4. Its texture is sandy loam to sandy clay loam and is slightly calacreous. The available water capacity is very low (<50 mm/m). Two phases were identified and mapped.

Landscape and soil Profile characteristics of Badiyala (BDL) Series

4.1.3 Dastharabad (DSB) Series: Dastharabad soils are shallow (25-50 cm), well drained, have dark brown, very gravelly clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Dastharabad series has been classified as a member of the clayey-skeletal, mixed, isohyperthermic family of Paralithic Haplustalfs.

The thickness of the solum ranges from 28 to 50 cm. The thickness of A horizon ranges from 9 to 14 cm. Its colour is in 10 YR and 7.5 YR hue with value and chroma of 3 to 4. The texture varies from sandy loam to sandy clay. The thickness of B horizon ranges from 28 to 40 cm. Its colour is in 7.5 YR hue with value 3 and chroma 3 to 4. The texture is sandy clay to clay with 35-60 per cent gravel. The available water capacity is very low (<50 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Dastharabad (DSB) Series

4.1.4 Vanakanahalli (VNK) Series: Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown sandy clay red soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Vanakanahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 25 to 49 cm. The thickness of A horizon ranges from 7 to 16 cm. Its colour is in 2.5 YR and 5 YR with value 3 and chroma 2 to 4. The texture is sandy loam to sandy clay loam and sandy clay. The thickness of B horizon ranges from 20 to 40 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 to 4 and chroma 3 to 4. Its texture is sandy clay. The available water capacity is very low (<50 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Vanakanahalli (VNK) Series

4.1.5 Jinkera (JNK) Series: Jinkera soils are moderately shallow (50-75 cm), well drained, have very dark gray to very dark grayish brown and dark brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Jinkera series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 51-75 cm. Thickness of A horizon ranges from 6 to 11 cm. Its colour is in hue 10 YR and 7.5 YR with value and chroma of 3 to 4. The texture varies from sandy loam to sandy clay. The thickness of B horizon ranges from 53 to 66 cm. Its colour is in 10 YR and 7.5 YR hue with value and chroma of 2 to 4. The texture varies from sandy clay loam to sandy clay and is slightly calcareous. The available water capacity is low (51-100 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Jinkera (JNK) Series

4.1.6 Yalleri (YLR) Series: Yalleri soils are moderately shallow (50-75 cm), well drained, have very dark reddish brown to dark brown, gravelly clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Yalleri series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 50 to 74 cm. The thickness of A horizon ranges from 10 to 13 cm. Its colour is in 7.5 YR and 5 YR hue with value and chroma 2 to 4. The texture is sandy loam, loamy sand, and sandy clay loam. The thickness of B horizon ranges from 45 to 64 cm. Its colour is in 10 YR, 7.5 YR and 5 YR hue with value 2 to 4 and chroma 2 to 4. Its texture is clay with gravel content of 15-35 per cent. The available water capacity is low (51-100 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Yalleri (YLR) Series

4.1.7 Balichakra (BLC) Series: Balichakra soils are moderately deep (75-100 cm), well drained, have dark reddish brown to reddish brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Balichakra series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 80 to 100 cm. The thickness of A horizon ranges from 10 to 16 cm. Its colour is in hue 5 YR with value and chroma of 3 to 4. Its texture varies from sandy clay loam and sandy clay. The thickness of B horizon ranges from 70 to 88 cm. Its colour is in hue 2.5 YR and 5 YR with value 3 to 5 and chroma 3 to 4. Its texture is sandy clay loam to sandy clay and is slightly calcareous. The available water capacity is medium (101-150 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Balichakra (BLC) Series

4.1.8 Gowdagera (GWD) Series: Gowdagera soils are moderately deep (75-100 cm), moderately well drained, have very dark gray to dark grayish brown, calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Gowdagera series has been classified as a member of the fine-loamy, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 8 to 16 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 2 to 4. Its texture varies from sandy loam to sandy clay loam. The thickness of B horizon ranges from 61 to 91 cm. Its colour is in hue 10 YR with value 2 to 4 and chroma 1 to 4. Its texture is sandy clay loam to sandy clay and is calcareous. The available water capacity is medium (101-150 mm/m). Two phases were identified and mapped.

Landscape and soil Profile characteristics of Gowdagera (GWD) Series

4.1.9 Hosalli (HSL) Series: Hosalli soils are moderately deep (75-100 cm), moderately well drained, have dark yellowish brown to yellowish brown, slightly calcareous sandy clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Hosalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A horizon ranges from 6 to 15 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 to 5 and chroma 2 to 4. Its texture varies from loamy sand to sandy loam and sandy clay loam. The thickness of B horizon ranges from 62 to 93 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 2 to 4. Its texture varies from sandy clay loam to sandy clay and clay and is slightly calcareous. The available water capacity is medium (101-150 mm/m). Two phases were identified and mapped.

Landscape and soil Profile characteristics of Hosalli (HSL) Series

4.1.10 Anur (ANR) Series: Anur soils are deep (100-150 cm), moderately well drained, have dark gray to dark brown, calcareous clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Anur series has been classified as a member of the fine, mixed, (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 102 to 148 cm. The thickness of A-horizon ranges from 9 to 17 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture ranges from loamy sand to sandy clay loam and sandy clay and are calcareous. The thickness of B horizon ranges from 102 to 135 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 6. Texture is sandy clay loam to sandy clay and clay and is calcareous. The available water capacity is very high (>200 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Anur (ANR) Series

4.1.11 Gondedagi (GDG) Series: Gondedagi soils are deep (100-150 cm), well drained, have dark reddish gray to dark brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Gondedagi series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 105 to 148 cm. The thickness of A horizon ranges from 9 to 17 cm. Its colour is in 7.5 YR and 5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam to sandy clay. The thickness of B horizon ranges from 108 to 135 cm. Its colour is in 5 YR and 7.5 YR hue with value 2 to 4 and chroma 2 to 4. The texture is sandy clay loam and is slightly calcareous. The available water capacity is medium (101-150 mm/m). One phase is identified and mapped.

Landscape and soil Profile characteristics of Gondedagi (GDG) Series

4.2 Soils of Alluvial landscape

In this landscape, two soil series has been identified and mapped. Of these, the Rampur (RMP) series cover an area of 5 ha (<1%) followed by Sowrashtrahalli (SWR) 4 ha (<1%) in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

4.2.1 Rampura (RMP) Series: Rampur soils are moderately shallow (50-75 cm), well drained, have very dark to yellowish brown, sandy clay loam soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Rampur series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 53 to 75 cm. The thickness of A horizon ranges from 6 to 12 cm. Its colour is in 7. 5 YR and 10 YR hue with value 4 to 5 and chroma 3 to 6. The texture is sandy loam to sandy clay loam. The thickness of B horizon ranges from 48 to 65 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 5 and chroma 1 to 6. Its texture is sandy clay loam to sandy clay. The available water capacity is medium (101-150 mm/m). One phase was identified and mapped.

Landscape and soil Profile characteristics of Rampura (RMP) Series

4.2.2 Sowrashtrahalli (SWR) Series: Sowrashtrahalli soils are deep (100-150 cm), moderately well drained, have very dark gray to dark gray, calcareous cracking clay soils. They have developed from alluvium and occur on very gently sloping plains under cultivation. The Sowrashtrahalli series has been classified as a member of the fine, smectitic, (calcareous), isohyperthermic family of Typic Haplusterts.

The thickness of the solum ranges from 107 to 150 cm. The thickness of A horizon ranges from 7 to 13 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. The texture varies from sandy clay to clay. The thickness of B horizon ranges from 104 to 142 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. The

texture is clay and is calcareous. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile characteristics of Sowrashtrahalli (SWR) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Bandehalli-3 microwatershed

Soil Series: Baddeppalli **(**BDP) **Pedon:** R-11
Location: $16^0$43'84.4"N $77^0$14'06.4"E, Halagera village, Yadgir hobli, Yadgir taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Loamy, mixed, (calcareous), isohyperthermic Lithic Ustorthents

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-16	Ap	58.67	17.02	24.31	19.03	13.74	9.62	10.57	5.71	<15	scl	16.19	8.18

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-16	8.58	-	-	0.262	1.60	7.67	-	-	0.24	0.06	-	18.10	0.74	100	0.35

Contd...

Soil Series: Badiyala **(**BDL) **Pedon:** R-5

Location: $16^0$37'10.0"N $77^0$20'21.5", Gudalagunta village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Coarse-loamy, mixed, isohyperthermic Fluventic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-12	Ap	87.13	7.04	5.83	10.03	24.32	23.61	23.51	5.67	<15	ls	6.27	2.44
12-28	Bw1	64.63	13.30	22.07	6.74	13.07	22.30	17.01	5.50	<15	scl	16.34	7.83
28-52	BC	73.11	12.02	14.87	3.93	16.03	26.89	18.41	7.86	<15	sl	12.94	5.47

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-12	6.20	-	-	0.074	1.00	0.00	2.80	0.98	0.14	0.01	3.92	4.20	0.72	93	0.20
12-28	9.04	-	-	0.253	0.80	3.20	-	-	0.16	0.69	-	16.90	0.77	100	4.09
28-52	9.41	-	-	0.364	1.10	3.60	-	-	0.16	1.39	-	11.10	0.75	100	12.52

Contd...

Soil Series: Dastharabad **(**DSB) **Pedon:** R-17

Location: $16^0$31’ 98.6”N $77^0$22’93.0”E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, mixed, isohyperthermic Paralithic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-6	Ap	90.51	4.84	4.64	7.06	8.07	37.24	26.03	12.11	35	s	5.32	1.59
6-17	Bt1	49.11	8.08	42.81	10.67	15.44	10.00	8.44	4.56	20	sc	20.68	13.16
17-43	Bt2	39.54	2.84	57.63	12.89	9.14	7.71	6.83	2.97	50	c	26.69	18.50

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-6	5.93	-	-	0.04	0.67	0.00	2.00	0.54	0.07	0.01	2.61	3.60	0.78	73	0.14
6-17	7.31	-	-	0.110	0.91	0.91	11.19	3.37	0.12	0.49	15.00	15.20	0.36	100	3.22
17-43	6.64	-	-	0.048	0.76	0.00	18.81	5.57	0.23	0.09	24.70	24.90	0.43	99	0.38

Contd...

Soil Series: Vanakanahalli (VNK) **Pedon:** R-15

Location: $16^0$43'49.5"N $77^0$17'17.9"E, Yaleri village, Balichakra hobli, Yadgiri taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	82.61	8.09	9.30	6.77	8.59	21.13	34.58	11.53	-	ls	8.85	3.53
18-50	Bt	54.51	8.73	36.77	4.93	6.18	14.15	20.75	8.49	-	sc	18.88	11.63

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	5.37	-	-	0.11	0.60	0.00	2.96	1.45	0.13	0.14	4.68	6.27	0.67	75	2.22
18-50	4.71	-	-	0.05	0.81	0.00	5.56	2.24	0.10	0.05	7.95	13.31	0.36	60	0.38

Contd...

Soil Series: Jinkera **(**JNK) **Pedon:** R-1

Location: $16^0$45'13.5"N $77^0$10'59.8"E, Varkanahalli village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-15	Ap	66.84	13.62	19.54	12.15	21.22	11.23	12.56	9.68	10	sl	14.42	7.70
15-38	Bw1	59.08	12.11	28.81	12.53	12.42	17.85	8.77	7.52	20	scl	18.21	12.23
38-50	Bw2	68.21	11.68	20.11	17.90	21.81	10.60	10.80	7.10	10	scl	14.54	8.96

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-15	8.42	-	-	0.148	0.70	0.65	-	-	0.15	0.03	-	14.50	0.74	100	0.18
15-38	8.38	-	-	0.226	0.31	2.21	-	-	0.09	0.23	-	21.70	0.75	100	1.05
38-50	8.40	-	-	0.195	0.25	1.17	-	-	0.07	0.19	-	15.90	0.79	100	1.23

Contd...

Soil Series: Yalleri (YLR) **Pedon:** R-16

Location: $16^0$32'54.3"N $77^0$22'71.2"E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-5	Ap	81.69	5.44	12.87	6.10	8.65	33.88	21.57	11.50	-	sl	8.60	3.37
5-34	Bt1	38.78	6.73	54.49	3.38	9.91	12.42	8.93	4.14	-	c	25.33	15.82
34-75	Bt2	40.35	2.90	56.75	12.91	6.83	10.30	7.48	2.82	35-60	c	24.49	16.20

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-5	6.91	-	-	0.069	0.70	0.00	5.29	1.37	0.28	0.03	6.96	6.90	0.54	100	0.45
5-34	7.05	-	-	0.053	0.62	0.00	16.43	3.89	0.26	0.09	20.67	21.60	0.40	96	0.42
34-75	7.25	-	-	0.058	0.59	0.00	15.22	3.46	0.25	0.14	19.06	19.90	0.35	96	0.69

Contd...

Soil Series: Balichakra (BLC) **Pedon:** T1/P2

Location: $16^0$33'25.0"N $77^0$20'52.3"E, Sowrashtralli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	65.46	8.38	26.16	12.51	18.72	18.82	10.44	4.96	-	scl	15.15	8.63
8-19	Bt1	63.48	8.16	28.36	12.80	15.84	17.21	12.49	5.14	-	scl	16.45	8.81
19-40	Bt2	52.64	11.58	35.79	13.19	13.19	14.35	8.23	3.69	-	sc	21.49	10.36
40-75	BC	55.14	10.71	34.15	14.10	14.42	14.63	7.53	4.45	-	scl	17.77	8.99

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	6.75	-	-	0.19	0.72	0.00	12.18	3.10	0.43	0.22	15.92	16.80	0.64	95	1.31
8-19	7.23	-	-	0.12	0.68	0.84	11.37	2.50	0.23	0.18	14.28	14.77	0.52	97	1.24
19-40	7.13	-	-	0.08	0.50	0.48	13.80	2.82	0.18	0.09	16.89	17.66	0.49	96	0.51
40-75	7.07	-	-	0.07	0.35	0.84	13.00	2.90	0.17	0.10	16.16	17.55	0.51	92	0.57

Contd...

Soil Series: Gowdagera (GWD) **Pedon:** R-13

Location: $16^0$38'24.4"N $77^0$21'24.0"E, Madhawara village, Balichakara hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, (calcareous), isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	79.61	13.94	6.45	14.17	17.53	23.65	17.02	7.24	-	ls	11.36	3.86
18-42	BW1	69.09	10.58	21.06	10.54	16.58	22.01	14.43	5.53	-	scl	31.62	12.30
42-81	Bw2	51.37	13.51	35.60	7.59	10.55	16.24	11.60	5.38	-	sc	67.57	26.89

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	9.89	-	-	0.74	0.66	1.20	-	-	0.18	3.63	-	8.35	1.29	100	43.51
18-42	10.82	-	-	1.60	0.27	5.76	-	-	0.19	19.23	-	15.84	0.75	100	121.42
42-81	10.83	-	-	2.30	0.27	7.80	-	-	0.40	26.71	-	26.54	0.75	100	100.67

Contd...

Soil Series: Hosalli (HSL) **Pedon:** R-3

Location: $16^0$46'60.3"N $77^0$05'47.6"E, Mudhanala village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-10	Ap	88.43	5.15	6.42	5.69	6.40	36.04	27.31	12.99	-	s	7.40	2.74
10-30	Bw1	58.47	7.24	34.29	4.26	9.37	19.91	19.28	5.64	-	scl	19.07	11.57
30-50	Bw2	51.43	12.67	35.90	3.49	8.89	16.72	15.87	6.46	<15	sc	21.64	12.44
50-90	Bw3	49.89	13.64	36.47	2.43	2.96	20.61	16.17	7.72	<15	sc	21.12	12.95

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	7.16	-	-	0.117	0.48	0.00	2.83	1.50	0.15	0.29	4.76	4.90	0.76	97	5.94
10-30	6.91	-	-	0.040	0.36	0.00	10.64	5.43	0.10	0.26	16.43	17.80	0.52	92	1.47
30-50	8.17	-	-	0.182	0.24	1.43	-	-	0.12	0.22	-	19.90	0.55	100	1.08
50-90	8.60	-	-	0.148	0.20	4.29	-	-	0.13	0.16	-	19.70	0.54	100	0.81

Contd...

Soil Series: Anur (ANR) **Pedon:** R-15

Location: $16^0$32'45.0"N $77^0$23'57.4"E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, (calcareous), isohyperthermic Typic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	64.60	13.44	21.96	7.33	10.42	18.68	20.12	8.05	<15	scl	16.59	7.96
18-49	Bw1	56.66	12.19	31.15	4.73	9.80	18.66	17.02	6.45	-	scl	33.38	13.51
49-95	Bw2	39.94	17.81	42.25	3.09	3.30	15.44	10.65	7.45	<15	c	44.68	25.23
95-123	Bw3	30.65	17.58	51.77	1.50	5.57	10.18	9.65	3.75	<15	c	54.94	32.07

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	10.17	-	-	0.365	0.48	6.11	-	-	0.25	3.52	-	19.90	0.91	100	17.70
18-49	10.32	-	-	1.38	0.30	6.76	-	-	0.21	16.03	-	24.60	0.79	100	65.17
49-95	10.08	-	-	2.55	0.17	6.11	-	-	0.33	21.49	-	32.60	0.77	100	65.91
95-123	9.92	-	-	2.56	0.12	7.93	-	-	0.51	26.03	-	36.00	0.70	100	72.30

Contd...

Soil Series: Gondedagi (GDG) **Pedon:** R-6

Location: $16^0$34' 42.6"N $77^0$20'00.1"E, Balached, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	84.15	7.67	8.18	19.72	24.39	20.33	12.80	6.91	-	ls	5.83	3.37
17-55	Bt1	62.36	11.26	26.38	19.71	16.58	11.89	7.82	6.36	-	scl	14.94	9.18
55-115	Bt2	57.78	13.38	28.84	21.84	12.54	9.61	7.63	6.17	-	scl	17.93	9.86

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	5.57	-	-	0.25	0.60	0.00	3.45	0.92	0.14	0.01	4.52	5.83	0.71	78	0.22
17-55	6.20	-	-	0.04	0.57	0.00	9.79	1.58	0.07	0.05	11.49	14.96	0.57	77	0.31
55-115	8.32	-	-	0.14	0.45	6.24	-	-	0.08	0.05	-	15.84	0.55	100	0.34

Contd...

Soil Series: Rampura (RMP) **Pedon:** T1/P1

Location: $16^0$33'54.7"N $77^0$20'45.1"E, Sowrashtralli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-loamy, mixed, isohyperthermic Typic Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-7	Ap	93.37	4.32	2.31	18.39	21.91	24.62	19.90	8.54	-	s	3.89	1.01
7-28	A2	83.08	7.65	9.26	14.60	18.23	21.75	20.85	7.65	-	ls	6.25	1.94
28-70	Bt1	61.88	6.38	31.74	19.17	13.54	14.17	12.29	2.71	-	scl	15.95	8.69

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-7	5.97	-	-	0.04	0.34	0.00	0.70	0.18	0.06	0.01	0.95	1.70	0.74	56	0.77
7-28	6.06	-	-	0.03	0.26	0.00	1.83	0.53	0.07	0.05	2.48	3.30	0.36	75	1.58
28-70	6.65	-	-	0.20	0.26	0.00	7.05	3.19	0.15	0.95	11.34	13.00	0.41	87	7.31

Contd...

Soil Series: Sowrashtrahalli (SWR) **Pedon:** R-8

Location: $16^0$38'49.0"N $77^0$16'56.1"E, Killanakera village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, smectitic, (calcareous), isohyperthermic Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-9	Ap	32.07	21.06	46.87	2.72	4.78	8.37	10.43	5.76	-	c	33.69	16.51
9_34	BA	32.29	20.37	47.35	3.90	5.20	8.56	9.10	5.53	-	c	37.43	16.65
34-67	Bss1	30.11	23.13	46.76	4.18	5.05	8.13	8.13	4.62	-	c	38.02	19.44
67-124	Bss2	19.93	23.40	56.66	2.46	3.14	5.04	5.71	3.58	-	c	42.55	23.92

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-9	8.44	-	-	0.18	0.77	7.47	-	-	0.79	0.21	-	47.70	1.02	100	0.45
9-34	8.57	-	-	0.14	0.81	6.86	-	-	0.51	0.23	-	47.80	1.01	100	0.49
34-67	8.73	-	-	0.12	0.81	6.48	-	-	0.28	0.44	-	50.60	1.08	100	0.88
67-124	8.71	-	-	0.16	0.77	7.56	-	-	0.42	0.91	-	51.20	0.90	100	1.78

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

The most important soil and site characteristics that affect the land use and conservation needs of an area are land capability, land irrigability, soil depth, soil texture, coarse fragments, available water capacity, soil slope, soil erosion, soil reaction etc. These are interpreted from the data base generated through land resource inventory and several thematic maps are generated. These would help in identifying the areas suitable for growing crops and, soil and water conservation measures and structures needed thus helping to maintain good soil health for sustained crop production. The various thematic maps generated are described below.

5.1 Land Capability Classification

Land capability classification is an interpretative grouping of soil map units (soil phases) mainly based on inherent soil characteristics, external land features and environmental factors that limit the use of land for agriculture, pasture, forestry, or other uses on a sustained basis (IARI, 1971). The land and soil characteristics used to group the land resources in an area into various land capability classes, subclasses and units are

Soil characteristics: Depth, texture, gravel content, calcareousness.

Land characteristics: Slope, erosion, drainage, rock outcrops.

Climate: Total rainfall and its distribution, and length of crop growing period.

The Land capability classification system is divided into land capability classes, subclasses and units based on the level of information available. Eight land capability classes are recognized. They are

Class I: They are very good lands that have no limitations or very few limitations that restrict their use.

Class II: They are good lands that have minor limitations and require moderate conservation practices.

Class III: They are moderately good lands that have moderate limitations that reduce the choice of crops or that require special conservation practices.

Class IV: They are fairly good lands that have severe limitations that reduce the choice of crops or that require very careful management.

Class V: Soils in these lands are not likely to erode, but have other limitations like wetness that are impractical to remove and as such not suitable for agriculture, but suitable for pasture or forestry with minor limitations.

Class VI: The lands have severe limitations that make them generally unsuitable for cultivation, but suitable for pasture or forestry with moderate limitations.

Class VII: The lands have very severe limitations that make them unsuitable for cultivation, but suitable for pasture or forestry with major limitations.

Class VIII: Soil and other miscellaneous areas (rock lands) that have very severe limitations that nearly preclude their use for any crop production, but suitable for wildlife, recreation and installation of wind mills.

The land capability subclasses are recognised based on the dominant limitations observed within a given land capability class. The subclasses are designated by adding a lower case letter like 'e', 'w', 's', or 'c' to the class numeral. The subclass "e" indicates that the main hazard is risk of erosion, "w" indicates drainage or wetness as a limitation for plant growth, "s" indicates shallow soil depth, coarse or heavy textures, calcareousness, salinity/alkali or gravelliness and "c" indicates limitation due to climate.

The land capability subclasses have been further subdivided into land capability units based on the kinds of limitations present in each subclass. Ten land capability units are used in grouping the soil map units. They are stony or rocky (0), erosion hazard (slope, erosion) (1), coarse texture (sand, loamy sand, sandy loam) (2), fine texture (cracking clay, silty clay (3), slowly permeable subsoil (4), coarse underlying material (5), salinity/alkali (6), stagnation, overflow, high ground water table (7), soil depth (8) and fertility problems (9). The capability units thus identified have similar soil and land characteristics that respond similarly to a given level of management. The soils of the microwatershed have been classified upto land capability subclass level.

The 16 soil map units identified in the Bandehalli-3 microwatershed are grouped under three land capability classes and three land capability subclass. Entire area in the microwatershed is suitable for agriculture (Fig. 5.1).

Maximum area of 444 ha (64%) is good cultivable lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the major part of the microwatershed. Moderately good cultivable lands (Class III) cover an area of 150 ha (22%) and are distributed in the northern, northwestern and southern part of the microwatershed with moderate problems of erosion and soil that require special conservation practices. An area of 76 ha (11%) is fairly good lands (Class IV) with very severe limitations of soil and erosion and are distributed in the western part of the microwatershed. An area of about 28 ha (4%) is under miscellaneous lands, habitation and water bodies.

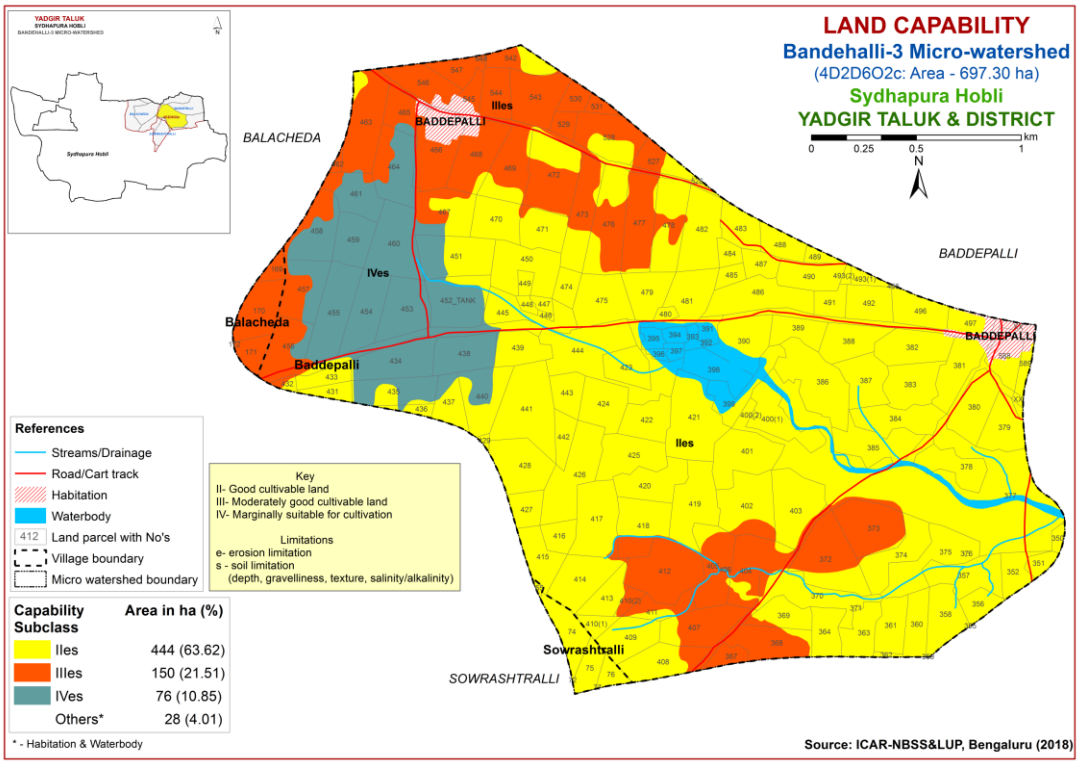


Fig. 5.1 Land Capability map of Bandehalli-3 microwatershed

5.2 Soil Depth

Soil depth refers to the depth of the soil occurring above the parent material or hard rock. The depth of the soil determines the effective rooting depth for plants and in accordance with soil texture, mineralogy and gravel content, the capacity of the soil column to hold water and nutrient availability. Soil depth is one of the most important soil characteristic that is used in differentiating soils into different soil series. The soil depth classes used in identifying soils in the field are very shallow (<25 cm), shallow (25-50 cm), moderately shallow (50-75 cm), moderately deep (75-100 cm), deep (100-150 cm) and very deep (>150 cm). They were used to classify the soils into different depth classes and a soil depth map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.2.

An area of about 76 ha (11%) is very shallow (<25 cm) and are distributed in the western part of the microwatershed. Shallow (25-50 cm) soils occupy an area of 134 ha (19%) and are distributed in the northern and southern part of the microwatershed. An area of 101 ha (15%) is moderately shallow (50-75 cm) and are distributed in the western, central and southern part of the microwatershed. Moderately deep soils (75-100 cm) occur in an area of 337 ha (48%) and are distributed in the major part of the microwatershed. Deep (100-150 cm) soils cover an area of 21 ha (3%) and are distributed in the western, northwestern and southwestern part of the microwatershed.

The most problem lands with an area of about 76 ha (11%) having shallow (25-50 cm) rooting depth. They are suitable for growing short duration agricultural crops but well suited for pasture, forestry or other recreational purposes. The most productive lands

covering about 21 ha (3%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are deep (100-150 cm) occurring in the major part of the microwatershed.

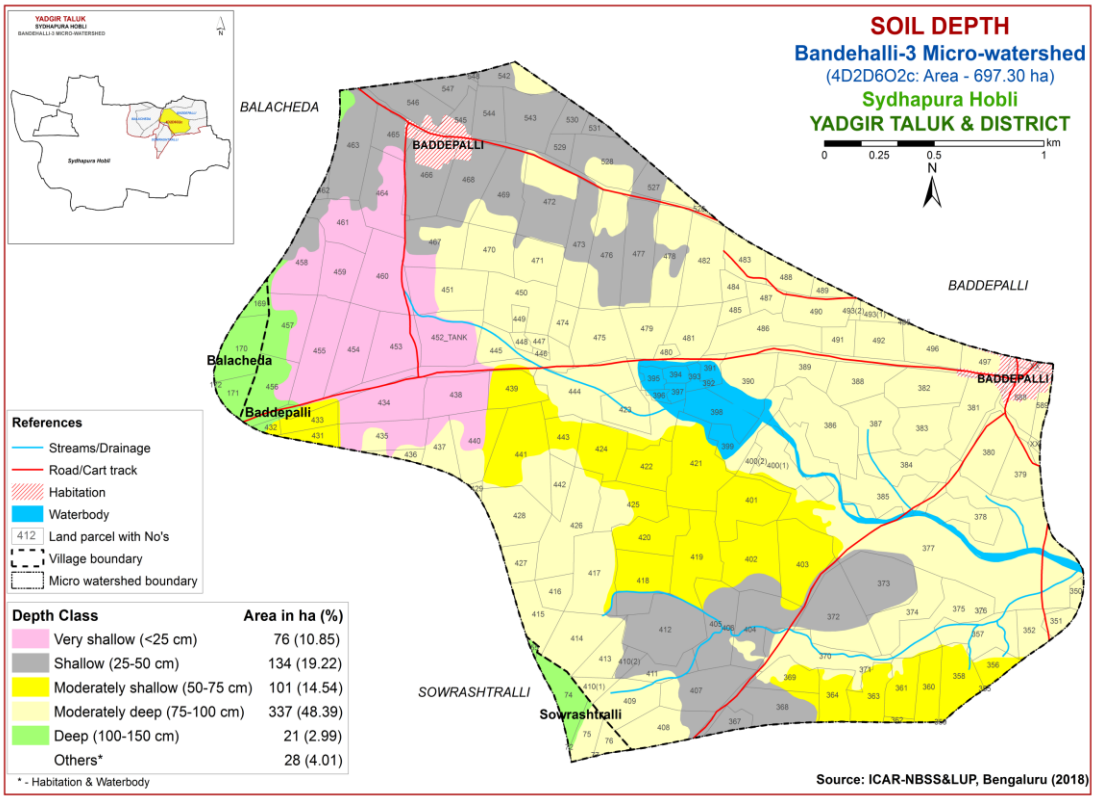


Fig. 5.2 Soil Depth map of Bandehalli-3 microwatershed

5.3 Surface Soil Texture

Texture is an expression to indicate the coarseness or fineness of the soil as determined by the relative proportion of primary particles of sand, silt and clay. It has a direct bearing on the structure, porosity, adhesion and consistence. The surface layer of a soil to a depth of about 25 cm is the layer that is most used by crops and plants. The surface soil textural class provides a guide to understanding soil-water retention and availability, nutrient holding capacity, infiltration, workability, drainage, physical and chemical behaviour, microbial activity and crop suitability. The textural classes used for LRI were used to classify and a surface soil texture map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.3.

An area of about 96 ha (14%) has clayey soils at the surface and are distributed in the southern, northern, northeastern and central part of the microwatershed. Loamy soils occupy an area of about 387 ha (56%) and are distributed in the major part of the microwatershed. An area of 186 ha (27%) has sandy soils and are distributed in the western, northwestern, southwestern and southeastern part of the microwatershed.

The most productive lands covering 96 ha (14%) with respect to surface soil texture are the clayey that have high potential for soil-water retention and availability, and

nutrient retention and availability, but have problems of drainage, infiltration, workability and other physical problems as compared to loamy soils. The other productive lands covering 387 ha (56%) are loamy soils which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems. The problem soils cover about 186 ha (27%) that have sandy soils at the surface having problems of poor soil water retention, nutrient retention and availability, but have better rain water retention less run off and soil moisture conservation, less capillary rise and less evaporation losses.

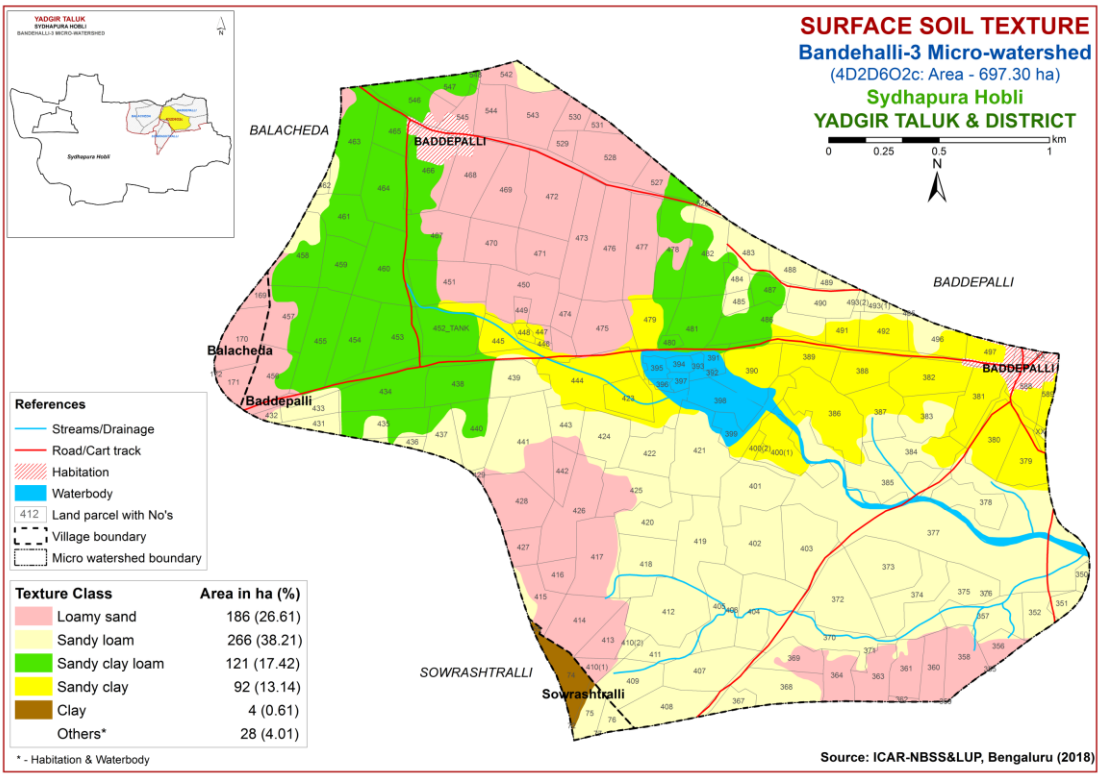


Fig. 5.3 Surface Soil Texture map of Bandehalli-3 microwatershed

5.4 Soil Gravelliness

Gravel is the term used for describing coarse fragments between 2 mm and 7.5 cm diameter and stones for those between 7.5 cm and 25 cm. The presence of gravel and stones in the soil reduces the volume of soil responsible for moisture and nutrient storage, drainage, infiltration and runoff and hinders plant growth by impeding root growth and seedling emergence, intercultural operations and farm mechanization. The gravelliness classes used in LRI were used to classify the soils and using these classes a gravelliness map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.4.

Major area of about 653 ha (94%) has soils that are non gravelly (<15%) and occur in all parts of the microwatershed. A small area of about 17 ha (2%) has gravelly (15-35%) and are distributed in the northwestern and western part of the microwatershed.

The most productive lands with respect to gravelliness are found to be 97 per cent. They are non gravelly (<15%) and have potential for growing all annual and perennial crops. The problem soils that are gravelly (15-35%) cover 17 ha (2%) where only short or medium duration crops can be grown.

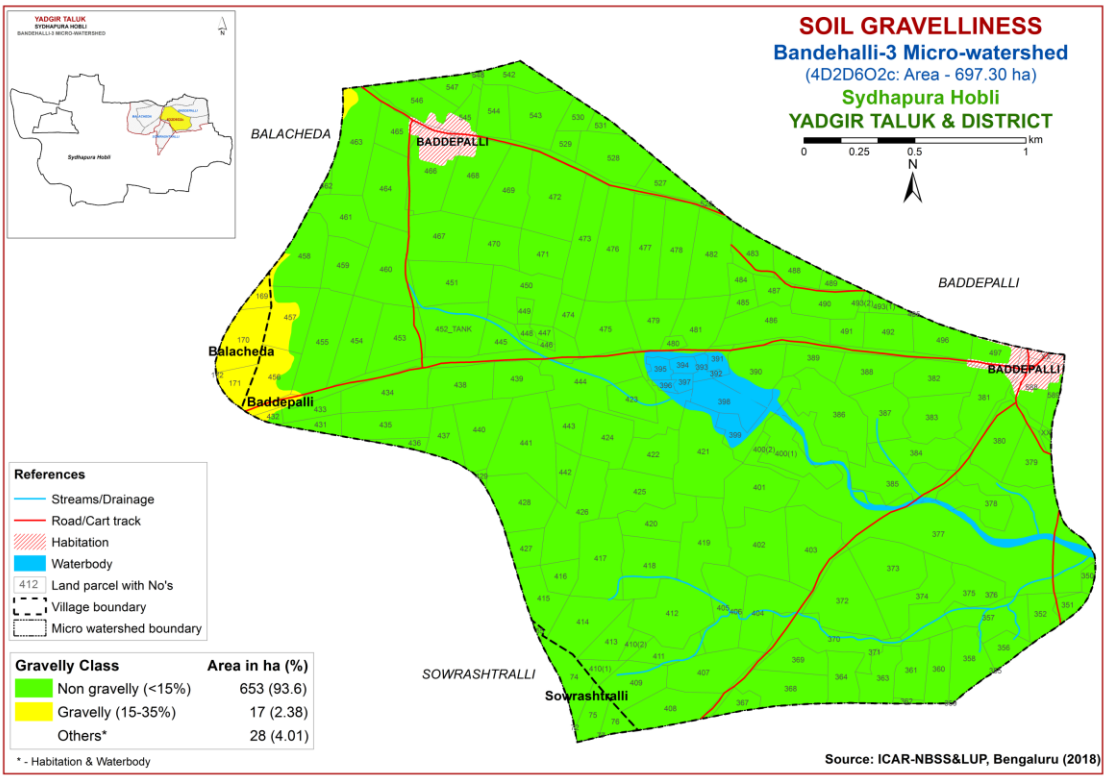


Fig. 5.4 Soil Gravelliness map of Bandehalli-3 microwatershed

5.5 Available Water Capacity

The soil available water capacity (AWC) is estimated based on the ability of the soil column to retain water between the tensions of 0.33 and 15 bar in a depth of 100 cm or the entire solum if the soil is shallower. The AWC of the soils (soil series) as estimated by considering the soil texture, mineralogy, soil depth and gravel content (Sehgal *et al.*, 1990) and accordingly the soil map units were grouped into five AWC classes *viz*, very low (<50 mm/m), low (50-100 mm/m), medium (100-150 mm/m), high (150-200 mm/m) and very high (>200 mm/m) and using these classes an AWC map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.5), showing the area extent and their spatial distribution in the microwatershed.

An area of 210 ha (30%) has soils that are very low (<50 mm/m) in available water capacity and are distributed in the southern, northern and western part of the microwatershed. An area of about 233 ha (33%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the southern, southwestern, central and northern part of the microwatershed. An area of 221 ha (32%) has soils that are medium (101-150 mm/m) in available water capacity and are distributed in the western, northern, central, southern and eastern part of the microwatershed. A small area of 5 ha (<1%) has

very high (>200 mm/m) and are distributed in the northwestern and southern part of the microwatershed.

An area of 210 ha (30%) in the microwatershed has soils that are problematic with regard to available water capacity. Here, only the short or medium duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. The potential soils with respect to AWC cover about 5 ha that has very high AWC, where all climatically adapted long duration crops can be grown.

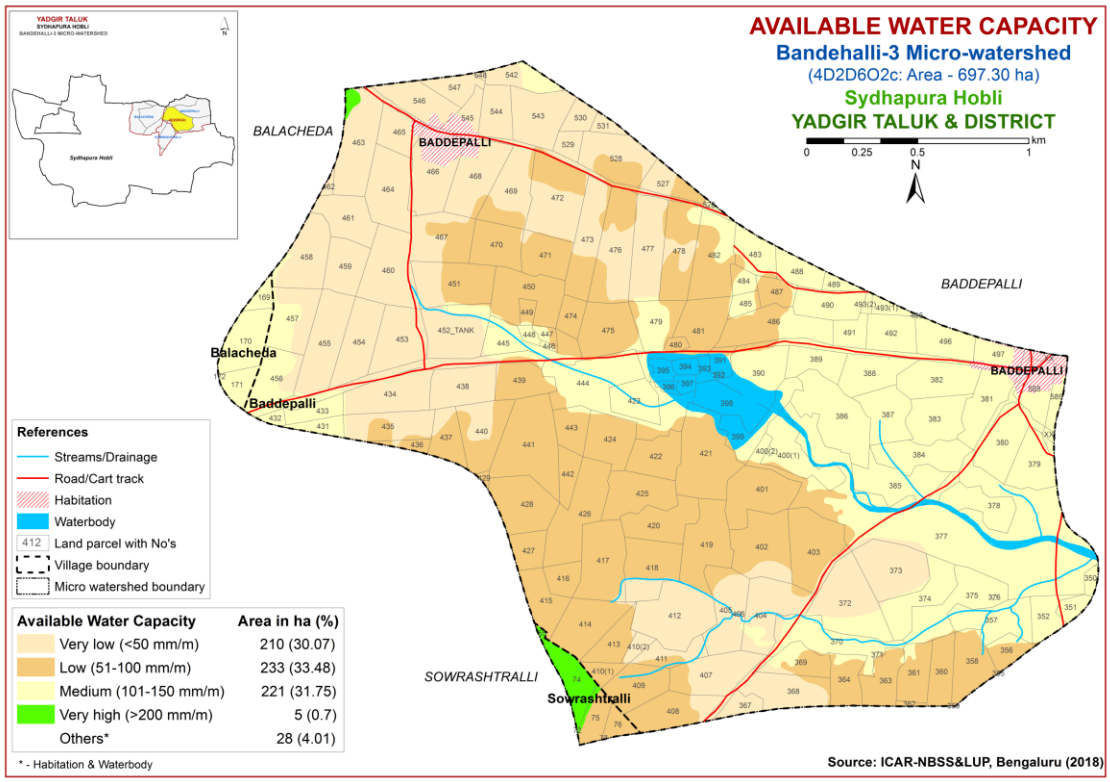


Fig. 5.5 Soil Available Water Capacity map of Bandehalli-3 microwatershed

5.6 Soil Slope

Soil slope refers to the inclination of the surface of the land. It is defined by gradient, shape and length, and is an integral feature of any soil as a natural body. Slope is considered important in soil genesis, land use and land development. The length and gradient of slope influences the rate of runoff, infiltration, erosion and deposition. The soil map units were grouped into four slope classes and a slope map was generated. The area extent and their geographical distribution in the microwatershed is shown in Figure 5.6.

Entire cultivated area in the microwatershed falls under very gently sloping (1-3%) lands. It covers an area of about 669 ha (96%) and is distributed in all parts of the microwatershed.

In all these lands, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

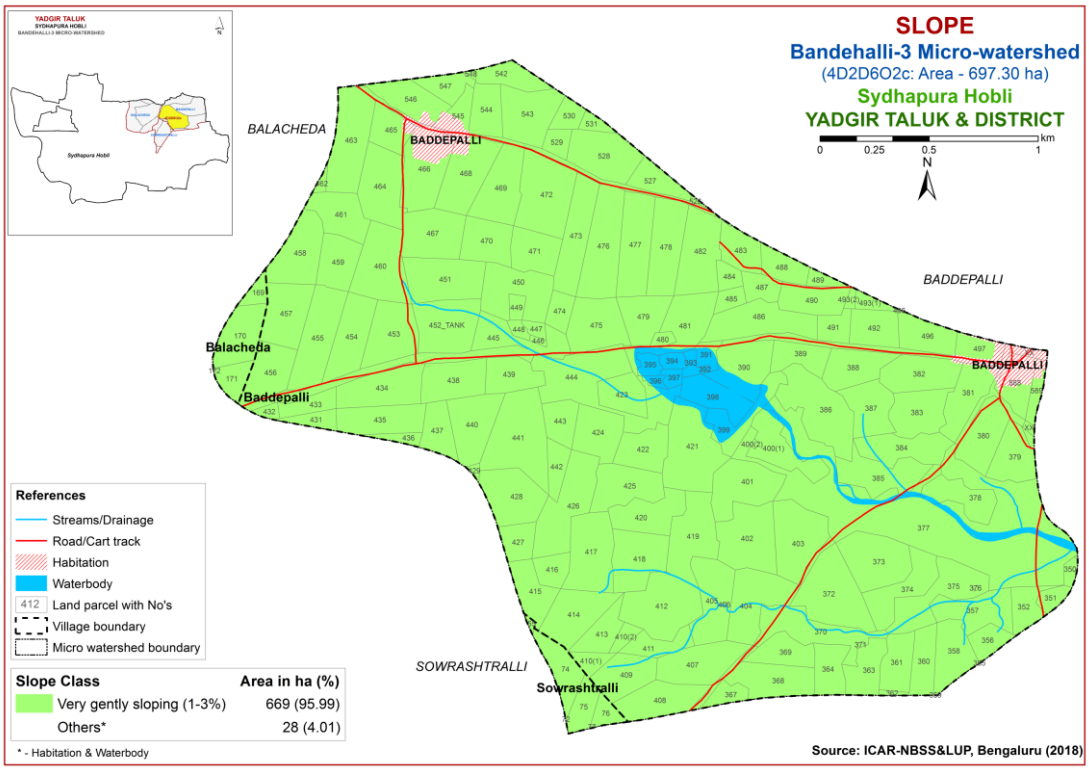


Fig. 5.6 Soil Slope map of Bandehalli-3 microwatershed

5.7 Soil Erosion

Soil erosion refers to the wearing away of the earth's surface by the forces of water, wind and ice involving detachment and transport of soil by raindrop impact. It is used for accelerated soil erosion resulting from disturbance of the natural landscape by burning, excessive grazing and indiscriminate felling of forest trees and tillage, all usually by man. The erosion classes showing an estimate of the current erosion status as judged from field observations in the form of rills, gullies or a carpet of gravel on the surface are recorded. Four erosion classes, viz, slight erosion (e1), moderate erosion (e2), severe erosion (e3) and very severe erosion (e4) are recognized. The soil map units were grouped into different erosion classes and a soil erosion map was generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

Soils that are moderately eroded (e2 class) cover maximum area of 653 ha (94%) and are distributed in all parts of the microwatershed. A small area of about 16 ha (2%) is under severe erosion and occur in the western part of the microwatershed. Entire area of the microwatershed needs soil and water conservation and other land development measures for restoring the soil health.

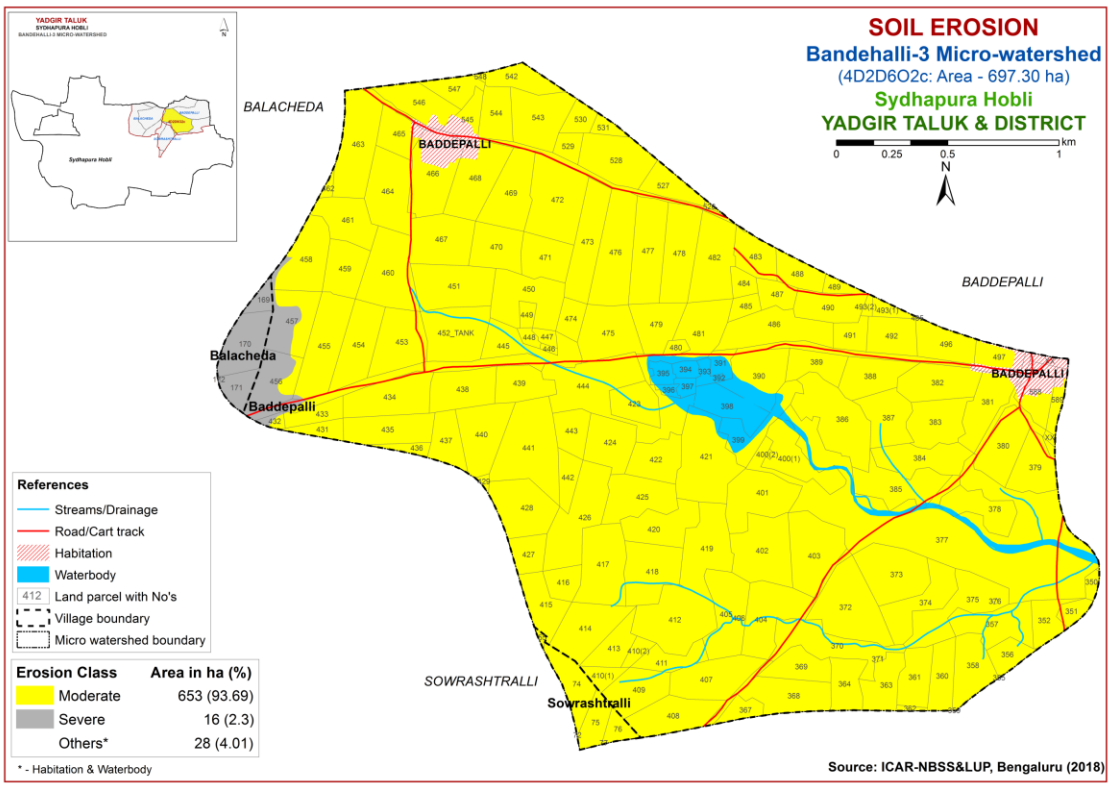


Fig. 5.7 Soil Erosion map of Bandehalli-3 microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m interval) all over the microwatershed through land resource inventory in the year 2017 were analysed for pH, EC, organic carbon, available phosphorus and potassium and for micronutrients like zinc, copper, iron and manganese, and secondary nutrient sulphur.

Soil fertility data generated has been assessed and individual maps for all the nutrients for the microwatershed have been generated using Kriging method under GIS. The village/survey number wise fertility data for the microwatershed is given in Appendix-II.

6.1 Soil Reaction (pH)

The soil fertility analysis of the Bandehalli-3 microwatershed for soil reaction (pH) showed that an area of 113 ha (16%) is neutral (pH 6.5 – 7.3) and are distributed in the northern and northwestern part of the microwatershed. An area of 231 ha (33%) is slightly alkaline (pH 7.3-7.8) and is distributed in the central, northern, western and southern part of the microwatershed. Maximum area of 260 ha (37%) is moderately alkaline (pH 7.8-8.4) in reaction and is distributed in the major part of the microwatershed. An area of 66 ha (10%) is strongly alkaline (pH 8.4-9.0) and is distributed in the eastern part of the microwatershed (Fig. 6.1). Thus, major soils in the microwatershed are alkaline in reaction.

6.2 Electrical Conductivity (EC)

The Electrical Conductivity of the soils is <2 dS m^{-1} in the entire microwatershed and as such the soils are non-saline (Fig. 6.2).

6.3 Organic Carbon

The soil organic carbon content (Fig. 6.3) of the soils in the microwatershed is high (>0.75%) in an area of 133 ha (19%) and are distributed in the northern, western, southern, central and eastern part of the microwatershed. Medium (0.5-0.75%) in organic carbon content cover a maximum area of 273 ha (39%) and is distributed in the major part of the microwatershed. An area of 263 ha (38%) is low (<0.5%) and are distributed in all parts of the microwatershed.

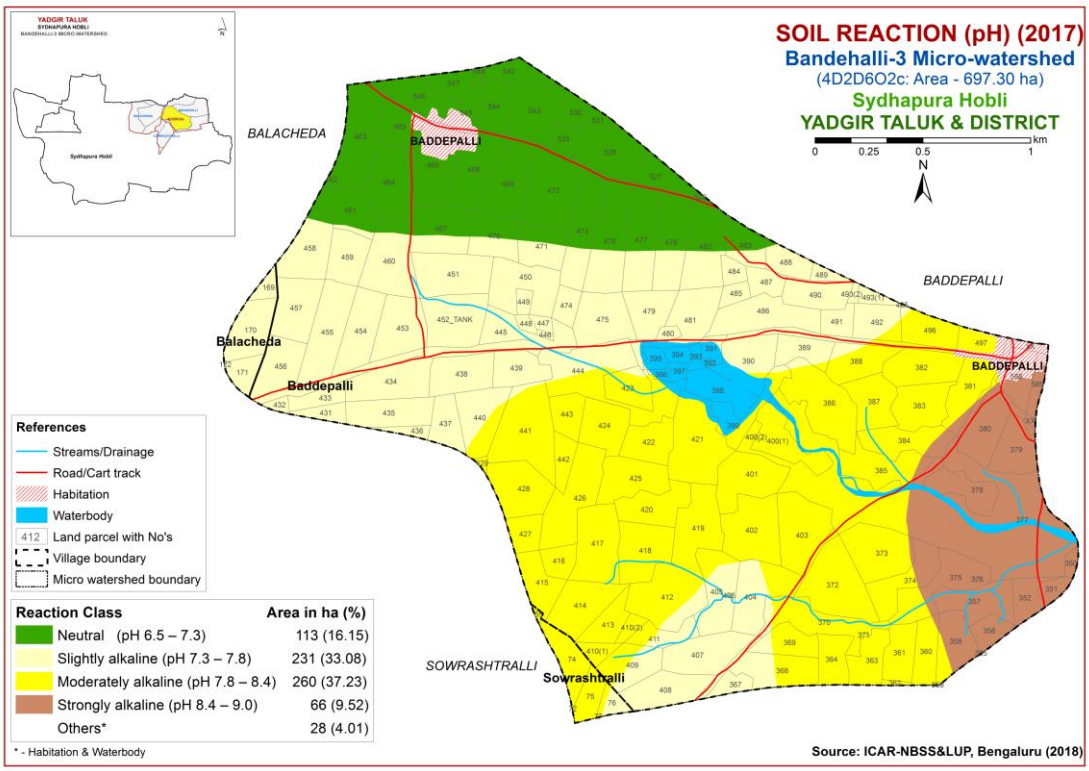


Fig.6.1 Soil Reaction (pH) map of Bandehalli-3 microwatershed

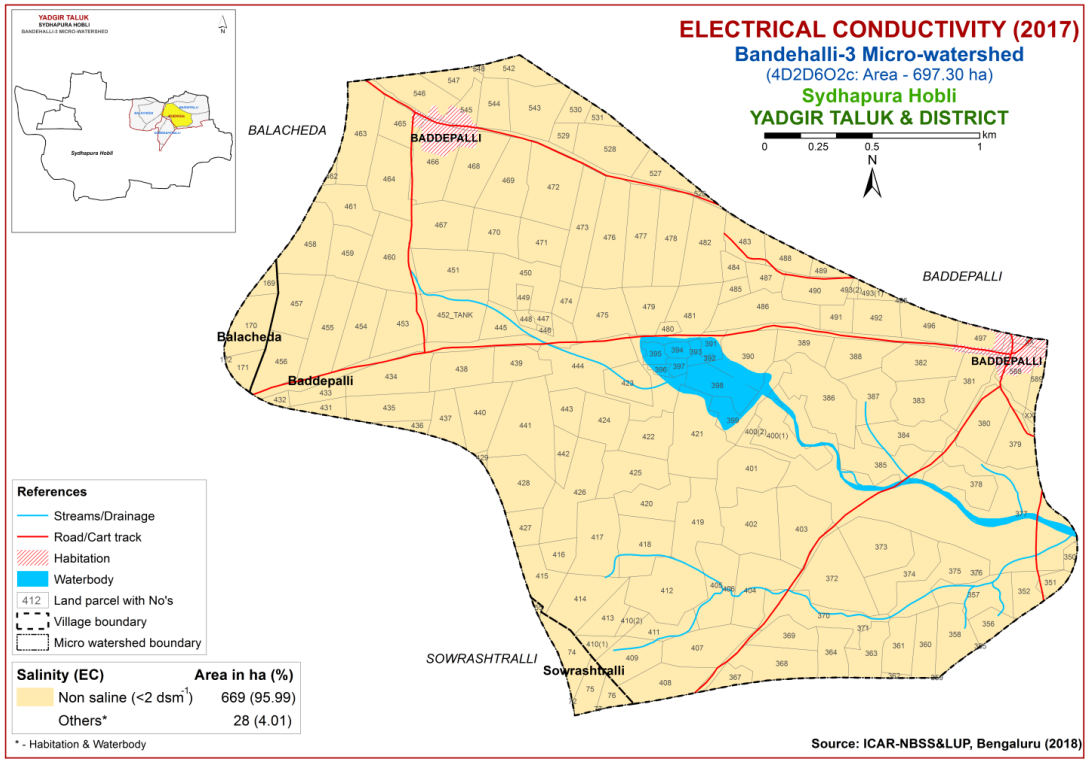


Fig.6.2 Electrical Conductivity (EC) map of Bandehalli-3 microwatershed

6.4 Available Phosphorus

The soil fertility analysis revealed that available phosphorus (Fig. 6.4) is low (<23 kg/ha) in an area of 262 ha (38%) and is distributed in the northwestern, western, central, southwestern and eastern part of the microwatershed. Medium (23-57 kg/ha) in available phosphorous cover maximum area of 331 ha (47%) and is distributed in the major part of the microwatershed. An area of 77 ha (11%) is high (>57 kg/ha) in available phosphorus and is distributed in the northern, southern, western and southeastern part of the microwatershed. There is an urgent need to increase the dose of phosphorous in soils that are low and medium for all the crops by 25 per cent over the recommended dose to realize better crop performance.

6.5 Available Potassium

Available potassium content (Fig. 6.5) is medium (145-337 kg/ha) in a maximum area of 582 ha (83%) and is distributed in the major part of the microwatershed. Low available potassium (<145 kg/ha) content cover an area of 87 ha (13%) and is distributed in the northern and western part of the microwatershed.

6.6 Available Sulphur

Soils that are low in available sulphur content is high (>20 ppm) in an area of 40 (6%) and is distributed in the eastern part of the microwatershed. Maximum area of about 463 ha (66%) is medium (10-20 ppm) and is distributed in the major part of the microwatershed. Available sulphur is low (<10 ppm) in an area of 166 ha (24%) and is distributed in the central, northern, southern, northwestern and western part of the microwatershed (Fig. 6.6). The areas that are low and medium in available sulphur need to be applied with magnesium sulphate or gypsum or factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.

6.7 Available Boron

Available boron content (Fig. 6.7) is low (<0.5 ppm) in an area of 230 ha (33%) and is distributed in the northern, western and southern part of the microwatershed. Maximum area of about 439 ha (63%) is medium (0.5-1.0 ppm) and is distributed in the major part of microwatershed.

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in a maximum area of 512 ha (73%) and is distributed in the major part of the microwatershed. It is deficient (<4.5 ppm) in an area of about 158 ha (22%) and is distributed in the central and eastern part of the microwatershed (Fig. 6.8).

6.9 Available Manganese

Available manganese content is sufficient (>1.0 ppm) in the entire microwatershed area (Fig 6.9).

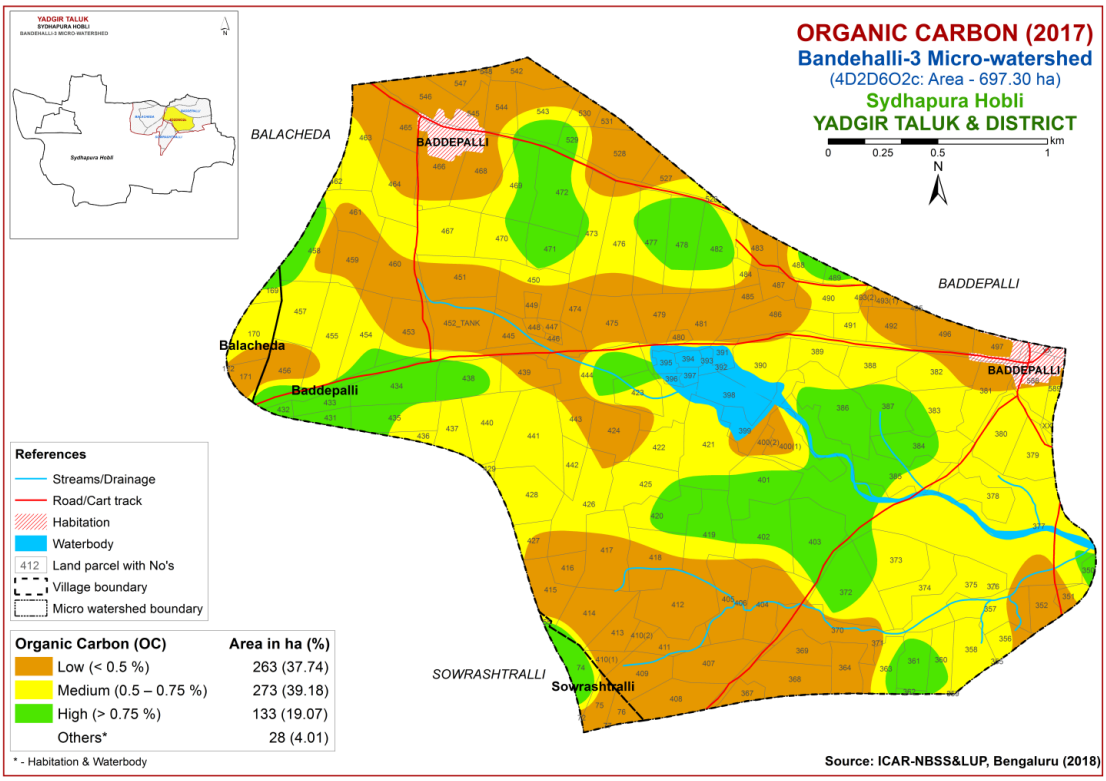


Fig.6.3 Soil Organic Carbon map of Bandehalli-3 microwatershed

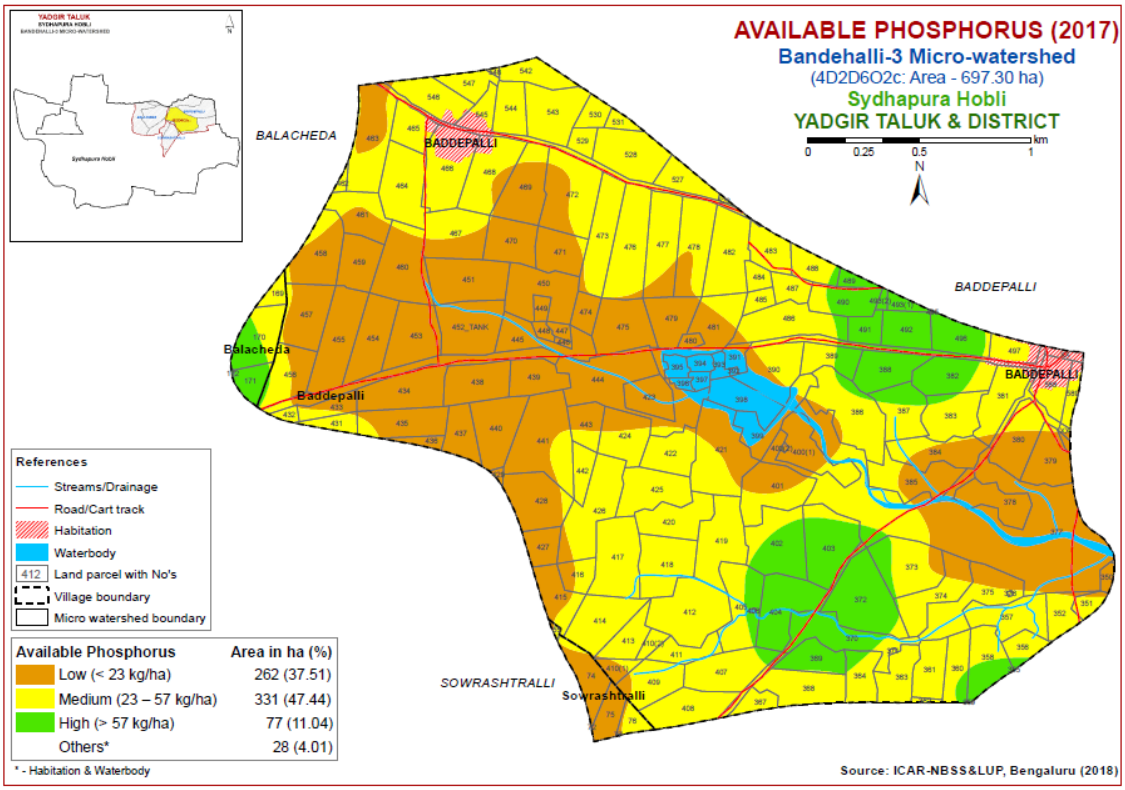


Fig.6.4 Soil available Phosphorus map of Bandehalli-3 microwatershed

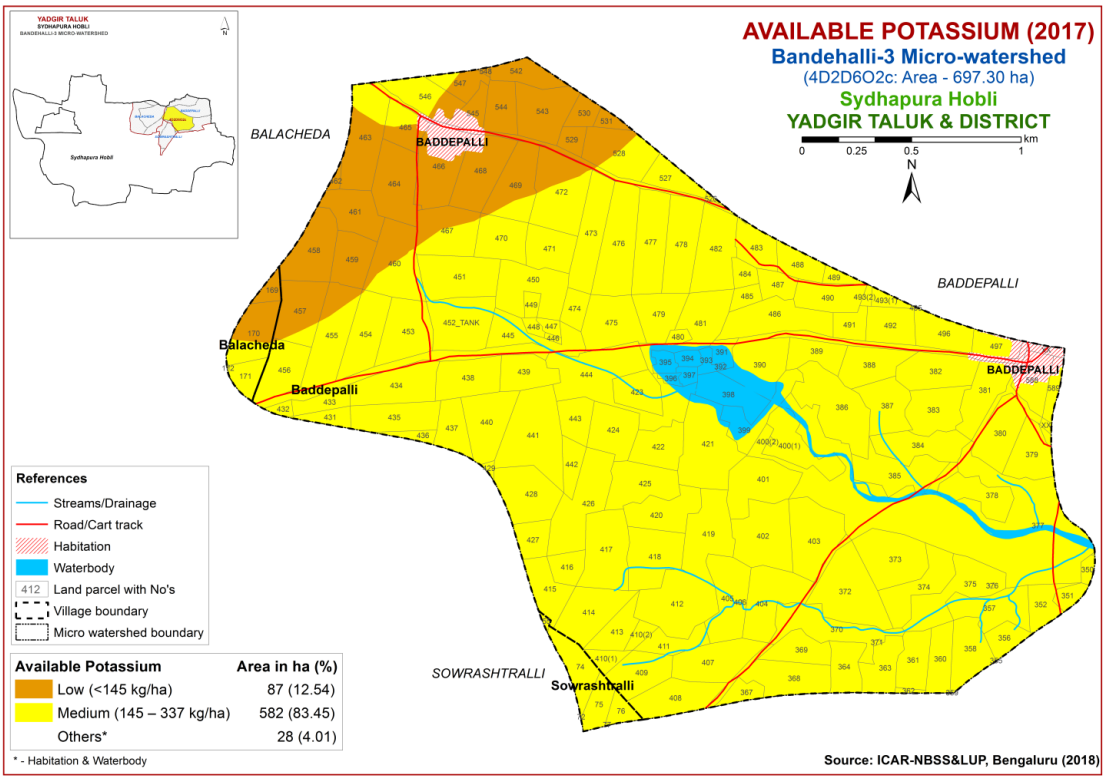


Fig. 6.5 Soil available Potassium map of Bandehalli-3 microwatershed

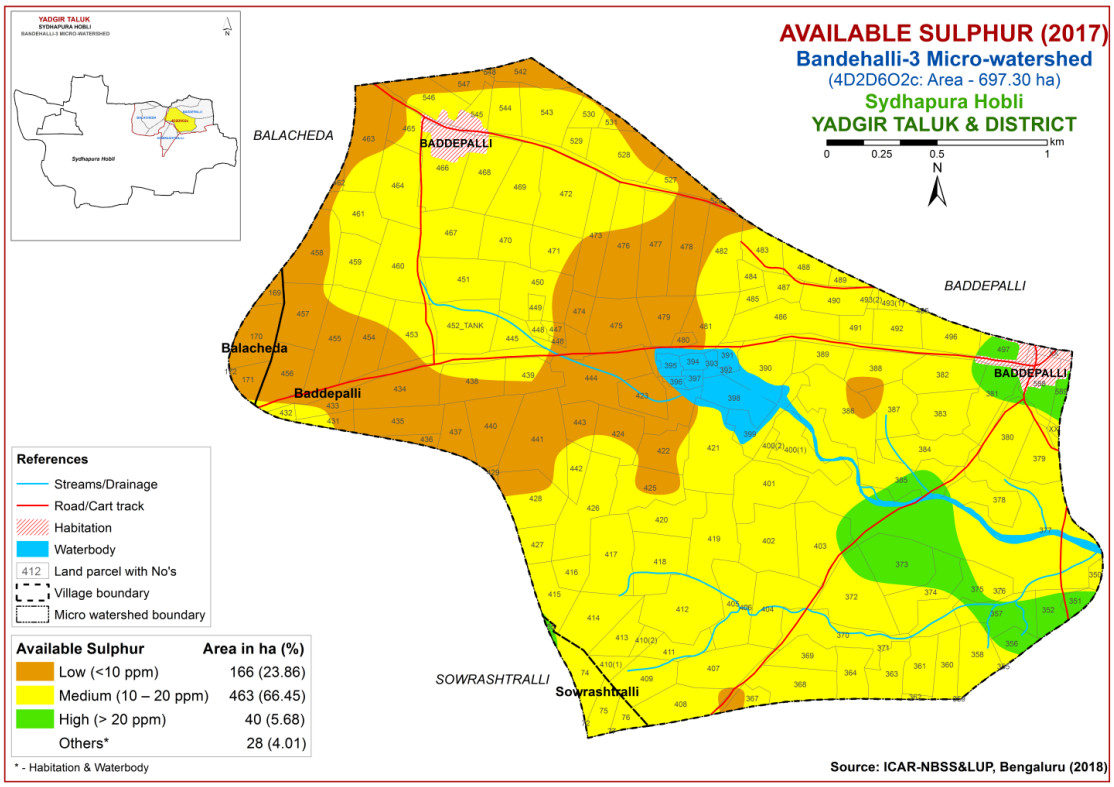


Fig. 6.6 Soil available Sulphur map of Bandehalli-3 microwatershed

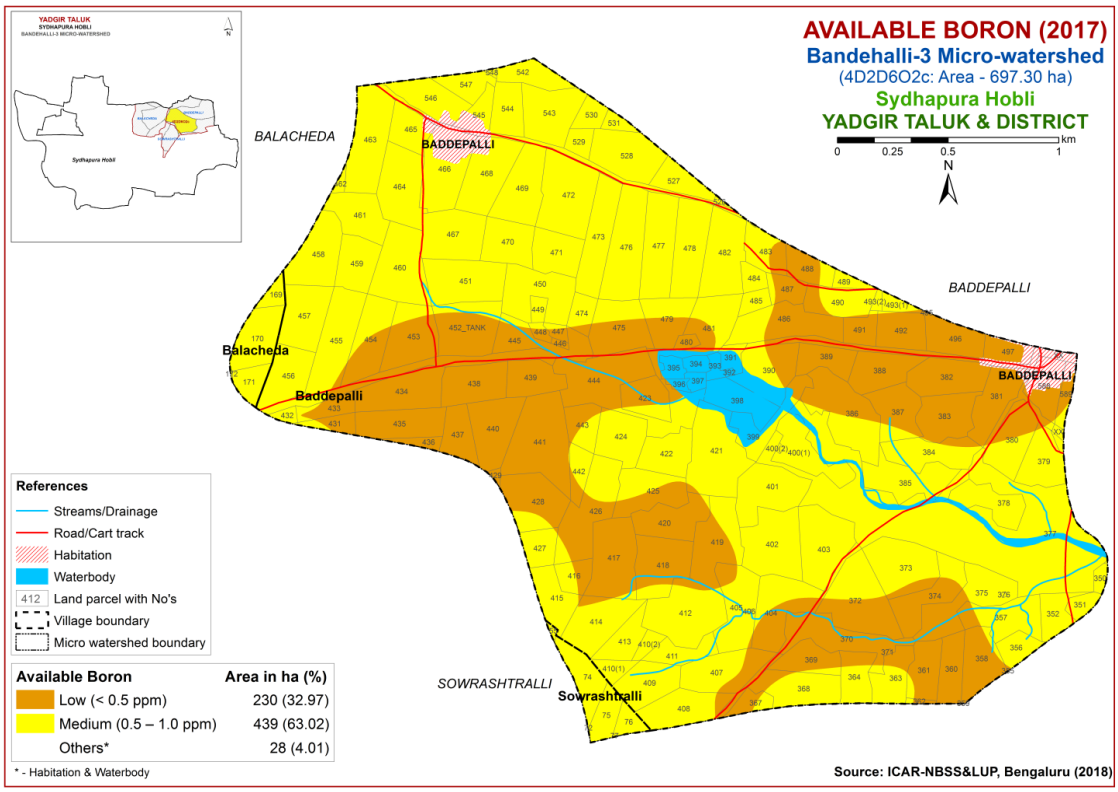


Fig. 6.7 Soil available Boron map of Bandehalli-3 microwatershed

6.10 Available Copper

Available copper content is sufficient (>0.2 ppm) in a maximum area of 662 ha (95%) and is distributed in the major part of the microwatershed (Fig 6.10). It is deficient (<0.2 ppm) in a small area of about 7 ha (1%) and is distributed in the western and eastern part of the microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in a maximum area of 665 (95%) and is distributed in all parts the microwatershed (Fig 6.11). A small area of 4 ha (<1%) is sufficient (>0.6 ppm) and is distributed in the northeastern part of the microwatershed.

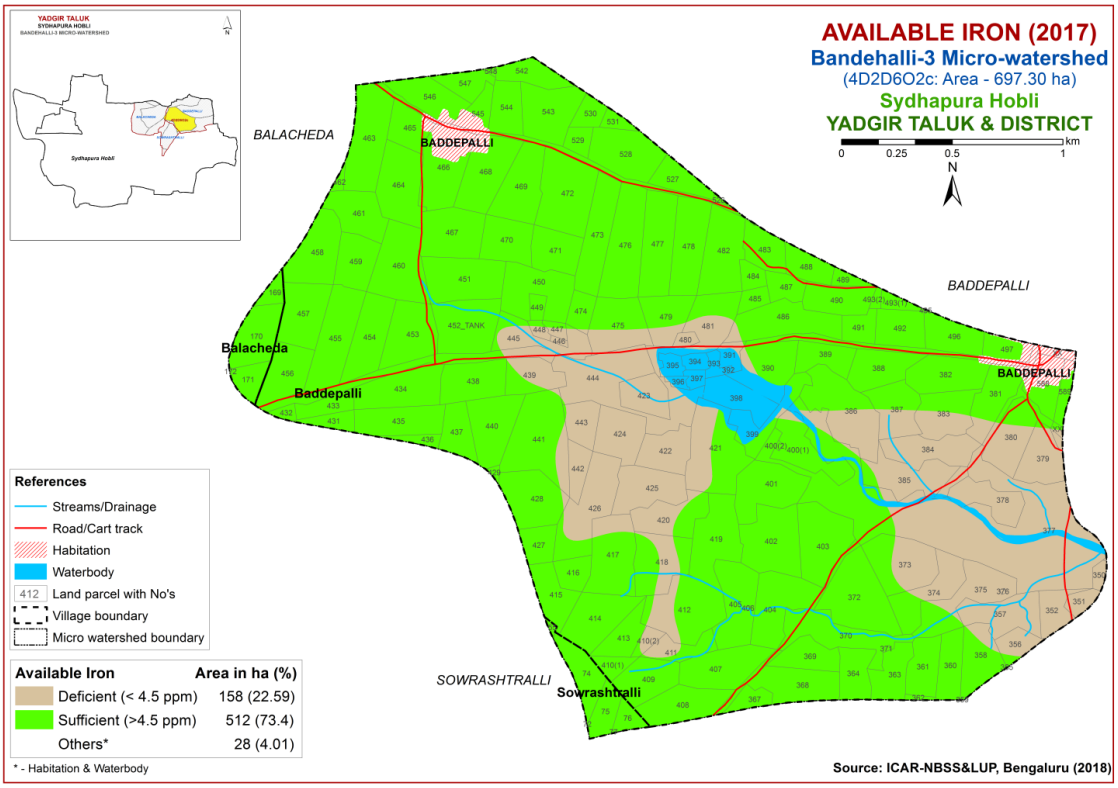


Fig. 6.8 Soil available Iron map of Bandehalli-3 microwatershed

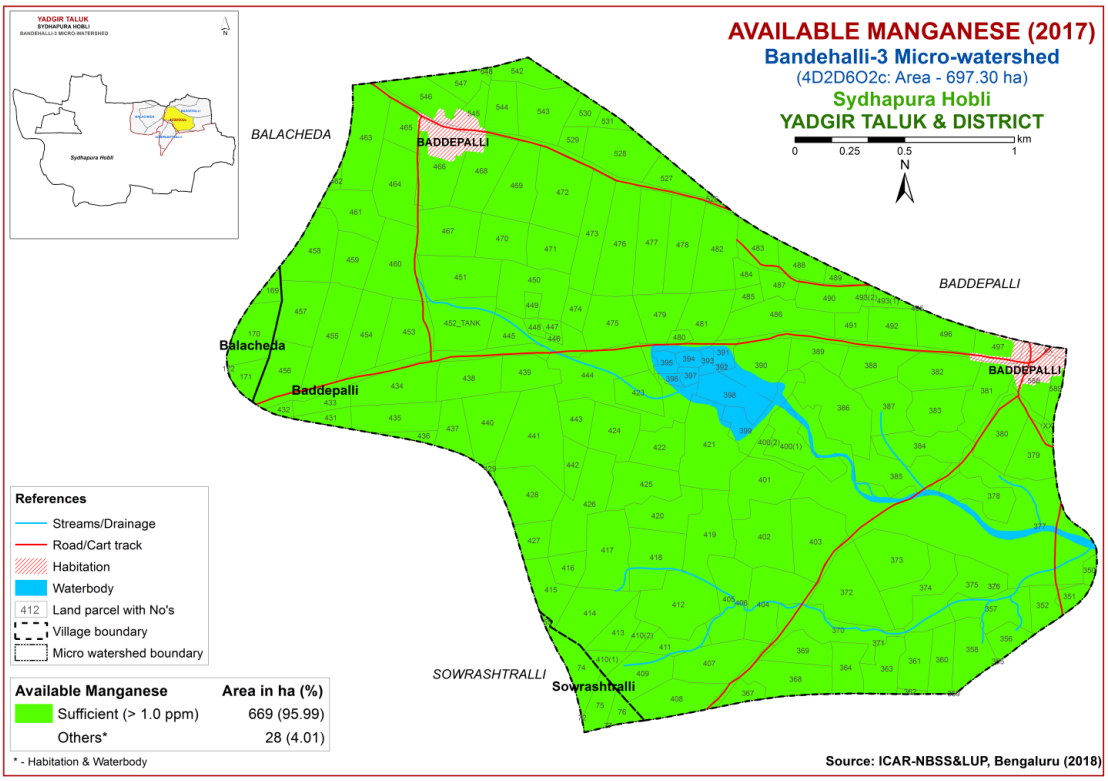


Fig. 6.9 Soil available Manganese map of Bandehalli-3 microwatershed

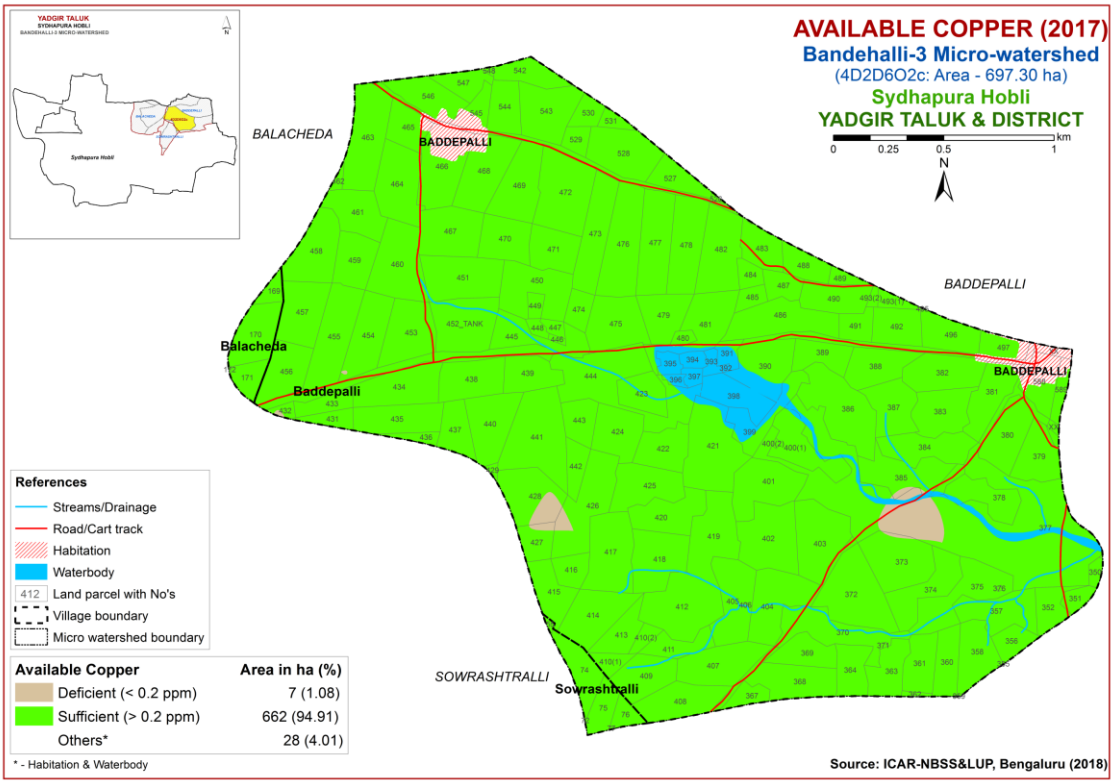


Fig. 6.10 Soil available Copper map of Bandehalli-3 microwatershed

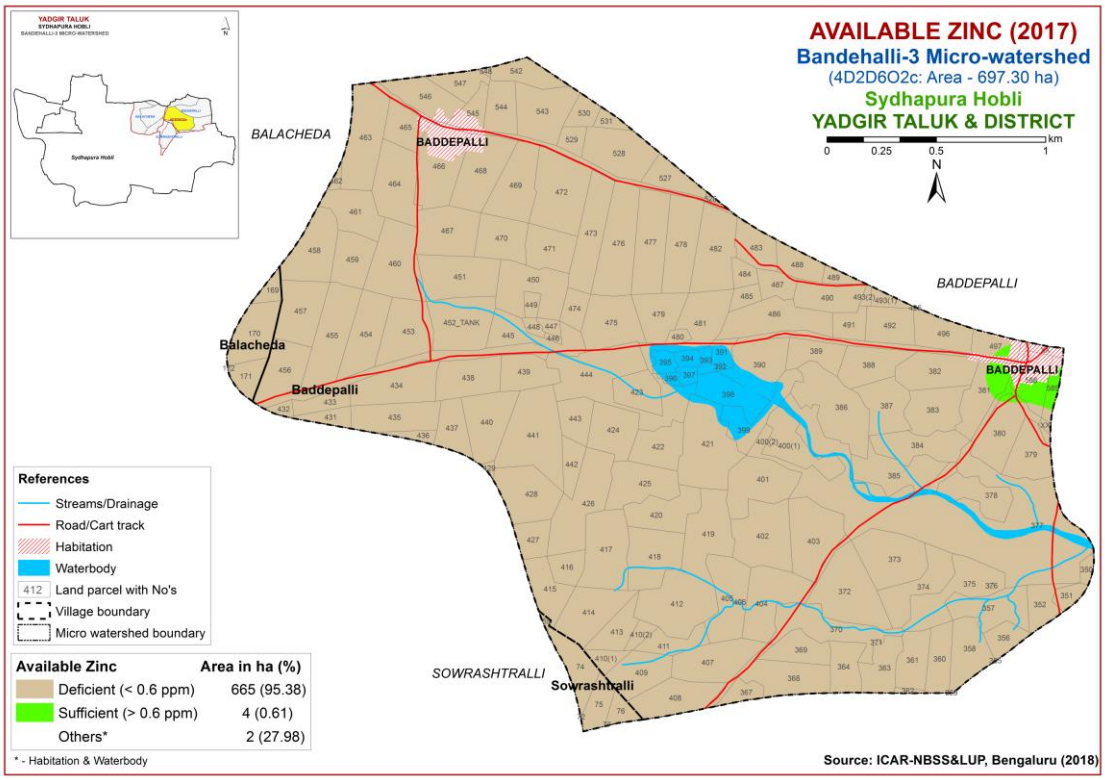


Fig. 6.11 Soil available Zinc map of Bandehalli-3 microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Bandehalli-3 microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data, and also by referring to Naidu *et al.* (2006) and Natarajan *et al* (2015). The crop requirements were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3-Marginally Suitable. Order N has two classes, N1-Currently not Suitable and N2-Permanently not Suitable. There are no subclasses within the class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness 's' for sodium and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable land with the limitations of soil depth and erosion is designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

Using the above criteria, the soil map units of the microwatershed were evaluated and land suitability maps for 26 major agricultural and horticultural crops grown in the state were generated. The detailed information on the kind of suitability of each of the soil phase for the crops assessed are given village/ survey number wise for the microwatershed in Appendix-III.

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

Sorghum is one of the major crop grown in an area of 10.47 lakh ha in northern Karnataka in Bijapur, Kalaburgi, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing sorghum (Table 7.2) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing sorghum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.1.

An area of 5 ha (<1%) is highly suitable (Class S1) for growing sorghum in the microwatershed. Maximum area of about 456 ha (65%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed.

Table 7.1 Soil-Site Characteristics of Bandehalli-3 microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC	ESP	CEC [Cmol (p^+) kg^{-1}]	BS (%)
					Surf-ace	Sub-surface	Sur-face (%)	Sub-surface (%)								
BDPhB2	866	120-150	WD	<25	scl	scl	-	-	<50	1-3	moderate	8.58	0.26	0.35	18.10	100
BDLbB2	866	120-150	WD	25-50	ls	sl	-	-	<50	1-3	moderate	6.20	0.07	0.20	4.20	93
BDLhB2	866	120-150	WD	25-50	scl	sl	-	-	<50	1-3	moderate	6.20	0.07	0.20	4.20	93
DSBcB2	866	120-150	WD	25-50	sl	g c	-	35-60	<50	1-3	moderate	5.93	0.04	0.14	3.60	73
VNKcB2	866	120-150	WD	25-50	sl	sc	-	-	<50	1-3	moderate	5.37	0.11	2.22	6.27	75
JNKcB2	866	120-150	WD	50-75	sl	scl	-	-	51-100	1-3	moderate	8.42	0.14	0.18	14.50	100
YLRbB2	866	120-150	WD	50-75	ls	c	-	15-35	51-100	1-3	moderate	6.91	0.06	0.45	6.90	100
BLCcB2	866	120-150	WD	75-100	sl	scl	-	-	101-150	1-3	moderate	6.75	0.19	1.31	16.80	95
GWDcB2	866	120-150	MWD	75-100	sl	scl	-	-	101-150	1-3	moderate	9.89	0.74	43.51	8.35	100
GWDiB2	866	120-150	MWD	75-100	sc	scl	-	-	101-150	1-3	moderate	9.89	0.74	43.51	8.35	100
HSLbB2	866	120-150	WD	75-100	ls	sc	-	-	101-150	1-3	moderate	7.16	0.11	5.94	4.90	97
HSLhB2	866	120-150	WD	75-100	scl	sc	-	-	101-150	1-3	moderate	7.16	0.11	5.94	4.90	97
ANRbB2g1	866	120-150	MWD	100-150	ls	c	15-35	-	>200	1-3	moderate	10.17	0.36	17.70	19.9	100
GDGbB3g1	866	120-150	WD	100-150	ls	scl	15-35	-	101-150	1-3	severe	5.57	0.25	0.22	5.83	78
RMPcB2	866	120-150	MWD	50-75	sl	scl	-	-	101-150	1-3	moderate	5.97	0.04	0.77	1.70	56
SWRmB2	866	120-150	MWD	100-150	c	c	-	-	>200	1-3	moderate	8.44	0.16	1.78	51.20	100

*Symbols and abbreviations are according to Field Guide for LRI under Sujala-III Project, Karnataka

They have minor limitations of drainage, calcareousness, gravelliness, texture and rooting condition. Marginally suitable lands (Class S3) occupy an area of 134 ha (19%) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitation of rooting condition. An area of about 76 ha (11%) is currently not suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.2 Crop suitability criteria for Sorghum

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	class	Well to mod. drained	imperfect	Poorly/ excessively	V. poorly
Soil reaction	pH	6.0-8.0	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>9.0
Surface soil texture	Class	c, cl, sicl, sc	l, sil, sic	sl, ls	s,fragmental skeletal
Soil depth	cm	100-75	50-75	30-50	<30
Gravel content	% vol.	5-15	15-30	30-60	>60
Salinity (EC)	dS m^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

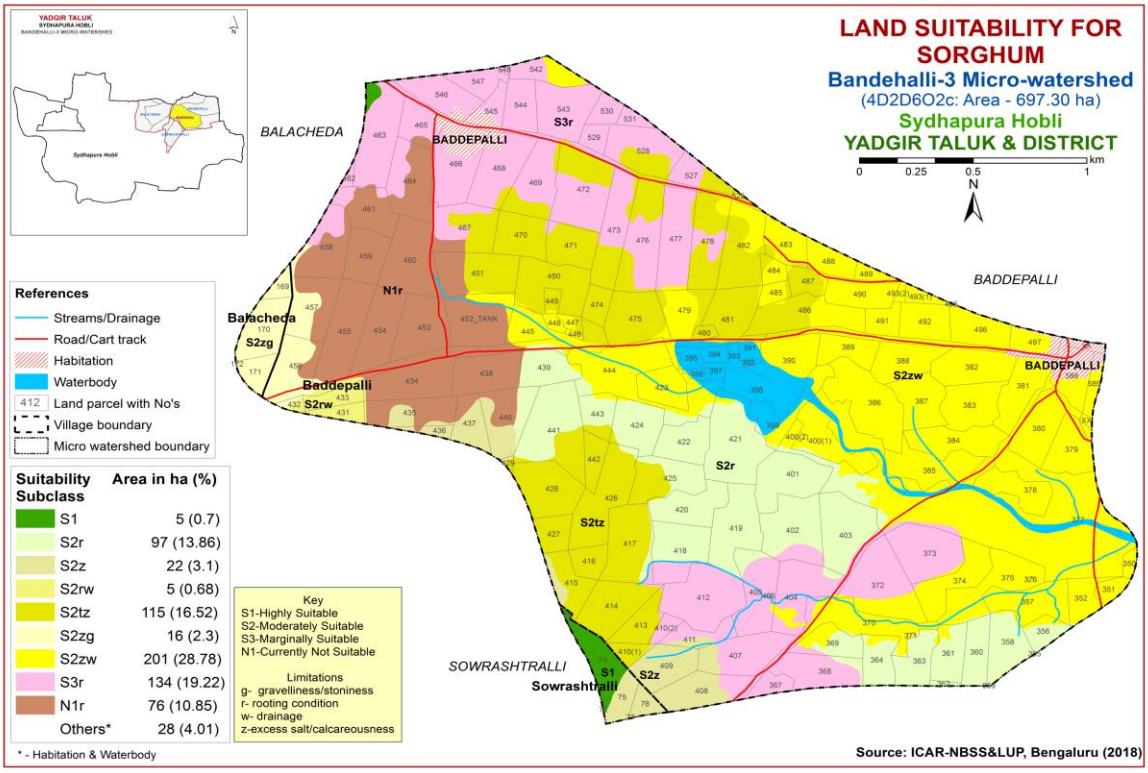


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

Maize is one of the most important food crop grown in an area of 13.37 lakh ha in all the districts of the State. The crop requirements for growing maize (Table 7.3) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing maize was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.2.

Table 7.3 Crop suitability criteria for Maize

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3.5	5-8	
LGP	Days	>100	100-80	60-80	
Soil drainage	class	Well drained	Mod. to imperfectly	Poorly/ excessively	V. poorly
Soil reaction	pH	5.5-7.5	7.6-8.5	8.6-9.0	
Surface soil texture	Class	l, cl, scl, sil	sl, sicl, sic	c(s-s), ls	s,fragmental
Soil depth	cm	>75	50-75	25-50	<25
Gravel content	%vol.	<15	15-35	35-50	>50
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	>15	

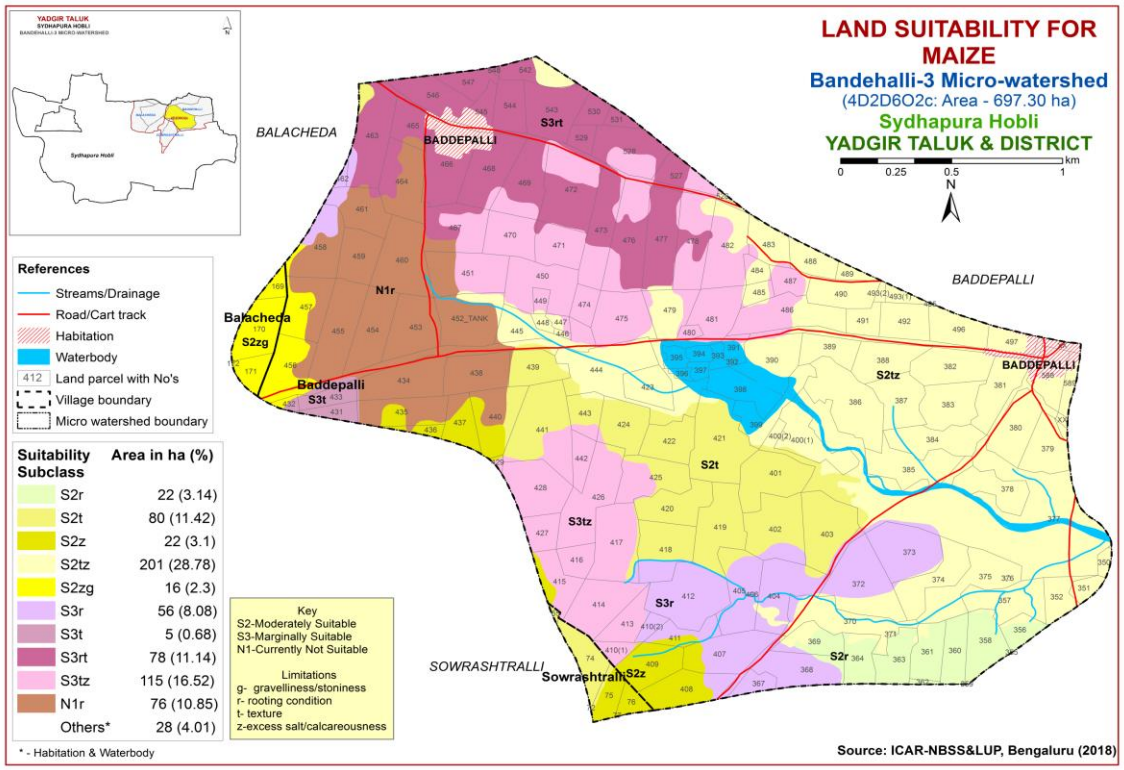


Fig. 7.2 Land Suitability map of Maize

In Bandehalli-3 microwatershed, there are no highly (Class S1) suitable lands for growing maize in the microwatershed. An area of about 341 ha (49%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have

minor limitations of calcareousness, texture, gravelliness and rooting condition. Marginally suitable (Class S3) lands occur in an area of 254 ha (36%) and are distributed in the northern, northwestern, western and southern part of the microwatershed. They have moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) cover an area of 76 ha (11%) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

7.3 Land Suitability for Red gram (*Cajanus cajan*)

Red gram is one of the major pulse crop grown in an area of 7.28 lakh ha mainly in northern Karnataka in Bijapur, Kalaburgi, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing red gram (Table 7.4) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing red gram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.3.

There are no lands that are highly (Class S1) suitable for growing red gram in Bandehalli-3 microwatershed. Maximum area of about 358 ha (51%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition, gravelliness, drainage and calcareousness. An area of about 236 ha (34%) is marginally suitable (Class S3) and are distributed in the northern, northwestern, western, central and southern part of the microwatershed. They have moderate limitations of rooting condition, texture and drainage. An area of 76 ha (11%) is currently not suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.4 Crop suitability criteria for Red gram

Crop requirement		**Rating**			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>210	180-210	150-180	<150
Soil drainage	class	Well drained	Mod. to well drained	Imperfectly drained	Poorly drained
Soil reaction	pH	6.5-7.5	5.0-6.5,7.6-8.0	8.0-9.0	>9.0
Surface soil texture	Class	l,scl,sil,cl, sl	sicl,sic,c(m)	ls	s,fragmental
Soil depth	cm	>100	85-100	40-85	<40
Gravel content	% vol.	<20	20-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

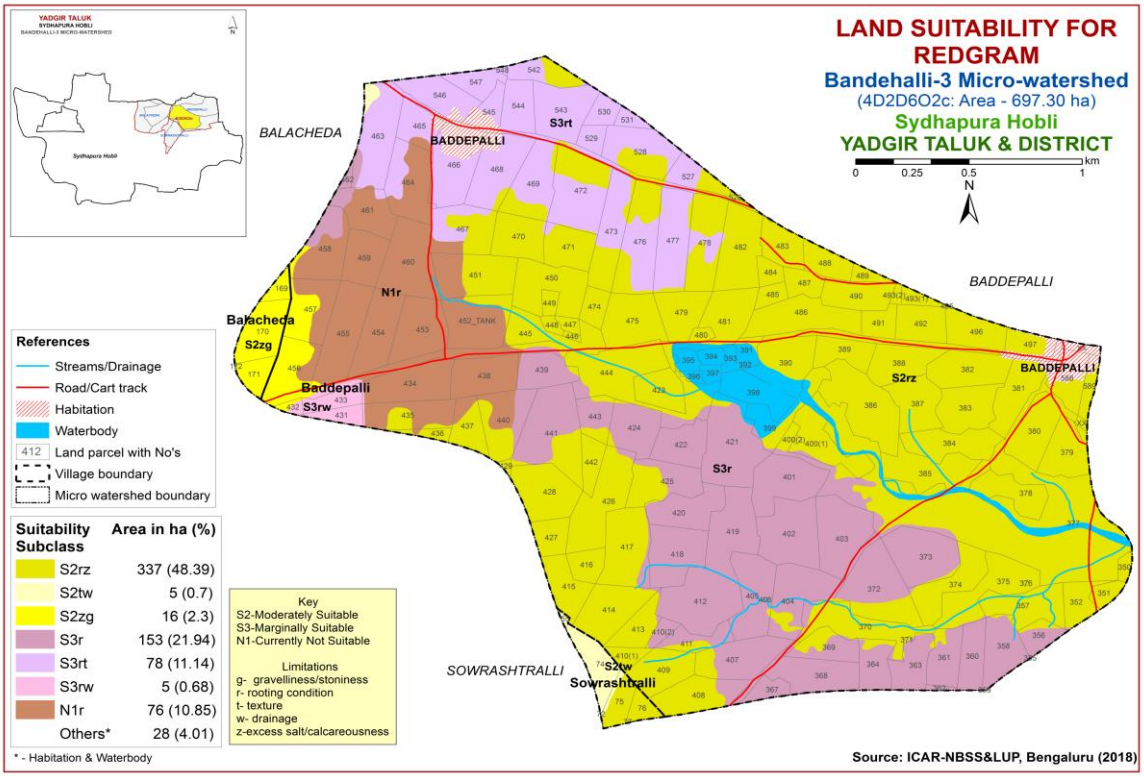


Fig. 7.3 Land Suitability map of Red gram

7.4 Land Suitability for Bajra (*Pennisetum glaucum)*

Bajra is one of the most important millet crop grown in an area of 2.34 lakh ha in the northern districts of Karnataka State. The crop requirements for growing bajra (Table 7.5) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing bajra was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.4.

Table 7.5 Crop suitability criteria for Bajra

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	2-3	3-8	8-15	>15
LGP	Days	120-150	120-90	<90	
Soil drainage	Class	Well to mod. drained	imperfect	Poorly/ excessively	V. poorly
Soil reaction	pH	6.0-8.0	5.5-5.9,8.1-8.5	<5.5,8.6-9.0	>9.0
Surface soil texture	Class	c, cl, sicl, sc	l, sil, sic	sl, ls	s,fragmental skeletal
Soil depth	cm	100-75	50-75	30-50	<30
Gravel content	% vol.	5-15	15-30	30-60	>60
Salinity (EC)	dSm^{-1}	2-4	4-8	8-10	>10
Sodicity (ESP)	%	5-8	8-10	10-15	>15

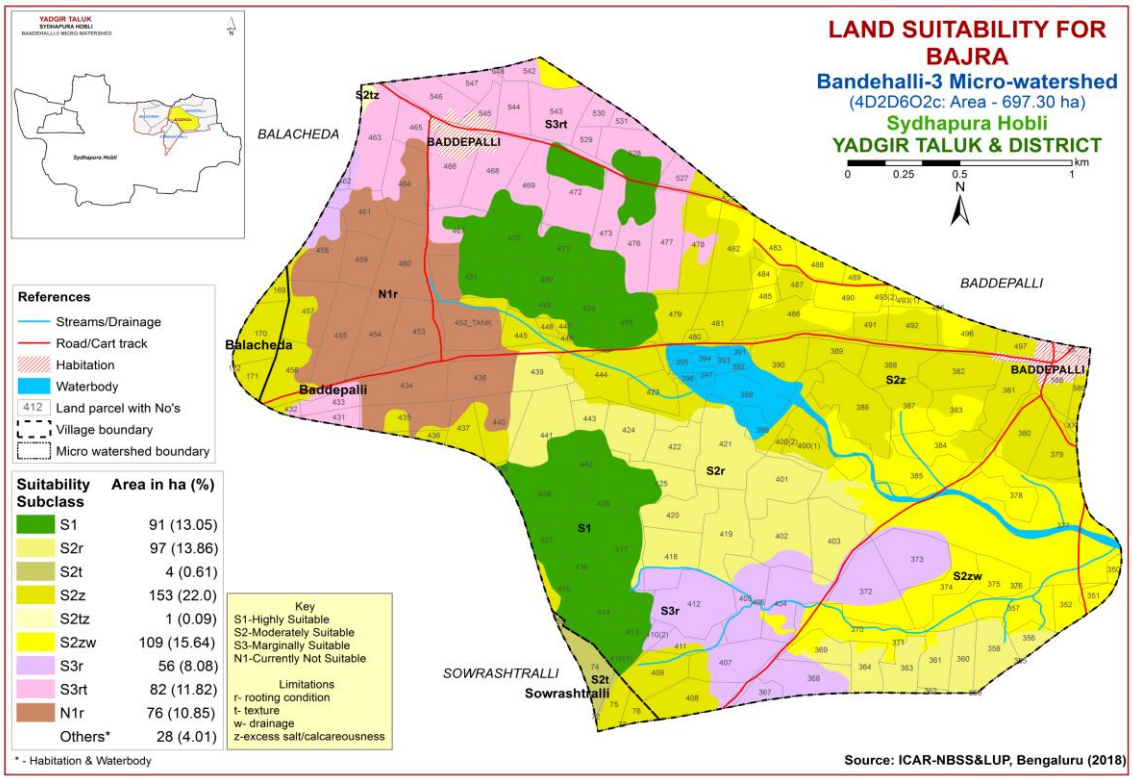


Fig. 7.4 Land Suitability map of Bajra

In Bandehalli-3 microwatershed, an area of 91 ha (13%) is highly (Class S1) suitable for growing bajra and are distributed in the northern and southwestern part of the microwatershed. Maximum area of about 364 ha (52%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of drainage, rooting condition, texture and calcareousness. Marginally suitable lands (Class S3) occupy an area of 138 ha (20%) and are distributed in the northern, northwestern, western and southern part of the microwatershed. They have moderate limitations of texture and rooting condition. Currently not suitable (Class N1) occur in an area of 76 ha (11%) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

7.5 Land suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.54 lakh ha in almost all the districts of the State. The crop requirements for growing groundnut (Table 7.6) were matched with the soil-site characteristics (Table 7.1) of soils of the microwatershed and a land suitability map for growing groundnut was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

There are no highly (Class S1) suitable lands for growing groundnut in the microwatershed. An area of about 175 ha (25%) is moderately suitable (Class S2) and are distributed in the northern, western, southern and southwestern part of the microwatershed. They have minor limitations of rooting condition, texture and

calcareousness. The marginally suitable (Class S3) lands cover a maximum area of about 420 ha (60%) and occur in all parts of the microwatershed. They have moderate limitations of texture, rooting condition, calcareousness and drainage. Currently not suitable (Class N1) lands occur in an area of 76 ha (11%) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.6 Land suitability criteria for Groundnut

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	100-125	90-105	75-90	
Soil drainage	Class	Well drained	Mod. Well drained	imperfectly drained	Poorly drained
Soil reaction	pH	6.0-8.0	8.1-8.5, 5.5-5.9	>8.5, <5.5	
Sub Surface soil texture	Class	l,cl,sil,scl,sicl	sc, sic, c,sl	s, ls,c (>60%)	
Soil depth	cm	>75	50-75	25-50	<25
Gravel content	% vol.	<35	35-50	>50	
$CaCO_3$ in root zone	%	low	Medium	high	
Salinity (EC)	dSm^{-1}	<2.0	2.0-4.0	4.0-8.0	
Sodicity (ESP)	%	<5	5-10	>10	

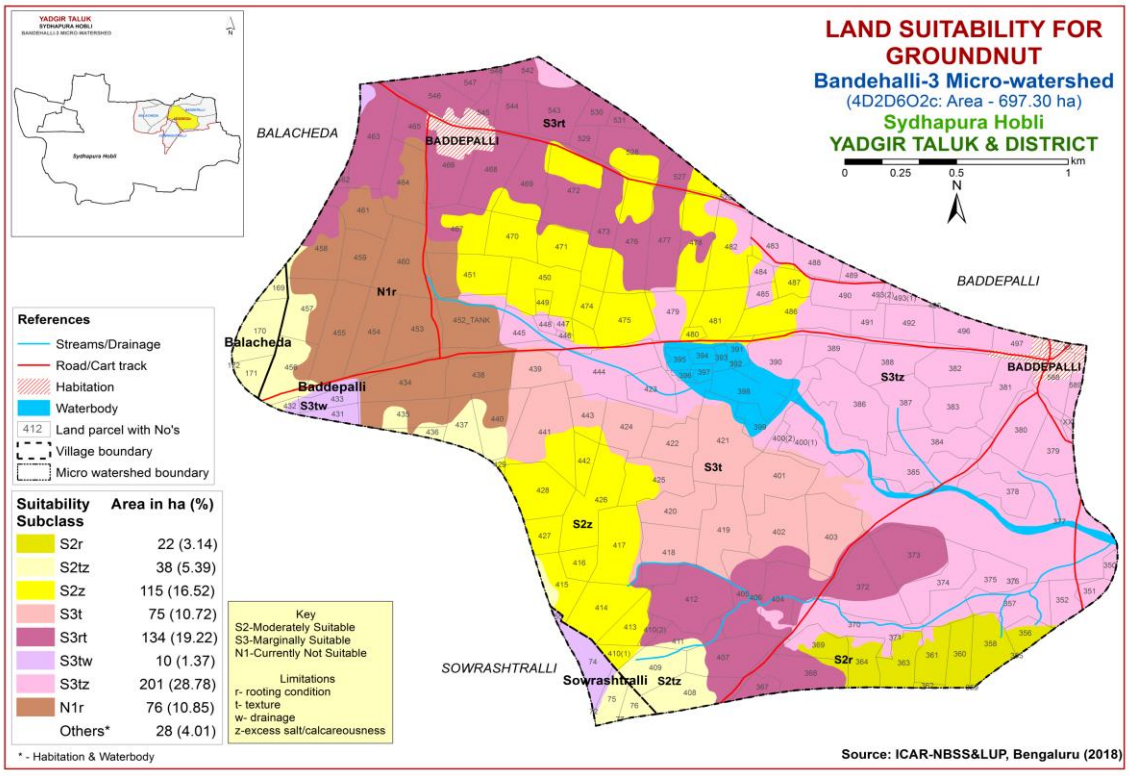


Fig. 7.5 Land Suitability map of Groundnut

7.6 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sunflower was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.6.

Table 7.7 Crop suitability criteria for Sunflower

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>90	80-90	70-80	<70
Soil drainage	class	Well drained	mod. Well drained	imperfectly drained	Poorly drained
Soil reaction	pH	6.5-8.0	8.1-8.5,5.5-6.4	8.6-9.0;4.5-5.4	>9.0,<4.5
Surface soil texture	Class	l, cl, sil, sc	scl, sic, c,	c (>60%), sl	ls, s
Soil depth	cm	>100	75-100	50-75	<50
Gravel content	%vol.	<15	15-35	35-60	>60
Salinity (EC)	dSm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

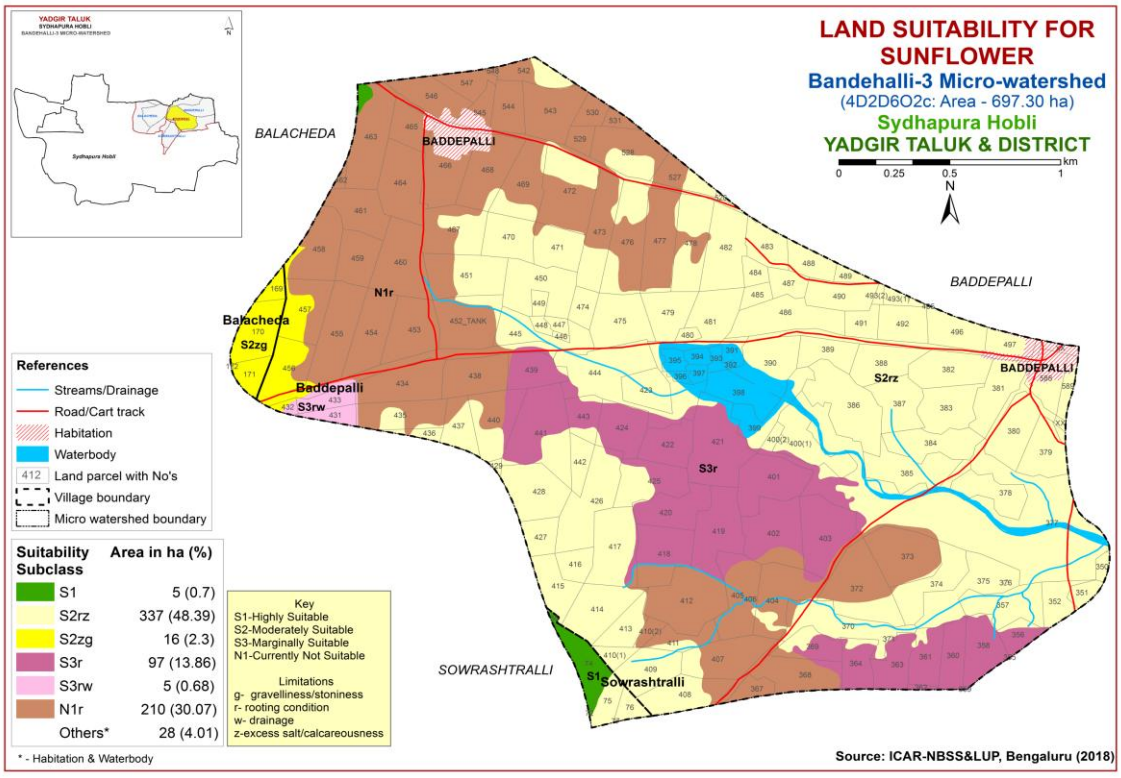


Fig. 7.6 Land Suitability map of Sunflower

A small area of 5 ha (<1%) is highly (Class S1) suitable for growing sunflower and are distributed in the northwestern and southern part of the microwatershed. Maximum area of about 353 ha (51%) is moderately suitable (Class S2) and are

distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness and calcareousness. An area of about 100 ha (15%) is marginally suitable (Class S3) and are distributed in the western, central and southeastern part of the microwatershed. They have moderate limitations of rooting condition and drainage. An area of 210 ha (30%) is currently not suitable (Class N1) for growing sunflower and are distributed in the northern, western and southern part of the microwatershed with severe limitation of rooting condition.

7.7 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is one of the most important fibre crop grown in the state in about 8.75 lakh ha area in Raichur, Dharwad, Belgaum, Kalaburgi, Bijapur, Bidar, Bellary, Chitradurga and Chamarajnagar districts. The crop requirements for growing cotton (Table 7.8) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cotton was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.7.

A small area of 5 ha (<1%) is highly (Class S1) suitable lands for growing cotton and are distributed in the northwestern and southern part of the microwatershed. Maximum area of about 340 ha (49%) is moderately suitable (Class S2) for growing cotton and are distributed in the major part of the microwatershed. They have minor limitations of drainage, calcareousness, gravelliness and rooting condition. Marginally suitable (Class S3) lands occupy an area of 249 ha (36%) and are distributed in the northern, northwestern and southern part of the microwatershed with moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) occur in an area of 76 ha (11%) and are distributed in the western part of the microwatershed.

Table 7.8 Crop suitability criteria for Cotton

Crop requirement		**Rating**			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	1-2	2-3	3-5	>5
LGP	Days	180-240	120-180	<120	
Soil drainage	class	Well to moderately well	imperfectly drained	Poor somewhat excessive	Stagnant/ excessive
Soil reaction	pH	6.5-7.5	7.6-8.0	8.1-9.0	>9.0 >6.5
Surface soil texture	Class	sic, c	sicl, cl	si, sil, sc, scl, l	sl, s,ls
Soil depth	cm	100-150	60-100	30-60	<30
Gravel content	%vol.	<5	5-10	10-15	15-35
$CaCO_3$ in root zone	%	<3	3-5	5-10	10-20
Salinity (EC)	dSm^{-1}	2-4	4.0-8.0	8.0-12	>12
Sodicity (ESP)	%	5-10	10-20	20-30	>30

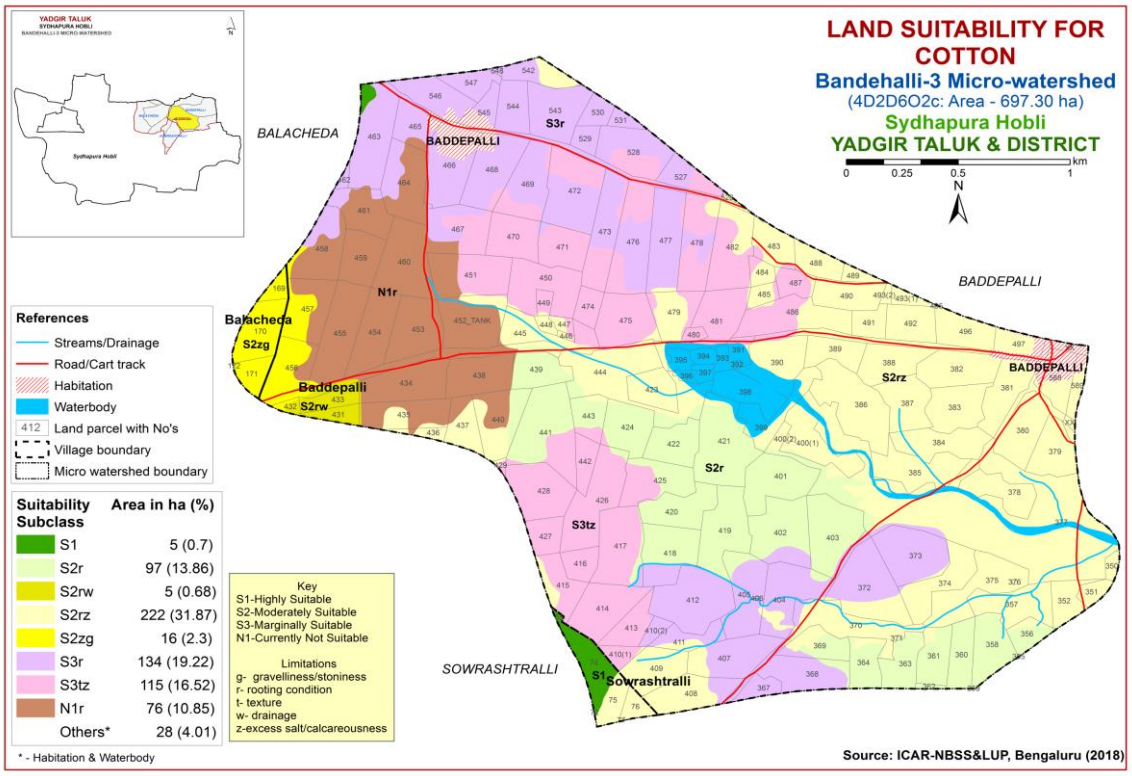


Fig. 7.7 Land Suitability map of Cotton

7.8 Land Suitability for Bengal gram (*Cicer aerativum*)

Bengal gram is one of the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwad, Belgaum and Bellary districts. The crop requirements for growing Bengal gram (Table 7.9) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Bengal gram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.8.

An area of 5 ha (<1%) is highly (Class S1) suitable for growing bengal gram and are distributed in the northwestern and southern part of the microwatershed. Maximum area of about 341 ha (49%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, drainage, texture, gravelliness and rooting condition. Marginally suitable (Class S3) lands occur in an area of 249 ha (36%) and are distributed in the northern, northwestern and southern part of the microwatershed with moderate limitations of rooting condition, texture and calcareousness. Currently not suitable (Class N1) occur in an area of 76 ha (11%) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.9 Crop suitability criteria for Bengal gram

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>100	90-100	70-90	<70
Soil drainage	Class	Well drained	Mod. to well drained; imperfectly drained	Poorly drained; excessively drained	Very Poorly drained
Soil reaction	pH	6.0-7.5	5.5-5.7, 7.6-8.0	8.1-9.0;4.5-5.4	>9.0
Surface soil texture	Class	l, scl, sil, cl,	sicl, sic, c	sl, c>60%	
Soil depth	cm	>75	51-75	25-50	<25
Gravel content	%vol.	<15	15-35	>35	
Salinity (ECe)	dsm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

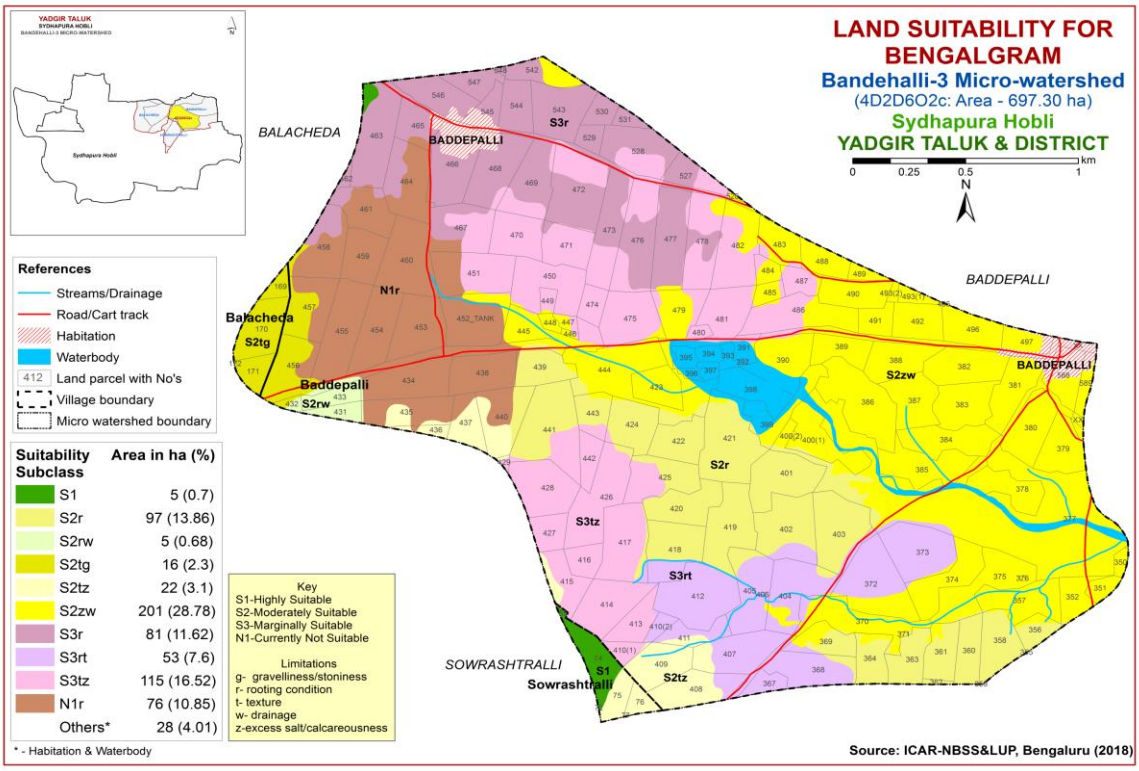


Fig. 7.8 Land Suitability map of Bengal gram

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important fruit and spice crop grown in about 0.42 lakh ha in Karnataka State. The crop requirements for growing chilli (Table 7.10) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chilli was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.9.

In Bandehalli-3 microwatershed, there are no highly (Class S1) suitable lands for growing chilli in the microwatershed. Maximum area of about 455 ha (65%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have

minor limitations of texture, calcareousness, drainage, gravelliness and rooting condition. Marginally suitable lands (Class S3) occupy an area of about 138 ha (20%) and are distributed in the northern, northwestern, western and southern part of the microwatershed. They have moderate limitations of rooting condition and texture. An area of 76 ha (11%) is currently not suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.10 Crop suitability criteria for Chilli

Crop requirement		Rating			
Soil –site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Mean temperature in growing season	^{0}c	20-30	30-35, 13-15	35-40, 10-12	>40,<10
Slope	%	<3	3-5	5-10	>10
LGP	Days	>150	120-150	90-120	<90
Soil drainage	class	Well drained	Moderately drained	Imp./ poor drained/excessively	V.poorly drained
Soil reaction	pH	6.5-7.8, 6.0-7.0	7.8-8.4	8.4-9.0, 5.0-5.9	>9.0
Surface soil texture	Class	scl, cl, sil	sl,sc,sic,c (m/k)	c (ss), ls, s	
Soil depth	cm	>75	50-75	25-50	<25
Gravel content	%vol.	<15	15-35	35-60	>60
Salinity (ECe)	dsm^{-1}	<1.0	1.0-2.0	2.0-4.0	<4
Sodicity (ESP)	%	<5	5-10	10-15	

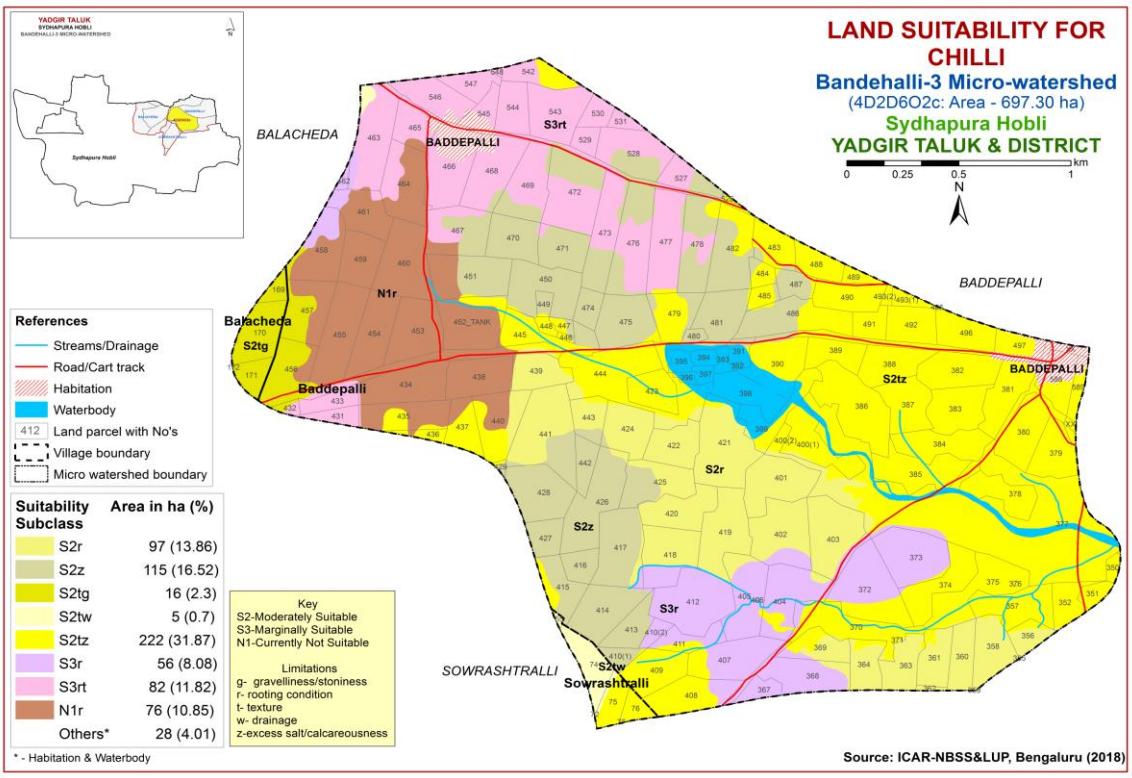


Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum*)

Tomato is one of the most important fruit crop grown in about 0.61 lakh ha covering almost all the district of the state. The crop requirements for growing tomato (Table 7.11) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tomato was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.10.

In Bandehalli-3 microwatershed, there are no highly (Class S1) lands available for growing tomato in the microwatershed. An area of about 251 ha (36%) is moderately suitable (Class S2) and are distributed in the northern, central, western, southern and southeastern part of the microwatershed. They have minor limitations of rooting condition, calcareousness, texture, drainage and gravelliness. The marginally suitable (Class S3) lands cover a maximum area of about 343 ha (49%) and occur in the major part of the microwatershed. They have moderate limitations of texture, rooting condition, calcareousness and drainage. An area of about 76 ha (11%) is currently not suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.11 Crop suitability criteria for Tomato

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}c	25-28	29-32 , 20-24	15-19 33-36	<15, >36
Soil moisture	Growing period	Days	>150	120-150	90-120	
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Poorly drained	V. poorly drained
Nutrient availability	Texture	Class	l, sl, cl, scl	sic,sicl,sc,c(m/k	c (ss), ls	s
	pH	1:2.5	6.0-7.3	5.5-6.0 7.3-8.4	8.4-9.0	>9.0
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	%vol	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	slight	strongly	
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	>10

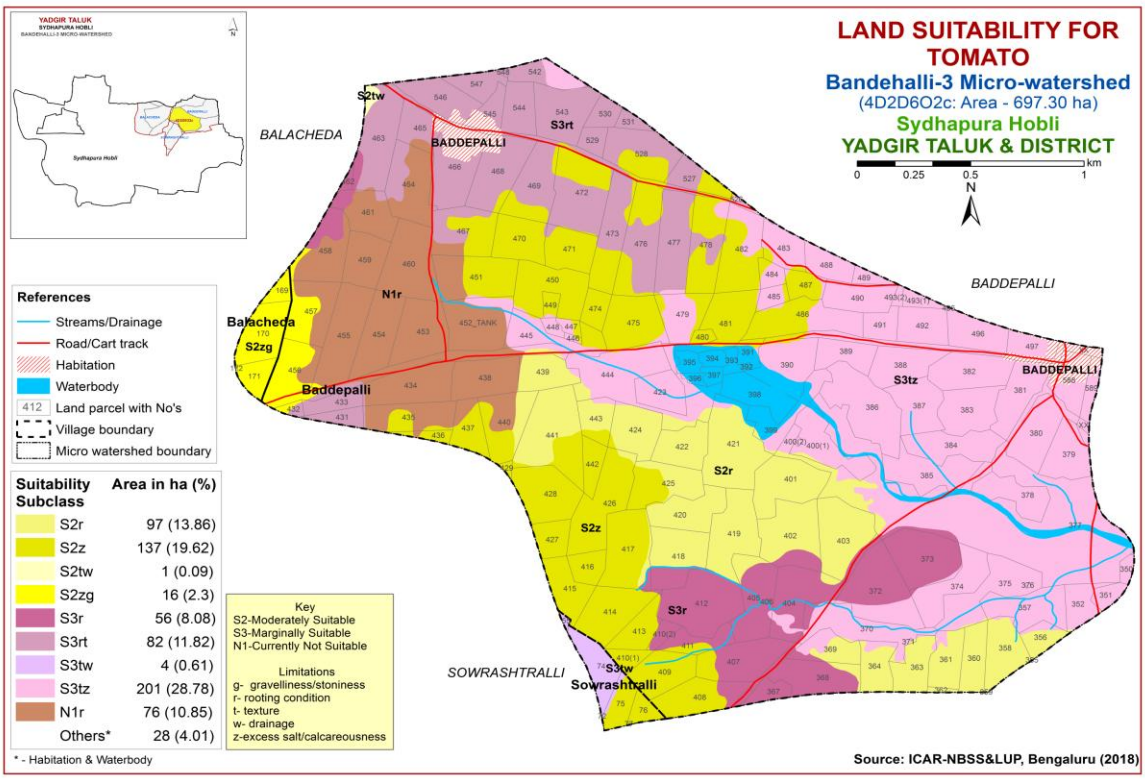


Fig 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Drumstick (*Moringa oleifera*)

Drumstick is one of the most important vegetable crop grown in about 2403 ha in the state. The crop requirements for growing drumstick (Table 7.12) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

There are no highly (Class S1) suitable lands for growing drumstick in the microwatershed. Maximum area of about 358 ha (51%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition, calcareousness and drainage. An area of about 102 ha (15%) is marginally suitable (Class S3) and are distributed in the western, central and southeastern part of the microwatershed. They have moderate limitations of rooting condition and drainage. Currently not suitable (Class N1) lands occupy an area of about 210 ha (30%) for drumstick and are distributed in the northern, western and southern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.12 Crop suitability criteria for Drumstick

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	sc,scl,cl,c(red)	sl, c (black)	ls	s
	pH	1:2.5	5.5-6.5	5-5.5, 6.5-7.3	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	%vol.	0-35	35-60	60-80	>80
Erosion	Slope	%	0-3	3-10	-	>10

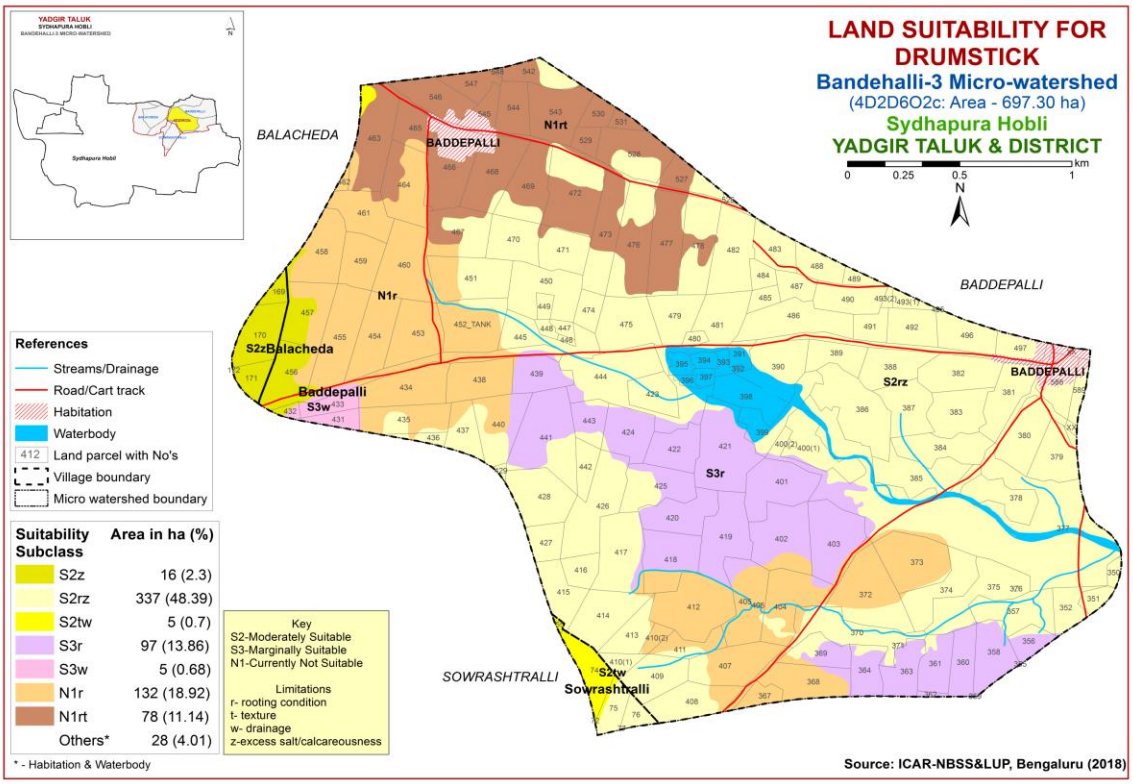


Fig 7.11 Land Suitability map of Drumstick

7.12 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is the important leaf crop grown for rearing silk worms in about 1,66,000 ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.13) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing mulberry was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

There are no highly (Class S1) lands available for growing mulberry in the microwatershed. An area of about 153 ha (22%) is moderately suitable (Class S2) and are distributed in the western, northern, central, southwestern and southern part of the microwatershed. They have minor limitations of calcareousness and rooting condition.

Marginally suitable (Class S3) lands occur in a maximum area of 308 ha (44%) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, texture, calcareousness and drainage. Currently not suitable (Class N1) lands cover an area of about 210 ha (30%) for mulberry and are distributed in the northern, western and southern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.13 Crop suitability criteria for Mulberry

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	sc, cl, scl	c (red)	c (black), sl, ls	-
	pH	1:2.5				
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	%vol.	0-35	35-60	60-80	>80
Erosion	Slope	%	0-3	3-5	5-10	>10

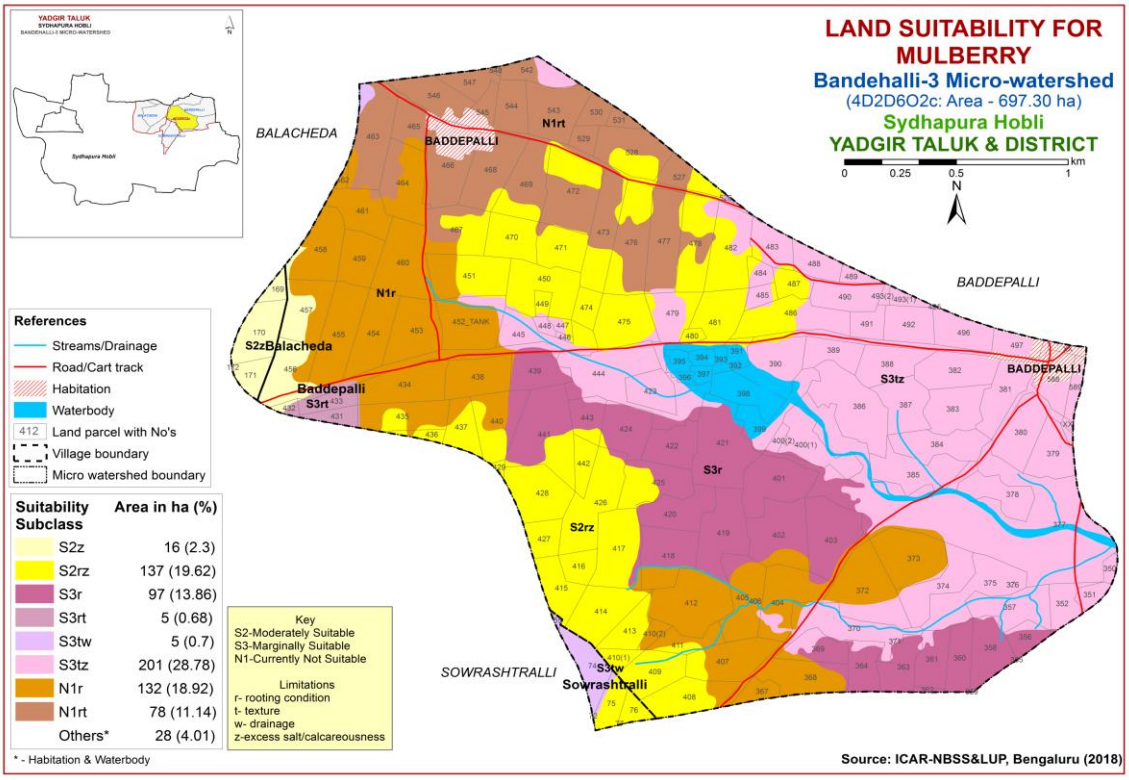


Fig 7.12 Land Suitability map of Mulberry

7.13 Land Suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in about 173080 ha in all the districts of the State. The crop requirements for growing mango (Table 7.14) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for

growing mango was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.13.

Table 7.14 Crop suitability criteria for Mango

Crop requirement			Rating			
soil-site characteristics		Unit	Highly suitable(S1)	Moderately suitable (S2)	Marginally suitable (S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	28-32	24-27 33-35	36-40	20-24
	Min. temp. before flowering	^{0}C	10-15	15-22	>22	
Soil moisture	Growing period	Days	>180	150-180	120-150	<120
Soil aeration	Soil drainage	class	Well drained	Mod. To imper.drained	Poor drained	V.poorly drained
	Water table	M	>3	2.50-3.0	2.5-1.5	<1.5
Nutrient availability	Texture	Class	sc, l, sil, cl	sl, sc, sic, l, c	c (<60%)	c (>60%),
	pH	1:2.5	5.5-7.5	7.6-8.55.0-5.4	8.6-9.0,4.0-4.9	>9.0 <4.0
	OC	%	High	medium	low	
	$CaCO_3$ in root zone	%	Non calcareous	<5	5-10	>10
Rooting conditions	Soil depth	cm	>200	125-200	75-125	<75
	Gravel content	% vol.	Non gravelly	<15	15-35	>35
Soil toxicity	Salinity	dS/m	Non saline	<2.0	2.0-3.0	>3.0
	Sodicity	%	Non sodic	<10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

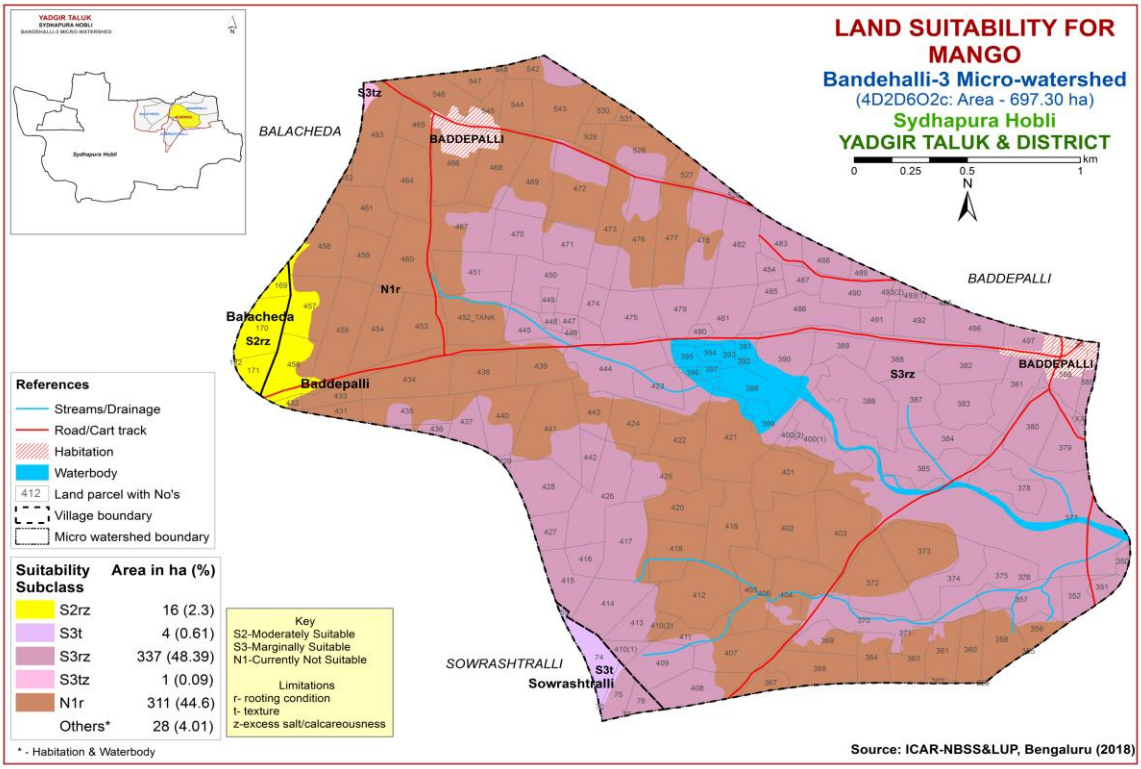


Fig. 7.13 Land Suitability map of Mango

In Bandehalli-3 microwatershed, there are no highly (Class S1) lands for growing mango in the microwatershed. An area of 16 ha (2%) is moderately suitable (Class S2) and are distributed in the western part of the microwatershed. Maximum area of about 342 ha (49%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, calcareousness and rooting condition. Currently not suitable lands (Class N1) occupy an area of 311 ha (45%) and are distributed in the northern, western, central and southern part of the microwatershed. They have severe limitation of rooting condition.

7.14 Land Suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in about 29373 ha in almost all the districts of the state. The crop requirements for growing sapota (Table 7.15) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.14.

In Bandehalli-3 microwatershed, there are no highly suitable (Class S1) lands for growing sapota in the microwatershed. An area of about 153 ha (22%) is moderately suitable (Class S2) and are distributed in the western, northern and southwestern part of the microwatershed. They have minor limitations of rooting condition, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of 308 ha (44%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, rooting condition and calcareousness. An area of about 210 ha (30%) is currently not suitable (Class N1) and are distributed in the northern, western and southern part of the microwatershed with severe limitation of rooting condition.

Table 7.15 Crop suitability criteria for Sapota

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable (S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-32	33-36 24-27	37-42 20-23	>42 <18
Soil moisture	Growing period	Days	>150	120-150	90-120	<120
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	scl, l, cl, sil	sl, sicl, sc	c (<60%)	ls,s,c(>60%)
	pH	1:2.5	6.0-7.5	7.6-8.0,5.0-5.9	8.1-9.0,4.5-4.9	>9.0,<4.5
	$CaCO_3$ in root zone	%	Non calcareous	<10	10-15	>15
Rooting conditions	Soil depth	cm	>150	75-150	50-75	<50
	Gravel content	%vol.	Non gravelly	<15	15-35	<35
Soil toxicity	Salinity	dS/m	Non saline	Up to 1.0	1.0-2.0	2.0-4.0
	Sodicity	%	Non sodic	10-15	15-25	>25
Erosion	Slope	%	<3	3-5	5-10	>10

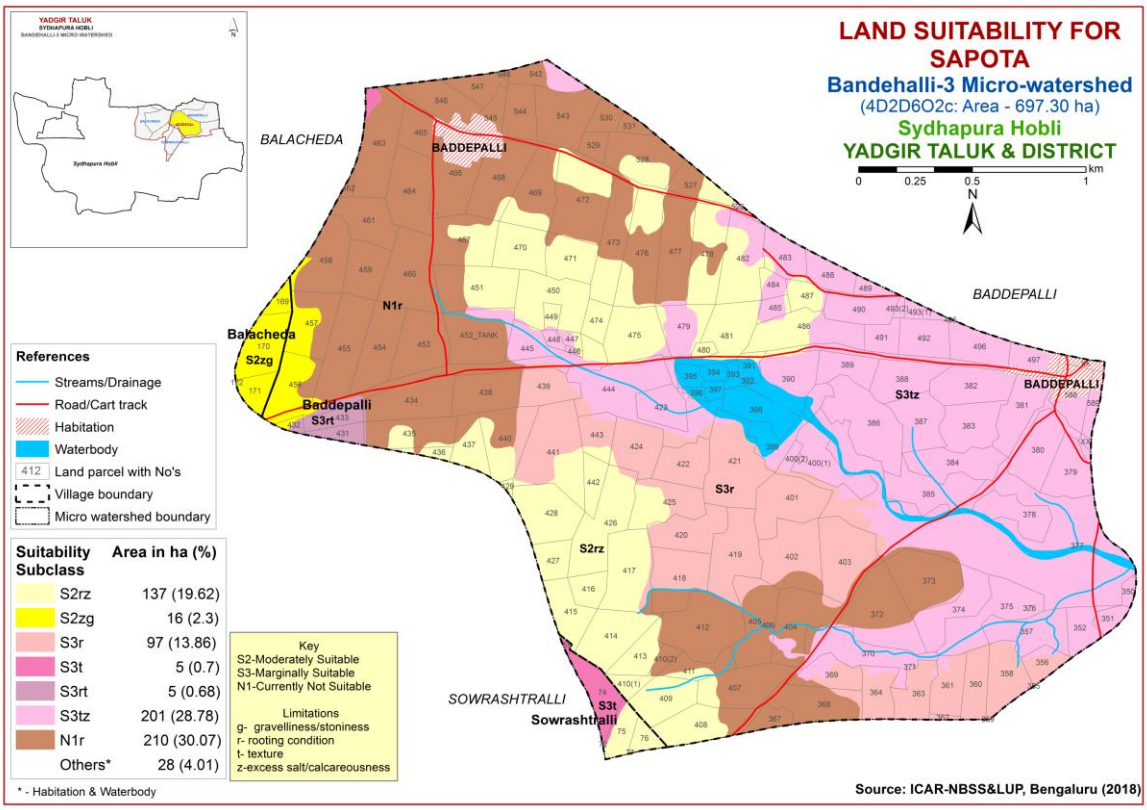


Fig. 7.14 Land Suitability map of Sapota

7.15 Land Suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in about 6558 ha in the State of Raichur, Dharwad, Belgaum, Kalaburgi, Bijapur, Bidar, Bellary, Chitradurga, Bangalore, Kolar, Chikkaballapur and Chamarajnagar districts. The crop requirements for growing guava (Table 7.16) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.15.

There are no highly (Class S1) suitable lands available for growing guava in the microwatershed. An area of about 153 ha (22%) is moderately (Class S2) and are distributed in the northern, western and southwestern part of the microwatershed. Marginally suitable (Class S3) cover an area of 307 ha (44%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, calcareousness and rooting condition. Currently not suitable (Class N1) lands occur in an area of about 210 ha (30%) and are distributed in the northern, western and southern part of the microwaterhsed. They have severe limitations of rooting condition and texture.

Table 7.16 Crop suitability criteria for Guava

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-32	33-36 24-27	37-42 20-23	
Soil moisture	Growing period	Days	>150	120-150	90-120	<90
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperfectly	poor	Very poor
Nutrient availability	Texture	Class	scl, l, cl, sil	sl, sicl, sic., sc,c	c (<60%)	c (>60%)
	pH	1:2.5	6.0-7.5	7.6-8.0:5.0-5.9	8.1-8.5:4.5-4.9	>8.5:<4.5
	$CaCO_3$ in root zone	%	Non calcareous	<10	10-15	>15
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	%vol.	<15	15-35	>35	
Soil toxicity	Salinity	dS/m	<2.0	2.0-4.0	4.0-6.0	
	Sodicity	%	Non sodic	10-15	15-25	>25
Erosion	Slope	%	<3	3-5	5-10	>10

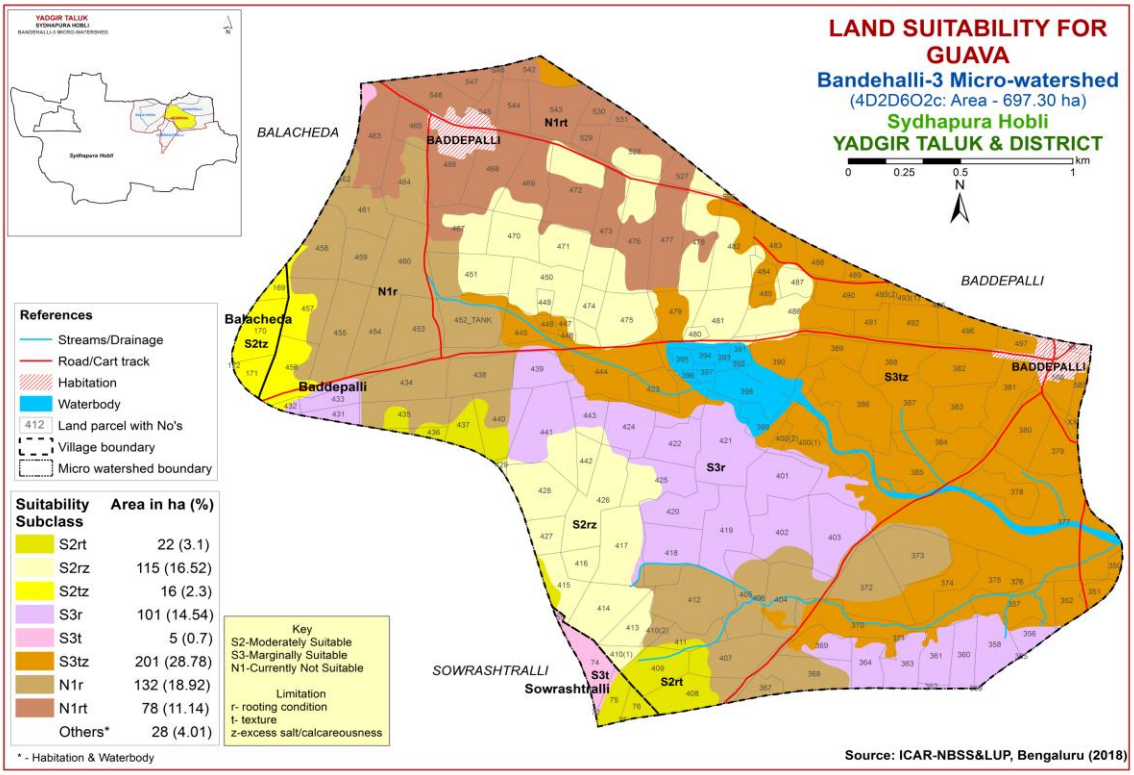


Fig 7.15 Land Suitability map of Guava

7.16 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in karnataka in an area of about 0.16 lakh ha mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.17) were matched with the soil-site characteristics (Table 7.1) and

a land suitability map for growing pomegranate was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.16.

Table 7.17 Crop suitability criteria for Pomegranate

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	30-34	35-38,25-29	39-40 15-24	
Soil moisture	Growing period	Days	>150	120-150	90-120	<90
Soil aeration	Soil drainage	class	Well drained	imperfectly drained		
Nutrient availability	Texture	Class	sl, scl, l, cl	c, sic, sicl	cl, s, ls	
	pH	1:2.5	5.5-7.5	7.6-8.5	8.6-9.0	
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	%vol.	nil	15-35	>35	
Soil toxicity	Salinity	ds/m	Nil	<9	>9	<50
	Sodicity	%	nil			
Erosion	Slope	%	<3	3-5	5-10	

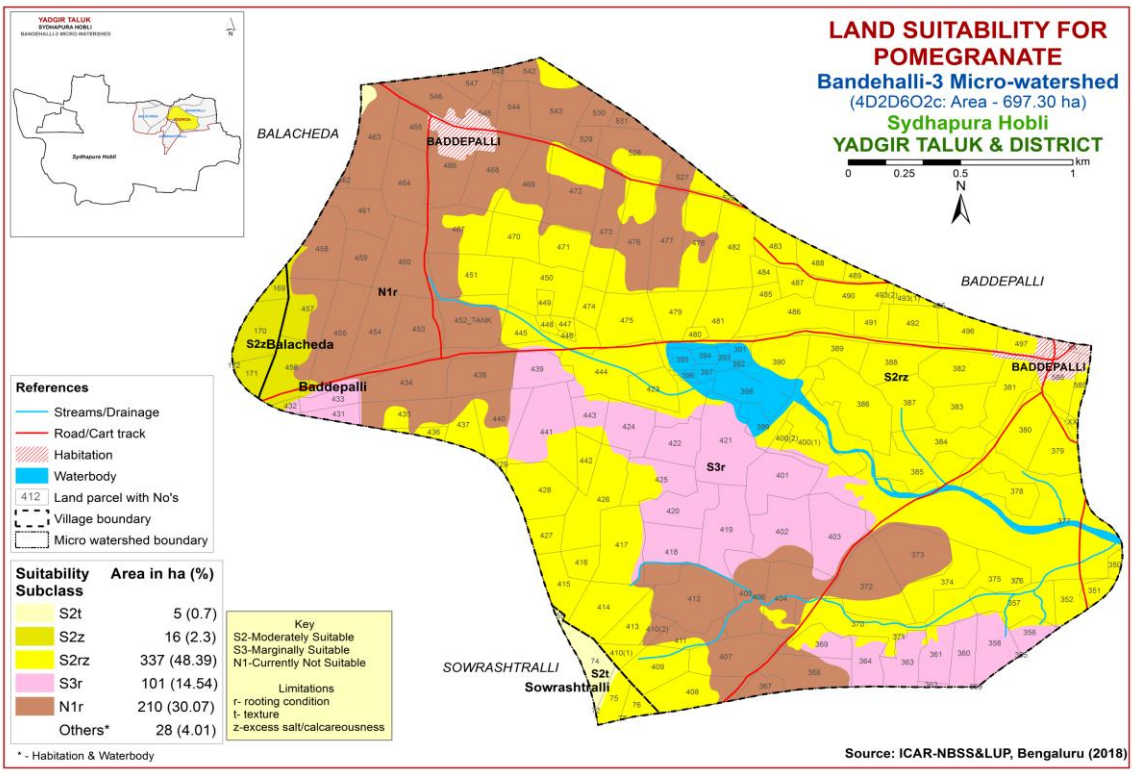


Fig 7.16 Land Suitability map of Pomegranate

In Bandehalli-3 microwatershed, there are no highly suitable (Class S1) lands for growing pomegranate in the microwatershed. An area of about 358 ha (51%) is

moderately suitable (Class S2) for pomegranate and are distributed in the major part of the microwatershed. They have minor limitations of texture, rooting condition and calcareousness. An area of about 101 ha (15%) is marginally suitable (Class S3) and are distributed in the western, central and southern part of the microwatershed. They have moderate limitation of rooting condition. Currently not suitable lands (Class N1) occur in an area of 210 ha (30%) and are distributed in the northern, western and southern part of the microwatershed. They have severe limitation of rooting condition.

7.17 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in 5368 ha in almost all the districts of the State. The crop requirements for growing jackfruit (Table 7.18) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jackfruit was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.17.

There are no highly (Class S1) lands for growing jackfruit in the microwatershed. An area of about 153 ha (22%) is moderately suitable (Class S2) and are distributed in the western, central, northern and southwestern part of the microwatershed. Marginally suitable (Class S3) lands cover an area of 308 ha (44%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, calcareousness and rooting condition. Currently not suitable lands (Class N1) occur in an area of about 210 ha (30%) and are distributed in the northern, western and southern part of the microwatershed with severe limitations of rooting condition and texture.

Table 7.18 Crop suitability criteria for Jackfruit

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	well	Mod. well	Poorly	Poorly
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	-	sl,ls,c(black)	-
	pH	1:2.5	5.5-7.3	5.0-5.5,7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	>5	-

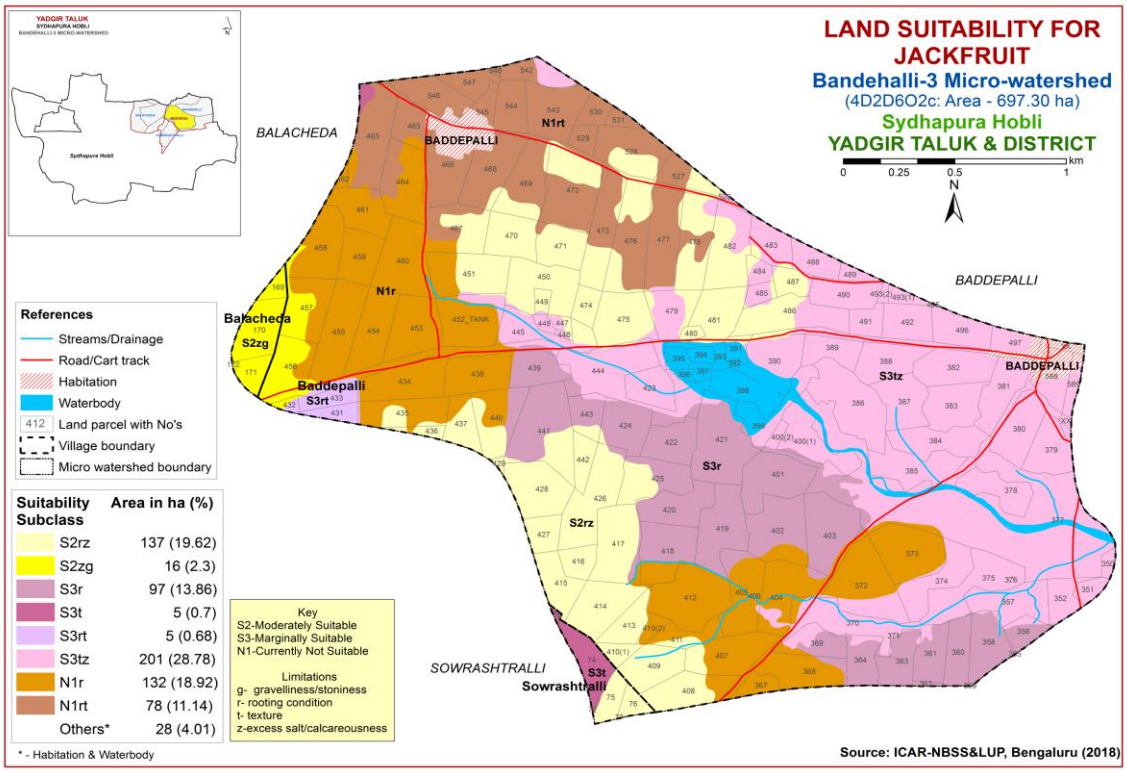


Fig 7.17 Land Suitability map of Jackfruit

7.18 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is one of the most important fruit crop grown in almost all the districts of the state. The crop requirements for growing jamun (Table 7.19) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.18.

Table 7.19 Crop suitability criteria for Jamun

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well	Mod. well	Poorly	V. Poorly
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.8	5.0-6.0	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	% vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-5	5-10	>10

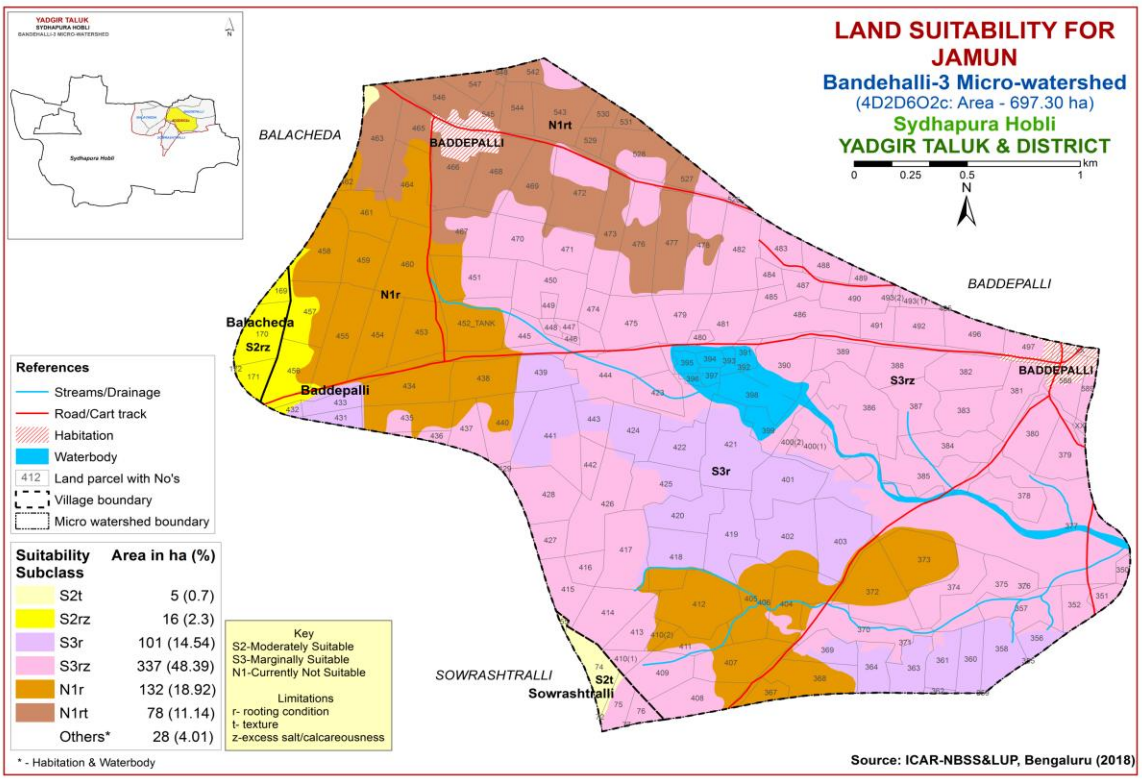


Fig 7.18 Land Suitability map of Jamun

There are no highly suitable (Class S1) lands for growing jamun in the microwatershed. An area of about 21 ha (3%) is moderately suitable (Class S2) and are distributed in the northwestern, western and southern part of the microwatershed. They have minor limitations of texture, rooting condition and calcareousness. Maximum area of about 438 ha (63%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition and calcareousness. Currently not suitable lands (Class N1) occur in an area of about 210 ha (30%) and are distributed in the northern, western and southern part of the microwatershed with severe limitations of rooting condition and texture.

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the most important fruit crop grown in an area of 5446 ha in almost all the districts of the State. The crop requirements for growing musambi (Table 7.20) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.19.

In Bandehalli-3 microwatershed, an area of 5 ha (<1%) is highly suitable (Class S1) for growing musambi and are distributed in the northwestern and southern part of the microwatershed. Maximum area of about 353 ha (51%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. An area of about 101 ha (15%) is marginally suitable (Class S3) and are distributed in the western, central and southeastern

part of the microwatershed. They have moderate limitation of rooting condition. Currently not suitable (Class N1) lands occur in an area of about 210 ha (30%) and are distributed in the northern, western and southern part of the microwatershed with the severe limitation of rooting condition.

Table 7.20 Crop suitability criteria for Musambi

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-30	31-35 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	Class	Well drained	Mod. to imper. drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl, l, sicl, cl, s	sc, sc, c	c (>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.4,7.6-8.0	4.0-5.4,8.1-8.5	<4.0 >8.5
	$CaCO_3$ in root zone	%	Non calcareous	Upto 5	5-10	>10
Rooting condition	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	%vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

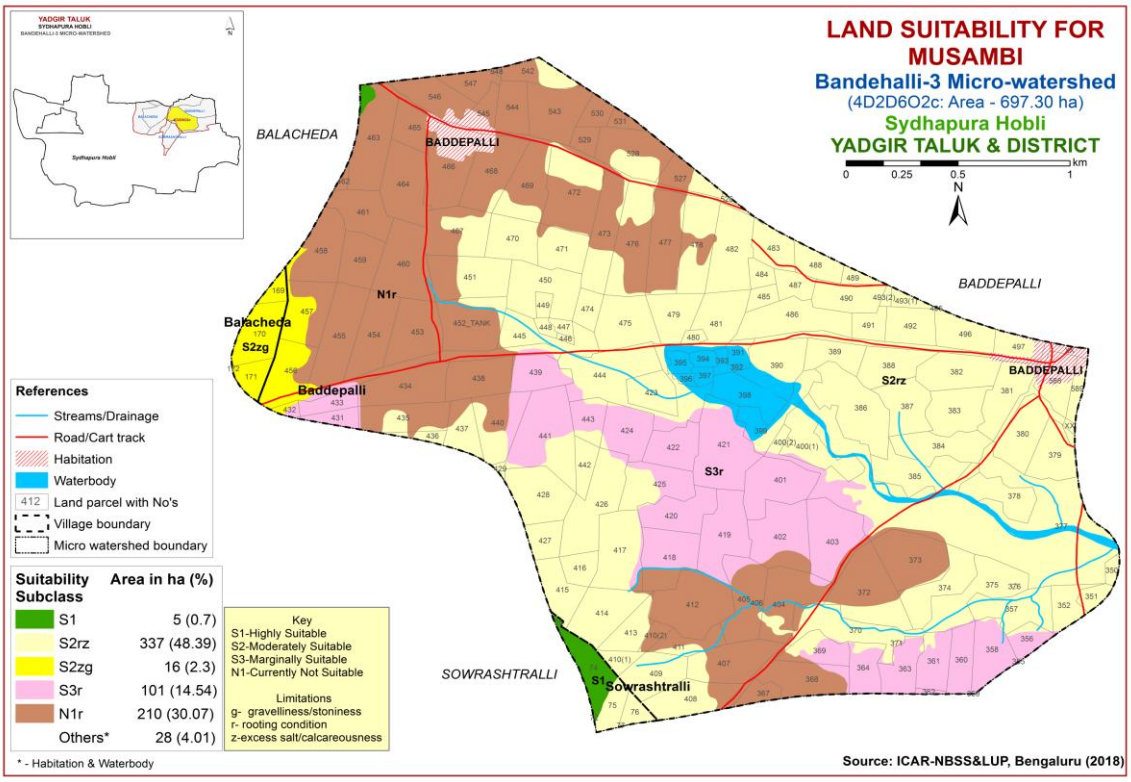


Fig 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in 11752 ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.20.

Table 7.21 Crop suitability criteria for Lime

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temp in growing season	^{0}C	28-30	31-35 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	class	Well drained	Mod. to imper. drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl,l,sicl,cl,s	sc, sc, c	c (>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.4/ 7.6-8.0	4.0-5.4 8.1-8.5	<4.0 >8.5
	$CaCO_3$ in root zone	%	Non calcareous	Upto 5	5-10	>10
Rooting condition	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	%vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

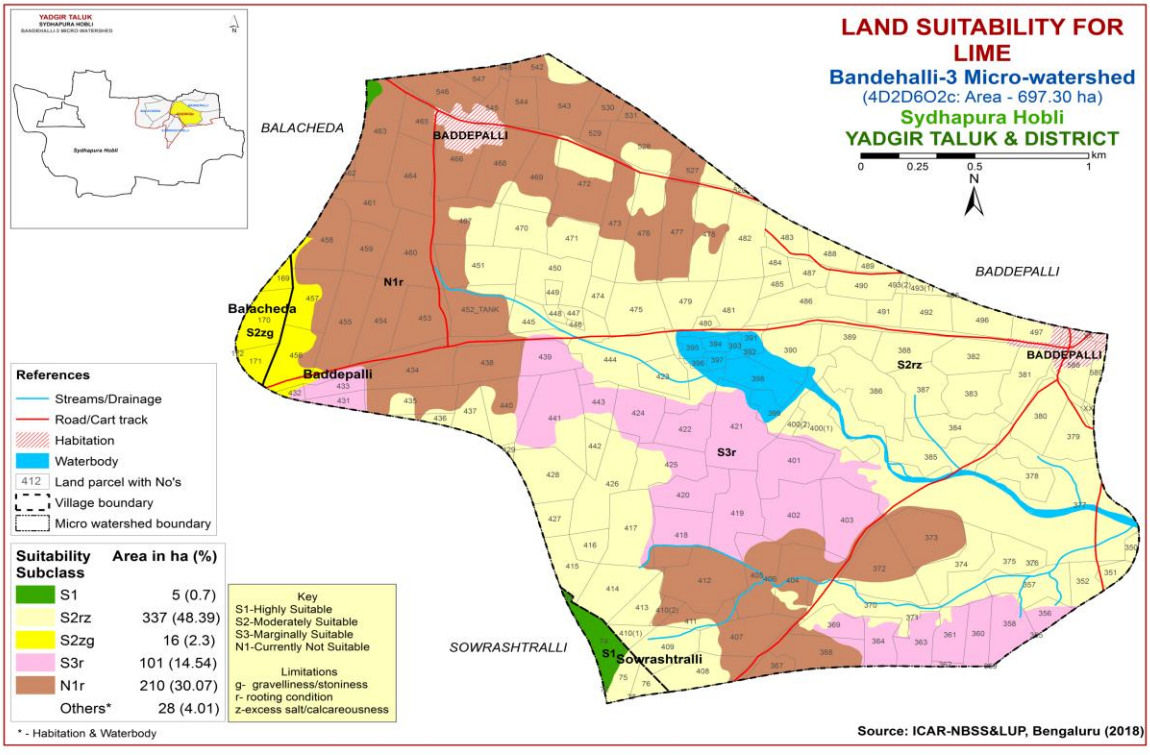


Fig 7.20 Land Suitability map of Lime

In Bandehalli-3 microwatershed, an area of 5 ha (<1%) is highly (Class S1) suitable for growing lime in the microwatershed. Maximum area of about 353 ha (51%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. An area of about 101 ha (15%) is marginally suitable (Class S3) and are distributed in the western, central and southeastern part of the microwatershed. They have moderate limitations of rooting condition. Currently not suitable (Class N1) lands occur in an area of about 210 ha (30%) and are distributed in the northern, western and southern part of the microwatershed with the severe limitation of rooting condition.

7.21 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important plantation nut crop grown in an area of about 70552 ha in almost all the districts. The crop requirements for growing Cashew (Table 7.22) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing Cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.21.

There are no highly (Class S1) suitable lands for growing cashew in the microwatershed. An area of 22 ha (3%) is moderately suitable (Class S2) and are distributed in the western and southern part of the microwatershed. They have minor limitations of rooting condition and texture. Marginally suitable (Class S3) lands occur in an area of 22 ha (3%) and are distributed in the southeastern part of the microwatershed with moderate limitation of rooting condition. Currently not suitable (Class N1) lands cover a maximum area of 625 ha (90%) and are distributed in all parts of the microwatershed. They have severe limitations of rooting condition, texture and calcareousness.

Table 7.22 Crop suitability criteria for Cashew

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V. Poorly drainage
Nutrient availability	Texture	Class				
	pH	1:2.5	5.5-6.5	5.0-5.5 ,6.5-7.3	7.3-7.8	>7.8
Rooting conditions	Soil depth	cm	>100	75-100	50-75	<50
	Gravel content	%vol.	<15	15-35	35-60	>60
Erosion	Slope	%	0-3	3-10	>10	

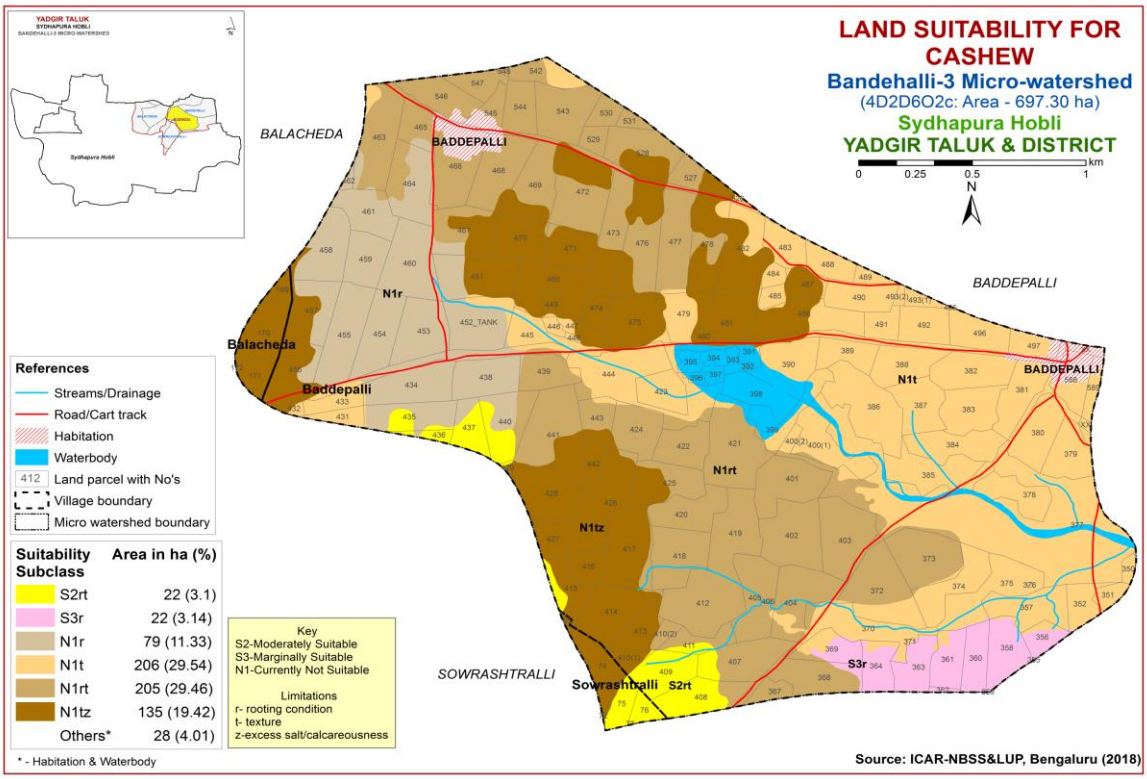


Fig 7.21 Land Suitability map of Cashew

7.22 Land Suitability for Custard Apple (*Annona reticulata*)

Custard apple is one of the most important fruit crop grown in 1426 ha in almost all the districts of the state. The crop requirements for growing custard apple (Table 7.23) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.22.

Maximum area of 243 ha (35%) is highly (Class S1) suitable for growing custard apple and are distributed in the major part of the microwatershed. An area of about 216 ha (31%) is moderately suitable (Class S2) and are distributed in the northern, central, western and southern part of the microwatershed. They have minor limitations of calcareousness and rooting condition. Marginally suitable lands (Class S3) occur in an area of 134 ha (19%) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitation of rooting condition. An area of 76 ha (11%) is currently suitable not (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.23 Crop suitability criteria for Custard Apple

Crop requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately Suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	scl, cl, sc, c (red), c (black)	-	sl, ls	-
	pH	1:2.5	6.0-7.3	7.3-8.4	5.0-5.5,8.4-9.0	>9.0
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15-35	35-60	60-80	-
Erosion	Slope	%	0-3	3-5	>5	

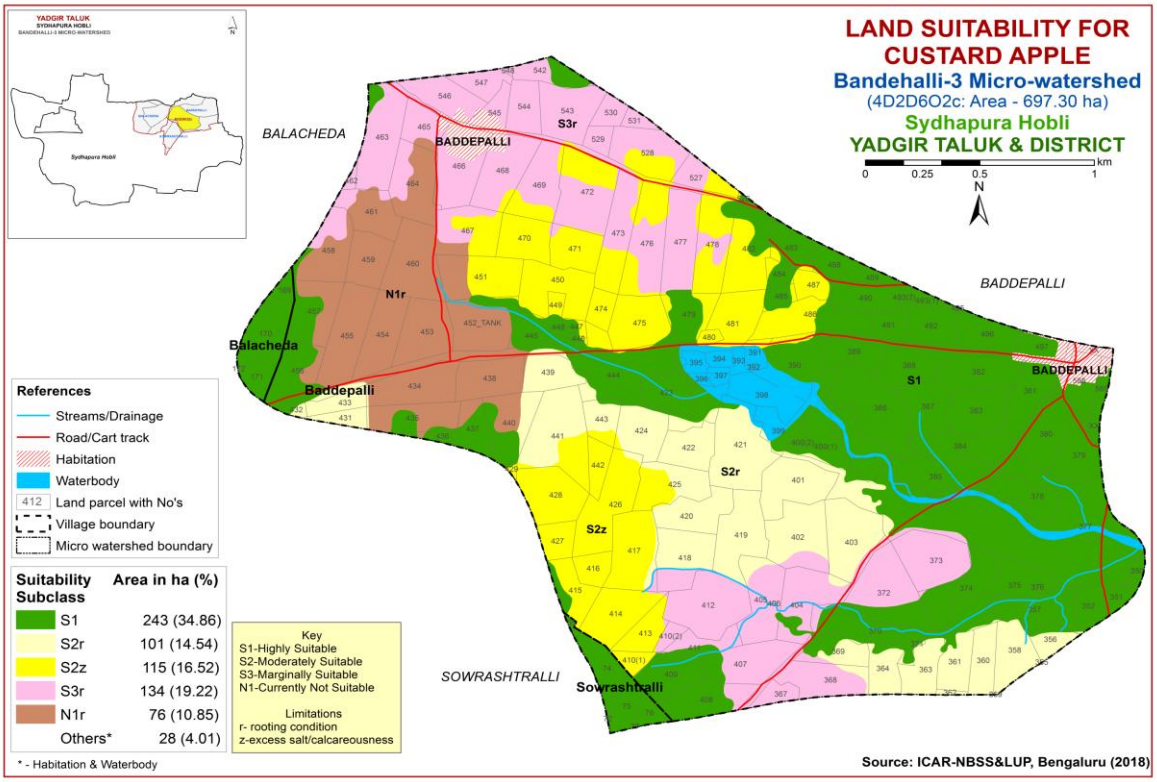


Fig 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important medicinal and fruit plant grown in 151 ha in almost all the districts of the state. The crop requirements for growing amla (Table 7.24) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.23.

In Bandehalli-3 microwatershed, an area of 42 ha (6%) is highly (Class S1) suitable for growing amla in the microwatershed. Moderately suitable (Class S2) lands occur in an area of 418 ha (60%) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, calcareousness and

rooting condition. An area of about 134 ha (19%) is marginally suitable (Class S3) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitations of rooting condition and texture. An area of 76 ha (11%) is not currently suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.24 Crop suitability criteria for Amla

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod. well drained	Poorly drained	V. Poorly drained
Nutrient availability	Texture	Class	scl,cl,sc,c (red)	c (black)	ls, sl	-
	pH	1:2.5	5.5-7.3	5.0-5.5	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	% vol.	<15-35	35-60	60-80	-
Erosion	Slope	%	0-3	3-5	5-10	>10

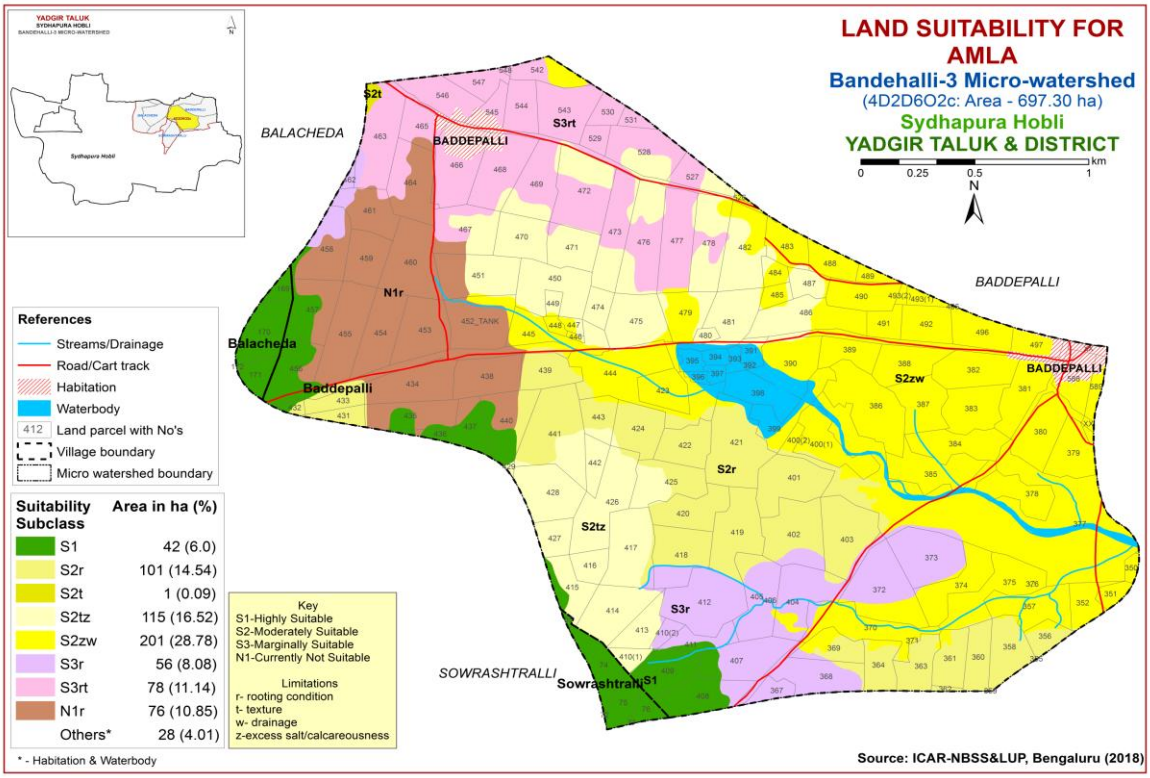


Fig 7.23 Land Suitability map of Amla

7.24 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop raised in 14897 ha in all the districts of the state. The crop requirements for growing tamarind (Table 7.25) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for

growing tamarind was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.24.

There are no highly suitable (Class S1) lands for growing tamarind in the microwatershed. Moderately suitable (Class S2) lands occur in a small area of 21 ha (3%) and are distributed in the western, northwestern and southern part of the microwatershed. They have minor limitations of texture, rooting condition and calcareousness. A maximum area of 337 ha (48%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition and calcareousness. Currently not suitable lands (Class N1) occur in an area of 311 ha (45%) and are distributed in the northern, western, central and southern part of the microwatershed. They have severe limitations of rooting condition and texture.

Table 7.25 Crop suitability criteria for Tamarind

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V.Poorly drained
Nutrient availability	Texture	Class	scl,cl,sc,c(red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0,7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	cm	>150	100-150	75-100	<50
	Gravel content	%vol.	<15	15-35	35-60	60-80
Erosion	Slope	%	0-3	3-5	5-10	>10

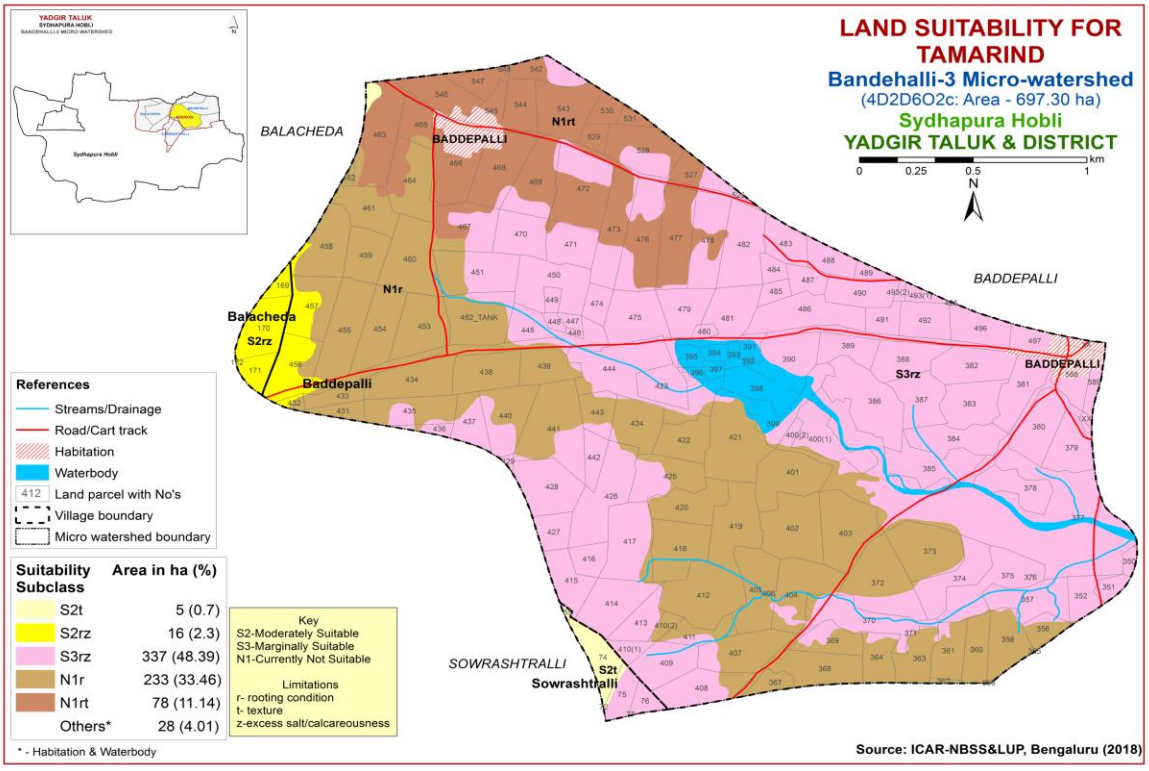


Fig 7.24 Land Suitability map of Tamarind

7.25 Land suitability for Marigold (*Tagetes sps.)*

Marigold is one of the most important flower crop grown in an area of 9108 ha in almost all the districts of the State. The crop requirements for growing marigold (Table 7.26) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.25.

Table 7.26 Land suitability criteria for Marigold

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	18-23	17-15,24-35	35-40,10-14	>40,<10
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l ,sl,scl,cl,sil	sicl,sc,sic, c	c	ls, s
	pH	1:2.5	7.0-7.5	5.5-5.9,7.6-8.5	<5, >8.5	-
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	-
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15	15-35	>35	-
Soil toxicity	Salinity	ds/m	Non saline	Slightly	Strongly	-
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	-

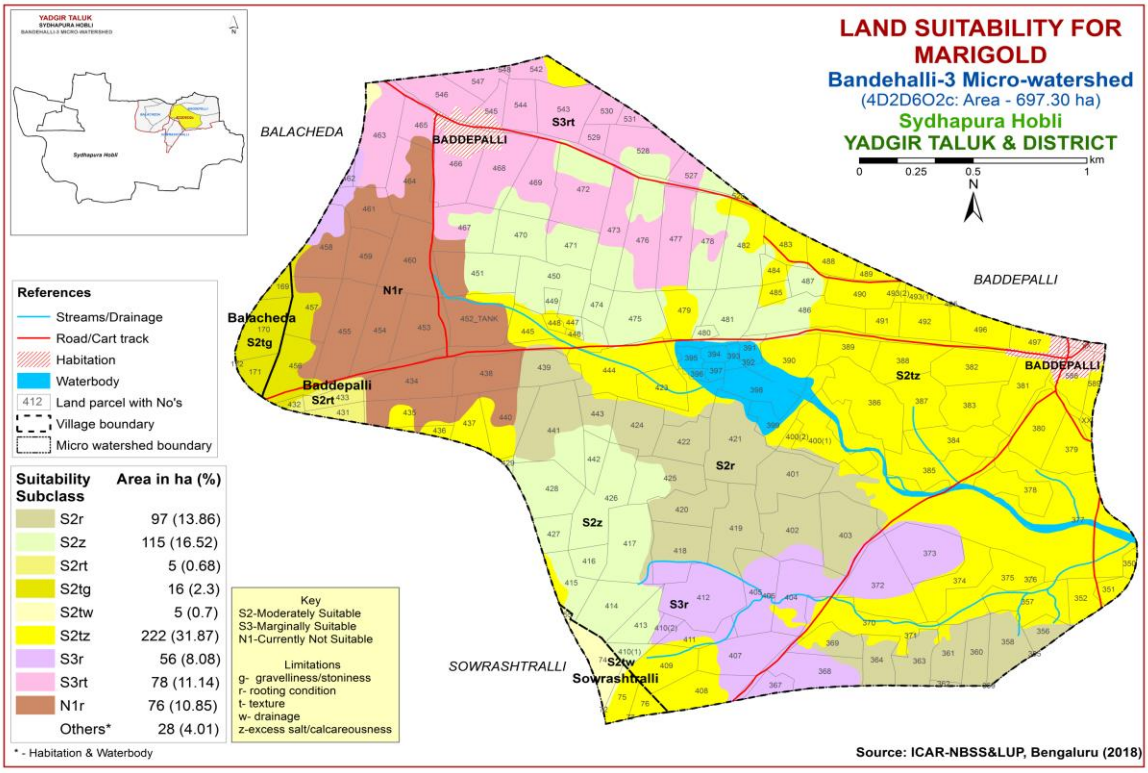


Fig. 7.25 Land Suitability map of Marigold

There are no highly (Class S1) suitable lands for growing marigold in the microwatershed. Maximum area of about 460 ha (66%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, gravelliness, calcareousness and rooting condition. Marginally suitable lands (Class S3) occur in an area of 134 ha (19%) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitations of texture and rooting condition. Currently not suitable (Class N1) lands cover an area of 76 ha (11%) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

7.26 Land suitability for Chrysanthemum (*Dendranthema grandiflora*)

Chrysanthemum is one of the most important flower crop grown in an area of 4978 ha in almost all the districts of the State. The crop requirements for growing chrysanthemum (Table 7.27) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

There are no highly (Class S1) suitable lands for growing chrysanthemum in the microwatershed. Maximum area of about 460 ha (66%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of drainage, texture, gravelliness, calcareousness and rooting condition. Marginally suitable lands (Class S3) cover an area of 134 ha (19%) and are distributed in the northern, northwestern and southern part of the microwatershed. They have moderate limitations of texture and rooting condition. An area of 76 ha (11%) is currently not suitable (Class N1) and are distributed in the western part of the microwatershed with severe limitation of rooting condition.

Table 7.27 Land suitability criteria for Chrysanthemum

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable(S1)**	**Moderately Suitable(S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	18-23	17-15, 24-35	35-40,10-14	>40, <10
Soil aeration	Soil drainage	Class	Well drained	Moderately well drained	Imperfectly drained	Poorly drained
Nutrient availability	Texture	Class	l,sl,scl,cl, sil	sicl, sc, sic,c	c	ls, s
	pH	1:2.5	7.0-7.5	5.5-5.9, 7.6-8.5	<5>8.5	
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Rooting conditions	Soil depth	cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	slightly	strongly	
	Sodicity(ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	

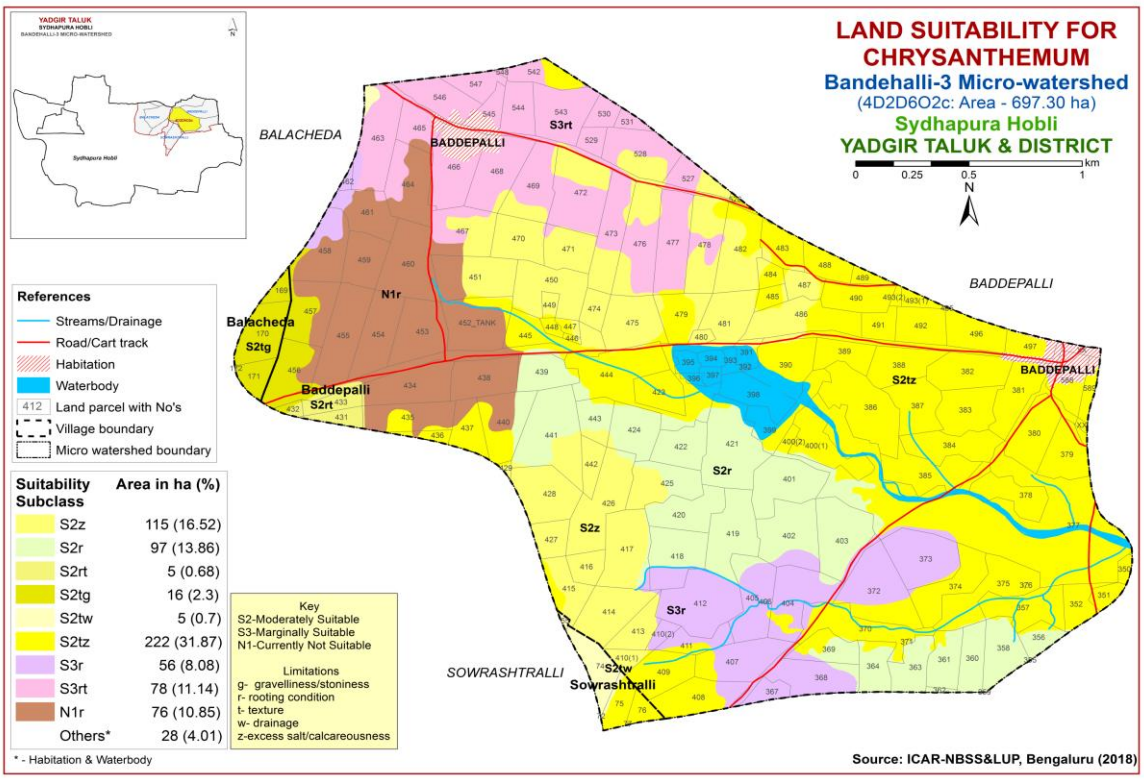


Fig. 7.26 Land Suitability map of Chrysanthemum

7.27 Land Management Units(LMUs)

The 16 soil map units identified in Bandehalli-3 microwatershed have been grouped into 8 Land Management Units(LMU's) for the purpose of preparing a Proposed Crop Plan. Land Management Unitsare grouped based on the similarities in respect of the type of soil, the depth of the soil, the surface soil texture, gravel content, AWC, slope, erosion etc. and a Land Management Unitsmap (Fig. 7.27) has been generated. These Land Management Unitsare expected to behave similarly for a given level of management.

The 16 soil map units that have been grouped into eight Land Management Unitsalong with brief description of soil and site characteristics are given below.

LMU NO.	Soil Map Unit number	Soil Map Units	Soil and site characteristics
1	51, 34, 111, 126, 91	ANRbB2g1,GWDcB2, GWDiB2, HSLbB2, HSLhB2, SWRmB2	Moderately deep to deep black calcareous sandy clay to sandy clay loam soils
2	37, 45	BLCcB2, GDGbB3g1	Moderately deep to deep red calcareous sandy clay soils
3	27	YLRbB2	Moderately shallow red sandy clay soils
4	20, 70	JNKcB2,RMPcB2	Moderately shallowblack sandy clay soils
5	2, 4	BDLbB2,BDLhB2	Shallow black clay soils
6	121	DSBcB2	Shallow gravelly black sandy clay soils
7	9	VNKcB2	Shallow red sandy clay soils
8	120	BDPhB2	Very shallow, black sandy clay soils

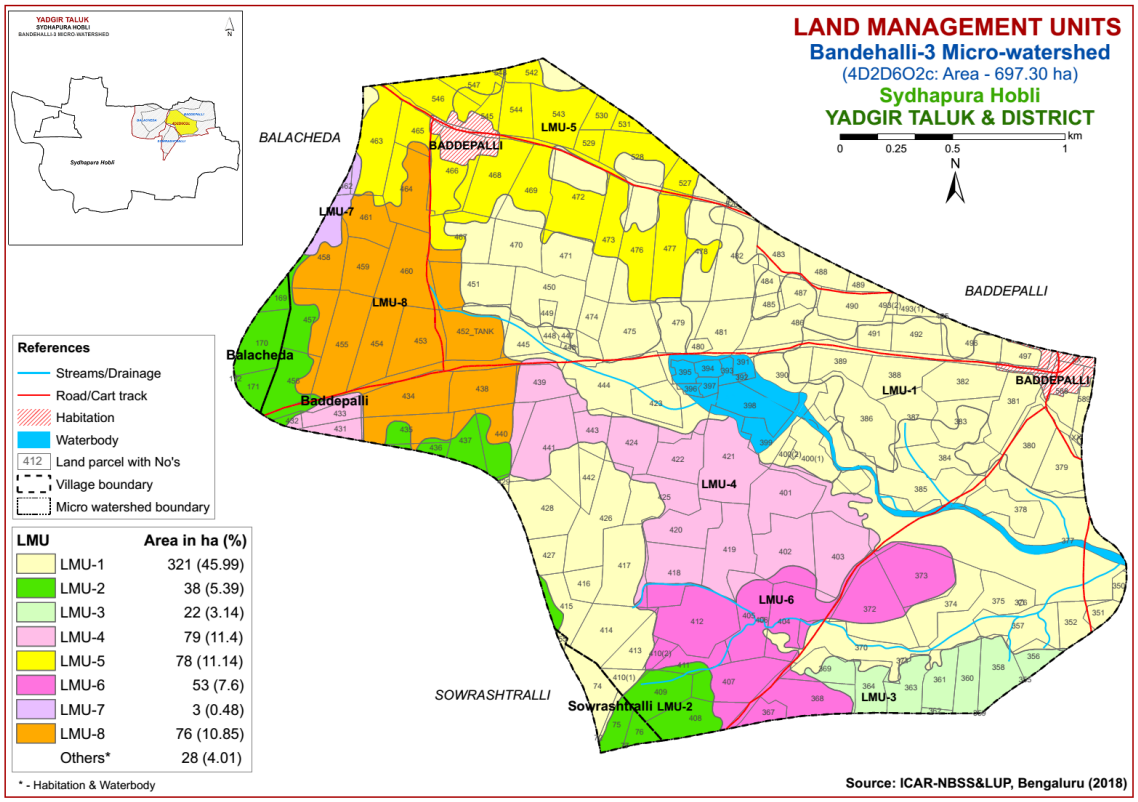


Fig. 7.27 Land Management Units (LMU's) map of Bandehalli-3 microwatershed

7.28 Proposed Crop Plan for Bandehalli-3 microwatershed

After assessing the land suitability for the 26 crops, a proposed crop plan has been prepared for the 8 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 26 crops. The resultant proposed crop plan is presented in Table 7.28.

Table 7.28 Proposed Crop Plan for Bandehalli-3 Micro watershed

Proposed LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 1 321 ha (46%)	51.ANRbB2g1 34.GWDcB2 35.GWDiB2 111.HSLbB2 126.HSLhB2 91.SWRmB2	**Baddepalli:**350,351,352,357,370,371,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,400(1),400(2),410(1),413,414,415,416,417,423,426,427,428,429,442,444,445,446,447,448,449,450,451,467,470,471,474,475,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493(1),493(2),495, 496,497,526, 589 **Sowrashtralli:** 55,72,74	Moderately deep to deep black calcareous sandy clay to sandy clay loam soils	Sunflower, Sorghum, Maize, Cotton, Bengal gram, Soybean, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi, Jamun, Tamarind, Amla, Custard apple **Vegetables:** Bhendi, Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
LMU 2 38 ha (5%)	37.BLCcB2 45.GDGbB3g1	**Baddepalli:**408,409,436,437,440,456 **Balacheda:** 169,170,171,172 **Sowrashtralli :** 75,76,77	Moderately deep to deep red calcareous sandy clay soils	Maize, Sorghum, Groundnut, Redgram, Bajra	**Fruit crops:** Sapota, Guava, Jackfruit, Musambi, Pomegranate Jamun, Lime, Tamarind, Amla, Custard apple, **Vegetables:** Tomato, Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Drip irrigation, mulching, suitable conservation practices (Crescent Bunding with Catch Pit etc)
LMU 3 22 ha (3%)	27.YLRbB2	**Baddepalli:**355,356,358,359,360,361,362,363,364,369	Moderately shallow red sandy clay soils	Maize, Sorghum, Groundnut, Bajra, Red	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent

				gram	**Flowers:** Marigold Chrysanthemum	Bunding with Catch Pit etc)
LMU 4 79 ha (11%)	20.JNKcB2 70.RMPcB2	**Baddepalli:**401,402,403,418,419,420,421,422,424,425,431,432,433,439,441, 443	Moderately shallow black sandy clay soils	Bengal gram, Sorghum, Bajra, Safflower, Linseed, Coriander	**Fruit crops:** Amla, Custard apple **Vegetables:** Coriander, Bhendi **Flowers:** Marigold, Jasmine Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 5 78 ha (11%)	2.BDLbB2 4.BDLhB2	**Baddepalli:**463,465,466,468,469,472,473,476,477,527,528,529,530,531,542,543,544,545,546,547, 548	Shallow black clay soils	Bengal gram, Linseed, Safflower, Coriander	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended
LMU 6 53 ha (8%)	121.DSBcB2	**Baddepalli:**367,368,372,373,404,405,406,407,410(2), 411,412	Shallow gravelly black sandy clay soils	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended
LMU 7 3 ha (<1%)	9.VNKcB2	**Baddepalli :** 462	Shallow red sandy clay soils	Horsegram, Bajra	**Agri-Silvi-Pasture:** Custard apple, Amla, Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers
LMU 8 76 ha (11%)	120.BDPhB2	**Baddepalli:**434,435,438,452,453,454,455,457,458,459,460,461,464	very shallow, black sandy clay soils	-	Glyricidia, *Styloxanthes hamata*, *Styloxanthes scabra*	Sowing across the slope, drip irrigation and mulching is recommended

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

Soil health is basic to plant health and plant health is basic to human and bovine health. Soil is fundamental to crop production. Without soil, no food could be produced nor would livestock be fed on a large scale. Because it is finite and fragile, soil is a precious resource that requires special care from its users.

Soil health or the capacity of the soil to function is critical to human survival. Soil health has been defined as: "the capacity of the soil to function as a living system without adverse effect on the ecosystem". Healthy soils maintain a diverse community of soil organisms that help to form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive repercussions for soil, water and nutrient holding capacity and ultimately improve crop production and also contribute to mitigating climate change by maintaining or increasing its carbon content.

Functional interactions of soil biota with organic and inorganic components, air and water determine a soil's potential to store and release nutrients and water to plants and to promote and sustain plant growth. Thus, maintaining soil health is vital to crop production and conserve soil resource base for sustaining agriculture.

The most important characteristics of a healthy soil are

- Good soil tilth
- Sufficient soil depth
- Good water storage and good drainage
- Adequate supply, but not excess of nutrients
- Large population of beneficial organisms
- Small proportion of plant pathogens and insect pests
- Low weed pressure
- Free of chemicals and toxins that may harm the crop
- Resistance to degradation
- Resilience when unfavourable conditions occur

Characteristics of Bandehalli-3 microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Gowdagera (GWD) 201 ha (29%), Hosalli (HSL) 115 ha (17%), Badiyala (BDL) 78 ha (11%), Baddeppalli (BDP) 76 ha (11%), Jinkera (JNK) 75 ha (11%), Dastharabad (DSB) 53 ha (8%), Yalleri (YLR) 22 ha (3%), Balichakra (BLC) 22 ha (3%), Rampur (RMP) 5 ha (<1%), Sowrashtrahalli (SWR) 4 ha (<1%) and other minor areas in the microwatershed.

- As per land capability classification, entire area comes under arable land category (Class II, III and IV). The major limitations identified in the arable lands were soil and erosion.
- On the basis of soil reaction, about 113 ha (16%) area is neutral (pH 6.5-7.3) followed by slightly alkaline (pH 7.3-7.8) soils of 231 ha (33%). An area of about 260 ha (37%) is moderately alkaline (pH 7.8-8.4) in reaction and an area of about 66 ha (10%) is strongly alkaline (pH 8.4-9.0) in reaction in the microwatershed. Major area in the microwatershed is alkaline in reaction.

Soil Health Management

The following actions are required to improve the current land husbandry practices that provide a sound basis for the successful adoption of sustainable crop production system.

Alkaline soils

Slightly alkaline to strongly alkaline soils cover about 557 ha (80%) area in the microwatershed.

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers (Azospirullum, Azatobacter, Rhizobium).
3. Application of 25% extra N and P (125 % RDN&P).
4. Application of $ZnSO_4$ – 12.5 kg/ha (once in three years).
5. Application of Boron – 5kg/ha (once in three years).

Neutral soils

Neutral soils occur in about 113 ha (16%) are in the microwatershed.

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of biofertilizers, (Azospirullum, Azotobacter, Rhizobium).
3. Application of 100 per cent RDF.
4. Need based micronutrient applications.

   Besides the above recommendations, the best transfer of technology options are also to be adopted.

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 697 ha area in the microwatershed, an area of about 653 ha (94%) is suffering from moderate and 16 ha (2%) is suffering from severe erosion. The areas with moderate and severe erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

Any large scale implementation of soil health management requires that supporting information is made available widely, particularly through channels familiar to farmers and extension workers. Given the very high priority attached to soil health especially by the Central Government on issuing Soil-Health Cards to all the farmers, media outlets like Regional, State and National Newspapers, Radio and Dooradarshan programs in local languages but also modern information and communication technologies such as Cellular phones and the Internet, which can be much more effective in reaching the younger farmers.

Inputs for Net Planning (Saturation Plan) and Interventions needed

Net planning (Saturation Plan) in IWMP is focusing on preparation of

1. Soil and Water Conservation Treatment Plan for each plot or farm.
2. Productivity enhancement measures/ interventions for existing crops/livestock/other farm enterprises.
3. Diversification of farming mainly with perennial horticultural crops and livestock.
4. Improving livelihood opportunities and income generating activities.

   In this connection, how various outputs of Sujala-III are of use in addressing these objectives of Net Planning (Saturation Plan) are briefly presented below.

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface Soil Texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and are highly suitable for crops like groundnut, root vegetables (carrot, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka may be adopted.
- **Gravelliness:** More gravel content is favourable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these

units. In general, erosion and soil are the major constraints in Bandehalli-3 microwatershed.

- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in an area of 263 ha (38%), 273 ha (39%) medium (0.5-0.75%) and about 133 ha (19%) area high (>0.75%). In the areas of low and medium OC, it needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops cost Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in 536 ha area where OC is less than 0.5-0.75%. For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: In 262 ha (38%) area, the available phosphorus is low and about 331 ha (47%) is medium. Hence for all the crops, 25% additional P-needs to be applied, where it is low or medium in available phosphorus. Available phosphorous is high in 77 ha (4%) in the microwatershed.
- **Available Potassium:** Available potassium is low in 87 ha (13%) and medium in 582 ha (83%) area of the microwatershed. In the low and medium plots, for all crops, additional 25% potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. It is low in 166 ha (24%) area of the microwatershed and medium in 463 ha (66%). These areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected. Available sulphur is high in 40 ha (6%) in the microwatershed**.**
- **Available Boron:** It is low in 230 ha (33%) area of the microwatershed and medium in 439 ha (63%). The areas that are low and medium need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.
- **Available Iron:** It is deficient in 158 ha (23%) area and it is sufficient in 512 ha (73%) area in the microwatershed. To manage iron deficiency, iron sulphate @ 25 ka/ha needs to be applied for 2-3 years**.**
- **Available Manganese:** Entire area is sufficient in available manganese.
- **Available Copper:** It is deficient in 7 ha (1%) area and is sufficient in 662 ha (95%) area in the microwatershed.
- **Available Zinc:** Almost entire area is deficient in available zinc, except for a small area of 4 ha that are sufficient. Application of zinc sulphate @25kg/ha is to be followed.

Soil Alkalinity: The microwatershed has 557 ha area with soils that are alkaline in reaction. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and, provision of subsurface drainage and growing of salt tolerant crops like Sesbania, Diancha, Casuarina, Acasia, Neem, Ber etc., are recommended.

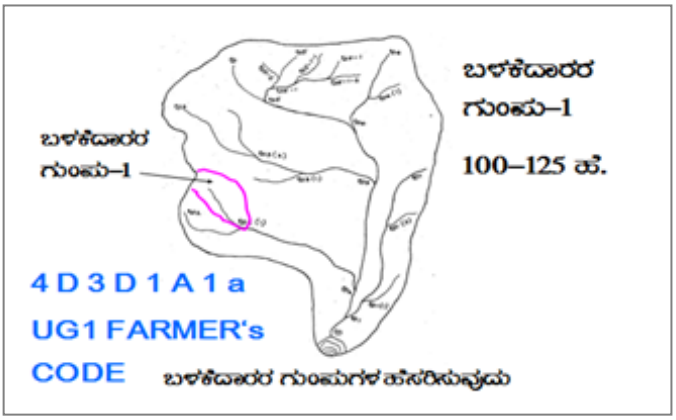
Land Suitability for various crops: Areas that are highly, moderately, marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase water holding capacity of light textured soils, growing of green manure crops and application of organic manure is recommended.

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Bandehalli-3 microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

- Soil depth
- Surface soil texture
- Available water capacity
- Soil slope
- Soil gravelliness
- Land capability
- Present land use and land cover
- Crop suitability maps
- Rainfall map
- Hydrology
- Water Resources
- Socio-economic data
- Contour plan with existing features- network of waterways, pothissa boundaries, cut up/ minor terraces etc.
- Cadastral map (1:7920 scale)
- Satellite imagery (1:7920 scale)



Apart from these, Hand Level/ Hydro Marker/ Dumpy Level/ Total Station and *Kathedars'* List needs to be collected.

Steps for Survey and Preparation of Treatment Plan

The boundaries of Land User Groups' and Survey No. boundaries are traced in the field.

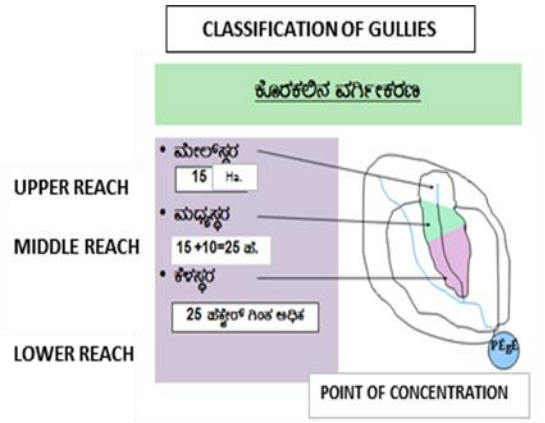
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge structures

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below

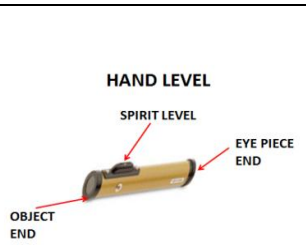
9.1.1 Arable Land Treatment

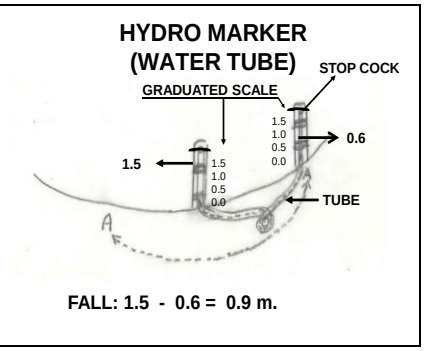
A. BUNDING

Steps for Survey and Preparation of Treatment Plan		USER GROUP-1
• Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale • Existing network of waterways, pothissa boundaries, grass belts, natural drainage lines/ watercourse, cut ups/ terraces are marked on the cadastral map to the scale • Drainage lines are demarcated into		
Small gullies	(up to 5 ha catchment)	
Medium gullies	(5-15 ha catchment)	
Ravines	(15-25 ha catchment) and	
Halla/Nala	(more than 25ha catchment)	

Measurement of Land Slope

Land slope is estimated or determined by the study and interpretation of contours or by measurement in the field using simple instruments like Hand Level or Hydromarker.





Vertical and Horizontal intervals between bunds as recommended by the Watershed Development Department.

Slope percentage	Vertical interval (m)	Corresponding Horizontal Distance (m)
2 - 3%	0.6	24
3 - 4%	0.9	21
4 - 5%	0.9	21
5 - 6%	1.2	21
6 - 7%	1.2	21

Note: (i) The above intervals are maximum.

(ii) Considering the slope class and erosion status (A1… A=0-1 % slope, 1= slight erosion) the intervals have to be decided.

Bund length recording: Considering the contour plan and the existing grass belts/partitions, the bunds are aligned and lengths are measured.

Section of the Bund

Bund section is decided considering the soil texture class and gravelliness class ($bg_{0...}$ b=loamy sand, g_0 = <15% gravel). The recommended Sections for different soils are given below.

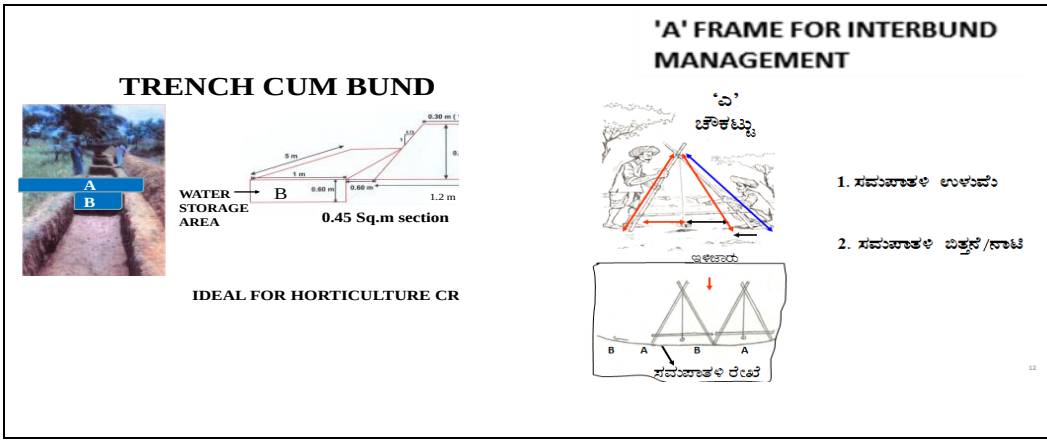
Recommended Bund Section

Top width(m)	Base width(m)	Height (m)	Side slope (Z:1;H:V)	Cross section (sq m)	Soil Texture	Remarks
0.3	0.9	0.3	01:01	0.18	Sandy loam	Vegetative bund
0.3	1.2	0.3	1.5:1	0.225	Sandy clay	
0.3	1.2	0.5	0.9:1	0.375	Red gravelly soil	
0.3	1.2	0.6	0.75:1	0.45		
0.3	1.5	0.6	01:01	0.54	Red sandy loam	
0.3	2.1	0.6	1.5:1	0.72	Very shallow black clayey soils	
0.45	2	0.75	01:01	0.92		
0.45	2.4	0.75	1.3:1	1.07	Shallow black clayey soils	
0.6	3.1	0.7	1.78:1	1.29	Medium black clayey soils	
0.5	3	0.85	1.47:1	1.49		

Formation of Trench cum Bund

Dimensions of the Borrow Pits/Trenches to be excavated (machinery are decided considering the Bund Section).

Details of Borrow Pit dimensions are given below:



Size of Borrow Pits/ Trench recommended for Trench cum Bund (by machinery)

Bund section	Bund length	Earth quantity	Pit				Berm (pit to pit)	Soil depth class
m^2	m	m^3	L(m)	W(m)	D(m)	Quantity (m^3)	m	
0.375	6	2.25	5.85	0.85	0.45	2.24	0.15	Shallow
0.45	6	2.7	5.4	1.2	0.43	2.79	0.6	Shallow
0.45	6	2.7	5	0.85	0.65	2.76	1	Moderately Shallow
0.54	5.6	3.02	5.5	0.85	0.7	3.27	0.1	Moderately shallow
0.54	5.5	2.97	5	1.2	0.5	3	0.5	Shallow
0.72	6.2	4.46	6	1.2	0.7	5.04	0.2	Moderately shallow
0.72	5.2	3.74	5.1	0.85	0.9	3.9	0.1	Moderately deep

B. Water Ways

- Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.
- Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.
- The design details are given in the Manual.

C. Farm Ponds

Waterways and the catchment area will give an indication on the size of the Farm Pond. Location of the pond can be decided based on the contour plan/ field condition and farmers' need/desire.

D. Diversion Channel

Existing EPT/ CPT are marked on the cadastral map. Looking to the need, these can be modernized or fresh diversion channel can be proposed and runoff from this can be stored in *Gokatte/* Recharge Ponds.

9.1.2 Non-Arable Land Treatment

Depending on the gravelliness and crops preferred by the farmers, the concerned authorities can decide appropriate treatment plan. The recommended treatments may be Contour Trench, Staggered Trench, Crescent Bund, Boulder Bund or Pebble Bund.

9.1.3 Treatment of Natural Water Course/ Drainage Lines

a) The cadastral map has to be updated as regards the network of drainage lines (gullies/ *nalas/ hallas*) and existing structures are marked to the scale and storage capacity of the existing water bodies are documented. (Fig. 9.1)

b) The drainage line will be demarcated into Upper Reach, Middle Reach and Lower Reach.

c) Considering the Catchment, *Nala* bed and bank conditions, suitable structures are decided.

d) Number of storage structures (Check dam/ *Nala* bund/ Percolation tank) will be decided considering the commitments and available runoff in water budgeting and quality of water in the wells and site suitability.

e) Detailed Levelling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.

f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.

g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.

h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthen checks in the natural water course. Location and design details are given in the Manual.

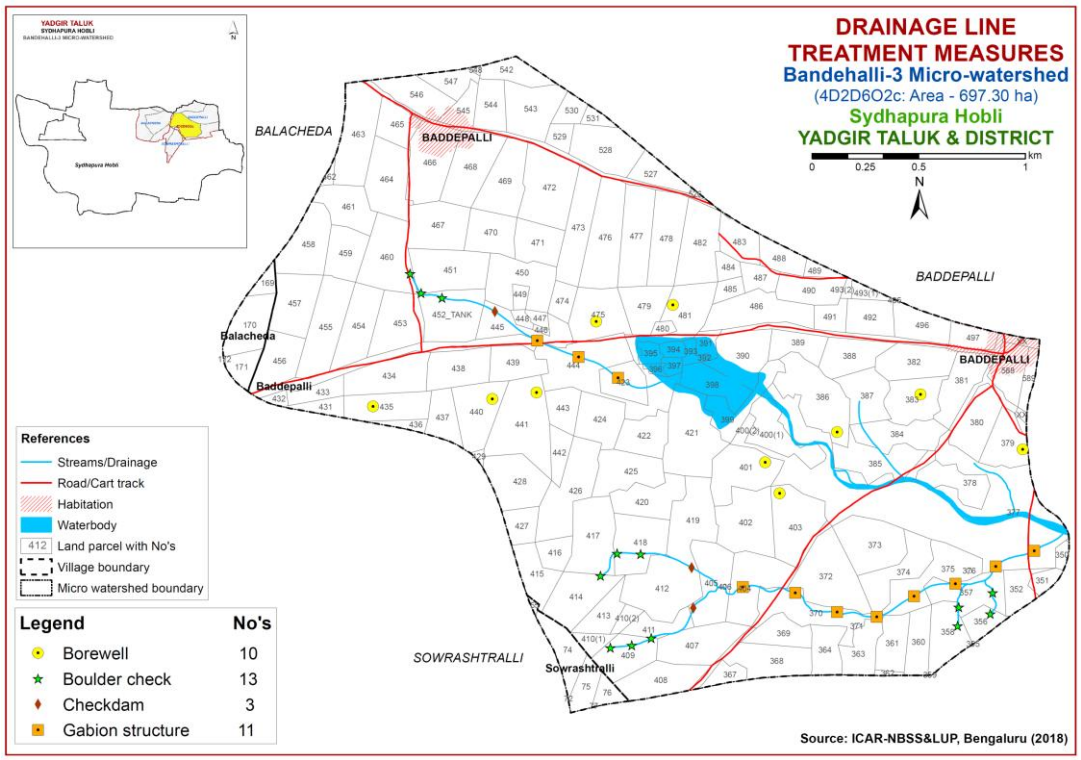


Fig. 9.1 Drainage line treatment map of Bandehalli-3 microwatershed

9.2 Recommended Soil and Water Conservation Measures

The appropriate conservation structures best suited for each of the land parcel/ survey number (Appendix-I) are selected based on the slope per cent, severity of erosion, amount of rainfall, land use and soil type. The different kinds of conservation structures recommended are:

1. Graded / Strengthening of Bunds
2. Trench cum Bunds (TCB)
3. Trench cum Bunds / Strengthening

4. Crescent Bunds

A map (Fig. 9.2) showing soil and water conservation plan with the kind of conservation structures recommended has been prepared, which shows the spatial distribution and extent of area. Maximum area of about 531 ha (76%) requires Graded Bunding and 138 ha (20%) requires Trench cum Bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

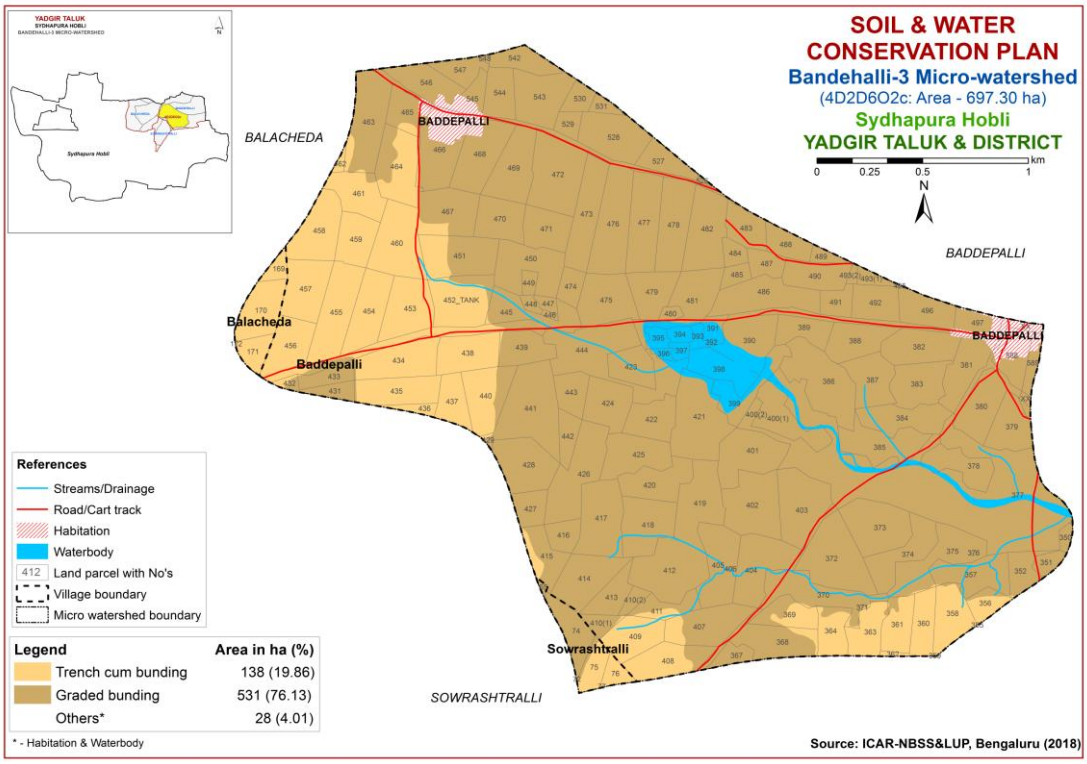


Fig. 9.2 Soil and Water Conservation Plan map of Bandehalli-3 microwatershed

9.3 Greening of Microwatershed

As part of the greening programme in the watersheds, it is envisaged to plant a variety of horticultural and other tree plants that are edible, economical and produce lot of biomass which helps to restore the ecological balance in the watersheds. The lands that are suitable for greening programme are non-arable lands (land capability classes V, VI, VII and VIII) and also the lands that are not suitable or marginally suitable and field bunds for growing annual and perennial crops. The method of planting these trees is given below.

It is recommended to open pits during the 1st week of March along the contour and heap the dug out soil on the lower side of the slope in order to harness the flowing water and facilitate weathering of soil in the pit. Exposure of soil in the pit also prevents spread of pests and diseases due to scorching sun rays. The pits should be filled with mixture of soil and organic manure during the second week of April and keep ready with sufficiently tall seedlings produced either in poly bags or in root trainer nurseries so that planting can be done during the 2nd or 3rd week of April depending on the rainfall.

The tree species suitable for the area considering rainfall, temperature and adaptability is listed below; waterlogged areas are recommended to be planted with species like Neral (*Sizyzium cumini*) and Bamboo. Dry areas are to be planted with species like Honge, Bevu, Seetaphal *etc*.

Dry Deciduous Species			**Temp (**°C)	**Rainfall (mm)**
1.	Bevu	*Azadiracta indica*	21–32	400 –1,200
2.	Tapasi	*Holoptelia integrifolia*	20-30	500 - 1000
3.	Seetaphal	*Anona Squamosa*	20-40	400 - 1000
4.	Honge	*Pongamia pinnata*	20 -50	500– 2,500
5.	Kamara	*Hardwikia binata*	25 -35	400 - 1000
6.	Bage	*Albezzia lebbek*	20 - 45	500 - 1000
7.	Ficus	*Ficus bengalensis*	20 - 50	500–2,500
8.	Sisso	*Dalbargia Sissoo*	20 - 50	500 -2000
9.	Ailanthus	*Ailanthus excelsa*	20 - 50	500 - 1000
10.	Hale	*Wrightia tinctoria*	25 - 45	500 - 1000
11.	Uded	*Steriospermum chelanoides*	25 - 45	500 -2000
12.	Dhupa	*Boswella Serrata*	20 - 40	500 - 2000
13.	Nelli	*Emblica Officinalis*	20 - 50	500 -1500
14.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 2000
Moist Deciduous Species			**Temp (**°C)	**Rainfall (mm)**
15.	Teak	*Tectona grandis*	20 - 50	500-5000
16.	Nandi	*Legarstroemia lanceolata*	20 - 40	500 - 4000
17.	Honne	*Pterocarpus marsupium*	20 - 40	500 - 3000
18.	Mathi	*Terminalia alata*	20 -50	500 - 2000
19.	Shivane	*Gmelina arboria*	20 -50	500 -2000
20.	Kindal	*T.Paniculata*	20 - 40	500 - 1500
21.	Beete	*Dalbargia latifolia*	20 - 40	500 - 1500
22.	Tare	*T. belerica*	20 - 40	500 - 2000
23.	Bamboo	*Bambusa arundinasia*	20 - 40	500 - 2500
24.	Bamboo	*Dendrocalamus strictus*	20 – 40	500 – 2500
25.	Muthuga	*Butea monosperma*	20 - 40	400 - 1500
26.	Hippe	*Madhuca latifolia*	20 - 40	500 - 2000
27.	Sandal	*Santalum album*	20 - 50	400 - 1000
28.	Nelli	*Emblica officinalis*	20 - 40	500 - 2000
29.	Nerale	*Sizyzium cumini*	20 - 40	500 - 2000
30.	Dhaman	*Grevia tilifolia*	20 - 40	500 - 2000
31.	Kaval	*Careya arborea*	20 - 40	500 - 2000
32.	Harada	*Terminalia chebula*	20 - 40	500 - 2000

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Appendix I

Bandehalli-3 Microwatershed

Soil Phase Information

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Baddepalli	400(1)	4.94	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	400(2)	0.1	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	410(1)	1.32	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	410(2)	0.96	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	493(1)	0.98	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	493(2)	0.36	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	350	0.67	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	351	1.23	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	352	2.6	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	355	0	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	356	2.09	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	357	5.21	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	358	4.58	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	359	0	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	360	3.3	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	361	3.57	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	362	0.28	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	363	3.58	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	364	3.29	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	TCB
Baddepalli	367	1.54	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Baddepalli	368	5.34	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Baddepalli	369	3.37	YLRbB2	LMU-3	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	TCB
Baddepalli	370	6.4	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	371	0.07	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	372	8.46	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	373	6.75	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	374	5.09	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	375	6.55	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	376	0.05	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Baddepalli	377	42.59	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy+Scrub land (Ct+Pd+Sl)	Not Available	IIes	Graded bunding
Baddepalli	378	4.01	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	379	4.26	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	1 Borewell	IIes	Graded bunding
Baddepalli	380	4.99	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Baddepalli	381	4.77	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Baddepalli	382	5.25	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	383	4.93	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	1 Borewell	IIes	Graded bunding
Baddepalli	384	4.99	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Baddepalli	385	5.57	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	386	8.41	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	1 Borewell	IIes	Graded bunding
Baddepalli	387	4.64	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	388	4.41	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	389	3.12	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut (Ct+Gn)	Not Available	IIes	Graded bunding
Baddepalli	390	5.67	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	391	1.21	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Baddepalli	392	0.12	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available	Not Available	Others	Others

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
											(NA)			
Baddepalli	393	0.74	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	394	0.84	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	395	1.02	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	396	0.47	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	397	0.7	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	398	3.84	Waterbody	Others	Others	Others	Others	Others	Others	Others	Paddy (Pd)	Not Available	Others	Others
Baddepalli	399	4.05	Waterbody	Others	Others	Others	Others	Others	Others	Others	Scrub land (Sl)	Not Available	Others	Others
Baddepalli	401	6.25	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	1 Borewell	IIes	Graded bunding
Baddepalli	402	7.29	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	403	6.91	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	1 Borewell	IIes	Graded bunding
Baddepalli	404	6.47	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	405	6.07	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	406	0.04	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Graded bunding
Baddepalli	407	5.93	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	408	5.21	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	TCB
Baddepalli	409	4.52	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Baddepalli	411	2.6	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Baddepalli	412	8.08	DSBcB2	LMU-6	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	413	2.96	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	414	5.78	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	415	3.74	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	416	2.11	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	417	7.09	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	418	6.01	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	419	6.68	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	420	4.86	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Baddepalli	421	8.87	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Scrub land (Ct+Sl)	Not Available	IIes	Graded bunding
Baddepalli	422	4.03	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Baddepalli	423	3.41	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	424	4.64	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Baddepalli	425	5.35	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	426	7.72	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	427	2.39	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	428	6.05	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Redgram (Ct+Gn+Rg)	Not Available	IIes	Graded bunding
Baddepalli	429	0.27	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	431	1.52	RMPcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	432	0.62	RMPcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	433	2.06	RMPcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	434	6.08	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Paddy (Ct+Gn+Pd)	Not Available	IVes	TCB
Baddepalli	435	5.07	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	1 Borewell	IVes	TCB
Baddepalli	436	0.94	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	TCB
Baddepalli	437	3.17	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	TCB
Baddepalli	438	4.99	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut (Ct+Gn)	Not Available	IVes	TCB
Baddepalli	439	3.7	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	440	5.71	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	1 Borewell	IIes	TCB
Baddepalli	441	9.51	JNKcB2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut+Marigold+Paddy(Ct+Gn+Mg+Pd)	1 Borewell	IIes	Graded bunding
Baddepalli	442	2.04	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	443	2.78	JNKcB2	LMU-4	Moderately shallow	Sandy	Non gravelly	Low (51-100	Very gently	Moderate	Not Available	Not Available	IIes	Graded

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
					(50-75 cm)	loam	(<15%)	mm/m)	sloping (1-3%)		(NA)			bunding
Baddepalli	444	11.44	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	445	4.38	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	446	0.23	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	447	0.63	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	448	0.6	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	449	0.79	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Baddepalli	450	6.41	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	451	6.72	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	452	6.59	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IVes	TCB
Baddepalli	453	5.85	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IVes	TCB
Baddepalli	454	5.61	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IVes	TCB
Baddepalli	455	7.17	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy+Redgram (Gn+Pd+Rg)	Not Available	IVes	TCB
Baddepalli	456	4.72	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Paddy+Redgram (Pd+Rg)	Not Available	IIIes	TCB
Baddepalli	457	5.58	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IVes	TCB
Baddepalli	458	5.92	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IVes	TCB
Baddepalli	459	4.07	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram+Paddy (Ct+Gg+Pd)	Not Available	IVes	TCB
Baddepalli	460	7.25	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IVes	TCB
Baddepalli	461	4.53	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Paddy+Redgram (Gn+Pd+Rg)	Not Available	IVes	TCB
Baddepalli	462	0.41	VNKcB2	LMU-7	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram+Redgram (Ct+Gg+Rg)	Not Available	IIIes	TCB
Baddepalli	463	7.57	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Redgram (Gg+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	464	6.46	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut (Ct+Gn)	Not Available	IVes	TCB
Baddepalli	465	3.15	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Baddepalli	466	7.01	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIIes	Graded bunding
Baddepalli	467	6	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	468	6.49	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	469	5.95	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIIes	Graded bunding
Baddepalli	470	4.36	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram+Paddy (Gg+Pd)	Not Available	IIes	Graded bunding
Baddepalli	471	4.04	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Baddepalli	472	8.24	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	473	6.1	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Scrub land (Ct+Sl)	Not Available	IIIes	Graded bunding
Baddepalli	474	1.81	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Baddepalli	475	5.78	HSLbB2	LMU-1	Moderately deep (75-100 cm)	Loamy sand	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram+Paddy (Ct+Gg+Pd)	1 Borewell	IIes	Graded bunding
Baddepalli	476	7.77	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Scrub land (Ct+Sl)	Not Available	IIIes	Graded bunding
Baddepalli	477	6.59	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram+Scrub land (Ct+Rg+Sl)	Not Available	IIIes	Graded bunding
Baddepalli	478	6.26	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Baddepalli	479	4.09	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram (Ct+Gg)	Not Available	IIes	Graded bunding
Baddepalli	480	0.63	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Baddepalli	481	5.93	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Marigold+Paddy(Ct+Mg+Pd)	1 Borewell	IIes	Graded bunding
Baddepalli	482	6.59	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Fallow land (Ct+Fl)	Not Available	IIes	Graded bunding
Baddepalli	483	3.22	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	484	1.26	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	485	1.21	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	486	6.58	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Redgram (Gn+Rg)	Not Available	IIes	Graded bunding
Baddepalli	487	2	HSLhB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Baddepalli	488	2.62	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	489	0.92	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Baddepalli	490	3.95	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	491	1.97	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	492	3.63	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	495	0.01	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	496	3.78	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Baddepalli	497	2.27	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Habitation	Not Available	IIes	Graded bunding
Baddepalli	526	0.14	GWDcB2	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Redgram (Pd+Rg)	Not Available	IIes	Graded bunding
Baddepalli	527	2.69	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	528	6.07	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram (Ct+Gg)	Not Available	IIIes	Graded bunding
Baddepalli	529	1.36	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Graded bunding
Baddepalli	530	1.62	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	531	0.92	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	542	2.91	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	543	5.91	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Greengram+Redgram (Ct+Gg+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	544	3.29	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIIes	Graded bunding
Baddepalli	545	2.11	BDLbB2	LMU-5	Shallow (25-50 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIIes	Graded bunding
Baddepalli	546	4.32	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Redgram (Ct+Rg)	Not Available	IIIes	Graded bunding
Baddepalli	547	2.34	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIIes	Graded bunding
Baddepalli	548	0.15	BDLhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIIes	Graded bunding
Baddepalli	588	3.56	Habitation	Others	Others	Others	Others	Others	Others	Others	Fallow land (Fl)	Not Available	Others	Others
Baddepalli	589	1.44	GWDiB2	LMU-1	Moderately deep (75-100 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallow land (Fl)	Not Available	IIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Balacheda	169	1.14	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IIIes	TCB
Balacheda	170	4.82	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	TCB
Balacheda	171	2.03	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	TCB
Balacheda	172	0.04	GDGbB3g1	LMU-2	Deep (100-150 cm)	Loamy sand	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Severe	No crop+Scrub land (Nc+Sl)	Not Available	IIIes	TCB
Sowrashtralli	55	0.2	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	owar+Cotton+Redgram(Jw+Ct+Rg)	Not Available	IIes	Graded bunding
Sowrashtralli	72	0	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Sowrashtralli	74	3.7	SWRmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Sowrashtralli	75	2.43	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Sowrashtralli	76	1.38	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB
Sowrashtralli	77	0.02	BLCcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	TCB

Appendix II

Bandehalli-3 Microwatershed

Soil Fertility Information

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	400(1)	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	400(2)	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	410(1)	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	410(2)	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	493(1)	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	493(2)	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	350	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	351	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	352	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	355	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	356	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	357	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	358	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	359	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	360	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	361	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	362	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	363	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	364	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	367	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	368	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	369	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	370	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	371	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	372	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	373	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	374	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	375	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	376	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	377	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	378	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	379	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	380	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	381	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	382	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	383	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	384	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	385	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	386	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	387	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	388	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	389	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	390	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	391	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	392	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	393	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	394	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	395	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	396	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	397	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	398	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	399	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	401	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	402	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	403	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	404	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	405	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	406	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	407	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	408	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	409	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	411	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	412	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	413	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	414	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	415	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	416	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	417	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	418	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	419	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	420	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	421	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	422	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	423	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	424	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	425	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	426	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	427	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	428	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	429	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	431	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	432	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	433	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	434	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	435	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	436	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	437	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	438	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	439	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	440	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	441	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	442	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	443	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	444	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	445	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	446	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	447	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	448	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	449	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	450	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	451	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	452	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	453	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	454	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	455	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	456	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	457	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	458	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	459	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	460	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	461	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	462	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	463	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	464	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	465	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	466	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	467	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	468	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	469	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	470	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	471	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	472	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	473	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	474	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	475	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	476	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	477	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	478	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	479	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	480	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	481	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	482	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	483	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	484	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	485	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	486	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	487	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	488	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	489	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	490	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	491	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	492	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	495	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	496	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	497	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	526	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Baddepalli	527	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	528	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	529	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	530	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	531	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	542	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	543	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	544	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	545	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	546	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	547	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	548	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Baddepalli	588	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	589	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Balacheda	169	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Balacheda	170	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Balacheda	171	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Balacheda	172	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	55	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	72	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	74	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	75	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	76	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Sowrashtralli	77	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Bandehalli-3 Microwatershed

Soil Suitability Information

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	400(1)	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	400(2)	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	410(1)	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	410(2)	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	493(1)	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	493(2)	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	350	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	351	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	352	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	355	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	356	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	357	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	358	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	359	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	360	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	361	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	362	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	363	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	364	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	367	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	368	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	369	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	370	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	371	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	372	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	373	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	374	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	375	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	376	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	377	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	378	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	379	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	380	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	381	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	382	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	383	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	384	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	385	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	386	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	387	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	388	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	389	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	390	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	391	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	392	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	393	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	394	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	395	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	396	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	397	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	398	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	399	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	401	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	402	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	403	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	404	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	405	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	406	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	407	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	408	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Baddepalli	409	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Baddepalli	411	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	412	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	413	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	414	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	415	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	416	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	417	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	418	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	419	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	420	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	421	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	422	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	423	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	424	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	425	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	426	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	427	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	428	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	429	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	431	N1r	S3t	S3rt	S2rw	S3r	S2rw	N1r	S3r	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1t	S3r	S3r	S3tw	S3rt	S3rt	S2rt	S2rt	S3r	S3rt	S3w	S3rt
Baddepalli	432	N1r	S3t	S3rt	S2rw	S3r	S2rw	N1r	S3r	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1t	S3r	S3r	S3tw	S3rt	S3rt	S2rt	S2rt	S3r	S3rt	S3w	S3rt
Baddepalli	433	N1r	S3t	S3rt	S2rw	S3r	S2rw	N1r	S3r	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1t	S3r	S3r	S3tw	S3rt	S3rt	S2rt	S2rt	S3r	S3rt	S3w	S3rt
Baddepalli	434	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	435	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	436	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Baddepalli	437	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Baddepalli	438	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	439	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	440	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Baddepalli	441	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	442	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	443	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Baddepalli	444	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	445	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	446	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	447	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	448	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	449	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	450	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	451	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	452	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	453	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	454	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	455	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	456	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S1	S2zg	S1	N1tz	S2rz	S2zg	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	457	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	458	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	459	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	460	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	461	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	462	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3r	N1r	S3r	S3r	N1r	S3r	N1r	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Baddepalli	463	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	464	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Baddepalli	465	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	466	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	467	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	468	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	469	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	470	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	471	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	472	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	473	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	474	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	475	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S1	S2rz	S2rz
Baddepalli	476	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	477	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	478	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	479	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	480	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	481	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	482	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	483	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Baddepalli	484	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	485	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	486	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	487	S3rz	S3tz	S2rz	S2tz	S2rz	S3tz	S3rz	S2rz	S3tz	S2rz	S2rz	S2tz	S2rz	S2z	N1tz	S3rz	S2rz	S2z	S2z	S2z	S2z	S2z	S2rz	S2z	S2rz	S2rz
Baddepalli	488	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	489	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	490	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	491	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	492	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	495	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	496	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	497	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz
Baddepalli	526	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2zw	S2rz	S3tz
Baddepalli	527	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	528	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	529	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	530	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	531	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	542	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	543	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	544	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	545	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	546	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	547	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	548	N1r	S3rt	N1r	S3r	N1rt	S3r	N1rt	N1r	S3r	N1r	S3rt	S3rt	N1rt	S3r	N1rt	N1rt	N1r	S3rt	S3rt	S3rt	S3rt	S3rt	N1r	S3rt	N1rt	N1rt
Baddepalli	588	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Baddepalli	589	S3rz	S2tz	S3tz	S2zw	S3tz	S2rz	S3rz	S2rz	S2zw	S2rz	S2rz	S2zw	S3tz	S1	N1t	S3rz	S2rz	S3tz	S2tz	S3tz	S2tz	S2tz	S2rz	S2z	S2rz	S3tz

Village	Survey No	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Balacheda	169	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S1	S2zg	S1	N1tz	S2rz	S2zg	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	170	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S1	S2zg	S1	N1tz	S2rz	S2zg	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	171	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S1	S2zg	S1	N1tz	S2rz	S2zg	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Balacheda	172	S2rz	S2zg	S2zg	S2zg	S2tz	S2zg	S2rz	S2zg	S2tg	S2zg	S2zg	S1	S2zg	S1	N1tz	S2rz	S2zg	S2tz	S2tg	S2zg	S2tg	S2tg	S2z	S2z	S2z	S2z
Sowrashtralli	55	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2tw	S1	S3t	S1	N1tz	S2t	S1	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2t	S2tw	S3tw
Sowrashtralli	72	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2tw	S1	S3t	S1	N1tz	S2t	S1	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2t	S2tw	S3tw
Sowrashtralli	74	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2tw	S1	S3t	S1	N1tz	S2t	S1	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2t	S2tw	S3tw
Sowrashtralli	75	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Sowrashtralli	76	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz
Sowrashtralli	77	S3rz	S2z	S2rz	S2z	S2rt	S2rz	S3rz	S2rz	S2tz	S2rz	S2rz	S1	S2rz	S1	S2rt	S3rz	S2rz	S2tz	S2tz	S2z	S2tz	S2tz	S2rz	S2z	S2rz	S2rz

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE STUDY

- *The results indicated that 35 farmers were sampled in Bandehalli-3 micro-watershed among them 7 (20%) were marginal farmers, 13 (37.14 %) were small farmers, 7 (20 %) were semi medium farmers, 3 (8.57 %) medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey.*
- *The data indicated that there were 91 (57.96 %) men and 66 (42.04 %) were women in the micro watershed. The average family size of landless farmers was 3.6, marginal farmers were 4.0, small farmers were 4.6, semi medium farmer was 5.3 and in medium farmers it was 4.7.*
- *The data indicated that 31 (19.75 %) people were in 0-15 years of age, 38 (43.31 %) were in 16-35 years of age, 52 (33.12 %) were in 36-60 years of age and 6 (3.82 %) were above 61 years of age.*
- *The results indicated that Bandehalli-3 had 43.95 per cent illiterates, 12.10 per cent of them had primary school education, 11.46 per cent of them had middle school education, 19.11 per cent of them had high school education, 3.82 per cent of them had PUC education, 0.64 per cent them had Diploma education, 5.73 per cent of them had degree education, 0.64 per cent had masters and 1.91 per cent of them had other education.*
- *The results indicated that, 77.14 per cent of households practicing agriculture followed by the 11.43 per cent of the household heads were general labourers, 2.86 per cent of the households head were general labour and 2.86 per cent of them were agriculture labour, government service, retired and student each.*
- *The results indicated that agriculture was the major occupation for 52.23 per cent of the household members, 5.10 per cent were agricultural labourers, 8.28 per cent were general labours, 0.64 percent were in government service, 1.27 per cent of them were students and 10.79 per cent were housewives. In case of landless households 55.56 per cent were general labour, 27.78 per cent were students and 16.67 per cent were housewives. In case of marginal households 35.71 per cent were practicing agriculture, 21.02 per cent of them were students and 8.92 per cent were housewives. In case of small farm households 57.14 per cent were practicing agriculture, 3.57 per cent were agriculture labours, 3.57 per cent were in government service, 14.29 per cent were students, and 10.71 per cent were housewives and children. In case of semi medium farmers 61.67 per cent were practicing agriculture, 23.33 per cent were students and 13.33 per cent of them were housewives. In case of semi-medium farmers 62.16 per cent were practicing agriculture, 13.51 per cent were agriculture labour, 21.62 per cent were student and 2.70 per cent were housewives. In case of medium farmers 42.86 per cent were practicing agriculture, 14.29 per cent were agriculture labour, 7.14 per cent*

were government service, 14.29 per cent were private service and 21.43 per cent were student.

- *The results showed no participation of households in any local institutions.*
- *The results indicated that 60 per cent of the households possess Katcha house, and 40 per cent of the households possess Pucca house.*
- *The results showed that 91.43 per cent of the households possess TV, 20 per cent of the households possess Mixer grinder, 17.14 per cent of the households possess motor cycle, 5.71 per cent of the households possess car/four wheeler, 2.86 per cent possess refrigerator, 2.86 per cent of the households possess bicycle, 2.86 per cent of the households possess landline phone and 88.57 per cent of the households possess mobile phones.*
- *The results showed that the average value of television was Rs. 8693, mixer grinder was Rs.2285, refrigerator was Rs. 10000, bicycle was Rs. 2000, motor cycle was Rs.54500, car/four wheeler Rs. 665000, landline was Rs.2000 and mobile phone was Rs.2166.*
- *The results indicated that about 22.86 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 2.86 per cent of the households possess irrigation pump, 5.71 per cent of them possess weeder and 8.57 per cent of the households possess power tiller, tractor and sprayer respectively.*
- *The results show that the average value of bullock cart was Rs.18750, the average value of Plough was Rs. 3600, the average value of sprayer was Rs.13333, the average value of weeder was Rs. 125, the average value of tractor was Rs.666666 and the average value of irrigation pump and power tiller were Rs. 50000 respectively.*
- *The results indicated that, 22.86 per cent of the households possess bullocks, 17.14 per cent of the households possess local cow, 5.71 per cent of the households possess sheep and 2.86 per cent of them possess goat.*
- *Results indicated that in case of marginal farmers 14.29 per cent of the households possess bullocks, 28.57 per cent of the households possess local cow and 14.29 per cent of the households possess sheep. In small farmers, 23.08 per cent of the households possess bullocks and 7.69 per cent of the households possess local cow and goat respectively. In case of semi medium farmers 28.57 per cent of the households possess bullock and 42.86 per cent of the households possess local cow and 66.67 per cent and 33.33 per cent of the medium farmers possess bullock and sheep respectively.*
- *The results indicated that, average own labour men available in the micro-watershed was 1.70, average own labour (women) available was 1.13, average hired labour (men) available was 13.67 and average hired labour (women) available was 12.53.*

- *Results showed that, in case of marginal farmers, average own labour men available was 1.29, average own labour (women) was 1.14, average hired labour (men) was 6.29 and average hired labour (women) available was 6. In case of small farmers, average own labour men available was 2.08, average own labour (women) was 0.92, average hired labour (men) was 10.08 and average hired labour (women) available was 8. In case of semi medium farmers, average own labour men available was 1.57, average own labour (women) was 1.43, average hired labour (men) was 19.29 and average hired labour (women) available was 18.57. In medium farmers average own labour men available was 1.33, average own labour (women) was 1.33, average hired labour (men) was 33.33 and average hired labour (women) available was also 33.33.*
- *The results indicated that, 85.71 per cent of the household opined that hired labour was adequate. About 100 per cent of the marginal farmers, small, semi medium and medium farmers have opined that the hired labour was adequate.*
- *The results indicated that, households of the Bandehalli-3 micro-watershed possess 55.54 ha (97.74%) of dry land and 1.29 ha (2.26%) of irrigated land. Marginal farmers possess 4.84 ha (100%) of dry land. Small farmers possess 17.18 ha (100%) of dry land. Semi medium farmers possess 19.05 ha (93.67%) of dry land and 1.29 ha (6.33%) of irrigated land. Medium farmers possess 13.84 ha (100%) of irrigated land.*
- *The results indicated that, the average value of dry land was Rs. 300,561.06 and average value of irrigated was Rs. 466,037.73. In case of marginal famers, the average land value was Rs. 764,130.44 for dry land. In case of small famers, the average land value was Rs. 409,702.34 for dry land. In case of semi medium famers, the average land value was Rs. 194,157.63 for dry land and Rs. 466,037.73 for irrigated land. In case of medium famers, the average land value was Rs. 144,444.45 for irrigated land.*
- *The results indicated that, there were 1 functioning bore well in the micro watershed.*
- *The results indicated that, canal was the irrigation source for 2.86 per cent of the farmers in the micro watershed.*
- *The results indicated that on an average the depth of the bore well was 3.74 meters.*
- *The results indicated that, in case of semi medium farmers there were 11 ha of irrigated land.*
- *The results indicated that, farmers have grown cotton (27.14 ha), paddy (1.29 ha), redgram (17.32 ha), sorghum (5.67 ha) and groundnut (5.11ha). Marginal and small farmers have grown cotton, groundnut and redgram. Semi medium farmers have grown cotton, paddy, redgram and sorghum. Medium farmers have grown cotton and red gram.*

- *The results indicated that, the cropping intensity in Bandehalli-3 micro-watershed was found to be 100 per cent in marginal farmers, small farmers, semi medium farmers and medium farmers respectively.*
- *The results indicated that, 48.57 per cent of the households have bank account and 40 per cent of them having savings. Among landless farmers 40 per cent of them possess bank account and 20 per cent of them possess savings. Among marginal farmers 57.14 percent of them possess both bank account and savings. Around 30.77 per cent of small farmers possess bank account and 23.08 per cent of them have savings correspondingly. Semi medium farmers possess 71.43 per cent of them possess bank account and 57.14 per cent possess savings respectively and medium category of farmers possess 66.67 per cent of bank account and also savings.*
- *The results indicated that, 40 per cent of landless, 14.29 per cent of marginal, 15.38 per cent of small, 14.29 per cent semi medium and 33.33 per cent of medium farmers have borrowed credit from different sources.*
- *The results indicated that, 100 per cent have availed loan in Grameena bank.*
- *The results indicated that, marginal, small, semi medium and medium farmers have availed Rs.50000, Rs. 75000, Rs. 200000 and 200000 respectively. Overall average credit amount availed by households in the micro watershed is 525000.*
- *The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.*
- *Results indicated that 100 per cent of them were unpaid their loan.*
- *The results indicated that 100 per cent of the households were opined that institutional credit was helped to perform timely agricultural operations.*
- *The results indicated that, the total cost of cultivation for cotton was Rs. 41514.15. The gross income realized by the farmers was Rs. 94251.54. The net income from groundnut cultivation was Rs. 52737.39, thus the benefit cost ratio was found to be 1:2.27.*
- *The results indicated that, the total cost of cultivation for paddy was Rs. 49039.59. The gross income realized by the farmers was Rs. 93207.55. The net income from paddy cultivation was Rs. 44167.95. Thus the benefit cost ratio was found to be 1:1.9.*
- *The results indicated that, the total cost of cultivation for sorghum was Rs. 24576.19. The gross income realized by the farmers was Rs. 45561.21. The net income from sorghum cultivation was Rs. 20985.02. Thus the benefit cost ratio was found to be 1:1.85.*
- *The results indicated that, the total cost of cultivation for redgram was Rs. 25433.63. The gross income realized by the farmers was Rs. 49900.24. The net income from red gram cultivation was Rs. 24466.61. Thus the benefit cost ratio was found to be 1:1.96.*

- *The results indicated that, the total cost of cultivation for cotton was Rs. 28763.94. The gross income realized by the farmers was Rs. 65783.82. The net income from cotton cultivation was Rs. 37019.88. Thus the benefit cost ratio was found to be 1:2.29.*
- *The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate and 37.14 per cent of the households opined that green fodder was adequate.*
- *The table indicated that, in case of landless farmers the average income from wage Rs. 70000. In marginal farmers the average income from wage was Rs.37142.86 and agriculture was Rs.72142.86. In small farmers the average income from service/salary was Rs. 4615.38, wage was Rs.30769.23 and agriculture was Rs.78461.54. In semi medium farmers the average income from wage was Rs.31428.57 and agriculture was Rs.137857.14. In case of medium farmers the average income from wage was Rs. 16666.67, agriculture was Rs. 340000 and goat farming was Rs.100000.*
- *The results indicate that in case of landless farmers the average annual expenditure from wage was Rs.42000. In marginal farmers the average expenditure from wage was Rs.4833.33 and agriculture was Rs. 24000. In case of small farmers the average expenditure from service/salary was Rs.30000, wage was Rs.10090.91 and agriculture was Rs.28307.69. In semi medium farmers the average expenditure from wage was Rs.6400 and agriculture was Rs.62114.29. In case of medium farmers the average expenditure from wage was Rs. 15000 and agriculture was Rs.116666.67.*
- *The results indicate that, households have planted 20 mango and 2 Sapota trees in their field. Households have also planted 1 mango trees in their backyard.*
- *The results indicate that, households have planted 76 neem trees, 8 tamarind trees and 1 teak tree in their field.*
- *The results indicate that, the average additional investment capacity for land development was Rs.5714.29 for marginal farmers, Rs.3076.92 for small farmers, Rs.5714.29 for semi medium farmers and Rs. 6666.67 for medium farmers. On an average the additional investment capacity for land development was Rs.4000.*
- *The results indicated that for 34.29 per cent of the households were dependent on loan from bank for land development and 5.71 per cent were dependent on their own funds.*
- *The results indicated that, cotton, groundnut, paddy, sorghum and redgram were sold to the extent of 100 per cent.*
- *The results indicated that 82.86 per cent of the households have sold their produce to local/village merchants and 2.86 per cent of the households sold their produce in regulated markets.*

- *The results indicated that 8.57 per cent of the households have used cart as a mode of transport and 77.14 per cent have used tractor.*
- *The results indicated that, 14.29 per cent of marginal and 7.69 per cent of small farmers faced soil and water erosion problems in the farm.*
- *The results indicated that, 85.71 per cent of the households have shown interest in soil testing.*
- *The results indicated that, 88.57 percent used fire wood as a source of fuel, and 11.43 percent of the households used LPG.*
- *The results indicated that, piped supply was the major source for drinking water for 94.29 per cent and bore well was the drinking source for 5.71 per cent of the households.*
- *The results indicated that, electricity was the major source of light for 100 per cent of the population.*
- *The results indicated that, 51.43 per cent of the households possess sanitary toilet i.e. 100 per cent of landless, 42.86 per cent of marginal, 46.15 per cent of small, 42.86 per cent of semi medium and 33.33 per cent of medium famers had sanitary toilet facility.*
- *The results indicated that, 5.71 per cent of the sampled households possessed APL card and 94.29 per cent of the sampled households possessed BPL card.*
- *The results indicated that, 80 per cent of the households participated in NREGA programme which included 60 per cent of the landless, 85.71 percent of the marginal, 76.92 per cent of the small, 85.71 per cent of the semi medium and 100 percent of the medium farmers.*
- *The results indicated that, cereals, pulses, oilseed, vegetables, milk, egg and meat were adequate for 94.29 per cent, 82.86 per cent, 80 per cent, 88.57 per cent, 22.86 per cent, 91.43 per cent, 94.29 per cent and 85.71 per cent of the households respectively.*
- *The results indicated that, cereals, vegetables, oilseed, vegetables, fruits, and meat were inadequate for 5.71 per cent, 17.14 per cent, 20 per cent, 11.43 per cent, 77.17 per cent and 11.43 per cent of the households and milk and egg were inadequate for 8.57 per cent of the households.*
- *The results indicated that, lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (85.71%), frequent incidence of pest and diseases (57.14%), inadequacy of irrigation water (42.86%), high cost of fertilizers and plant protection chemicals , high rate of interest on credit (74.29%), low price for the agricultural commodities (80 %), lack of marketing facilities in the area (74.29%), inadequate extension services (54.29%), lack of transport for safe transport of the agricultural produce to the market (80%) and less rainfall (2.86%).*

Chapter 2

INTRODUCTION

Soil and water are the two precious natural resources which are essential for crop production and existence of life on earth. Rainfed agriculture is under severe stress due to various constraints related to agriculture like uneven and erratic distribution of rainfall, indiscriminate use of fertilizers, chemicals and pesticides, adoption of improper land management practices, soil erosion, decline in soil fertility, decline in ground water resources leading to low crop productivity. The area under rainfed agriculture has to be managed effectively using the best available practices to enhance the production of food, fodder and fuel. This is possible if the land resources are characterized at each parcel of land through detailed land resource inventory using the best available techniques of remote sensing, GPS and GIS. The watershed development programs are aimed at the sustainable distribution of its resources and the process of creating and implementing plans, programs, and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary.

World Bank funded KWDP II, SUJALA III project was implemented in with Broad objective of demonstrating more effective watershed management through greater integration of programmes related to rain-fed agriculture, innovative and science based approaches and strengthen institutional capacities and If successful, it is expected that the systems and tools could be mainstreamed into the overall IWMP in the State of Karnataka and in time, throughout other IWMP operations in India. With this background the socio-economic survey has been carried out with following specific objectives:

1. To understand the demographic features of the households in the micro-watershed
2. To understand the extent of family labour available and additional employment opportunities available within the village.
3. To know the status of assets of households in the micro-watershed for suggesting possible improvements.
4. To study the cropping pattern, cropped area and productivity levels of different households in micro-watershed.
5. To determine the type and extent of livestock owned by different categories of HHs
6. Availability of fodder and level of livestock management.

Scope and importance of survey

Survey helps in identification of different socio-economic and resource use-patterns of farmers at the Micro watershed. Household survey provides demographic features, labour force, and levels of education; land ownership and asset position (including livestock and other household assets) of surveyed households; and cropping patterns, input intensities, and average crop yields from farmers' fields. It also discusses crop utilization and the degree of commercialization of production in the areas; farmers' access to and utilization of credit from formal and informal sources; and the level of adoption and use of soil, water,and pest management technologies.

Chapter 3

METHODOLOGY

The description of the methods, components selected for the survey and procedures followed in conducting the baseline survey are furnished under the following heads.

Description of the study area

Yadgiri District is one of the 30 districts of Karnataka state in southern India. This district was carved out from the erstwhile Gulbarga district as the 30th district of Karnataka on 10 April 2010. Yadgir town is the administrative headquarters of the district. The district comprises of 3 taluks namely, Shahapur, Yadgiri and Shorapur (There are 16 hoblies, 117 Gram Panchayats, 4 Municipalities,8 Towns/ Urban agglomeration and 487 inhabited &32 un-inhabited villages The district occupies an area of 5,160.88 km².

Yadgiri district is the second smallest district in the state, area wise is very rich in cultural traditions. The vast stretch of fertile black soil of the district is known for bumper red gram and jowar crops. The district is a "Daal bowl" of the state. The district is also known for cluster of cement industries and a distinct stone popularly known as "Malakheda Stone". Two main rivers, Krishna and Bhima, and a few tributaries flow in this region. Krishna and Bhima Rivers drain the district. They constitute the two major river basins of the district. Kagna and Amarja are the two sub - basins of Bhima River, which occur within the geographical area of the district.

According to the 2011 census Yadgiri district has a population of 1, 172,985, roughly equal to the nation of Timor-Lesteor the US state of Rhode Island. This gives it a ranking of 404th in India (out of a total of 640). The district has a population density of 224 inhabitants per square kilometre (580/sq mi). Its population growth rate over the decade 2001-2011 was 22.67%. Yadgir has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

Description of the micro watershed

The Bandehalli-3 micro-watershed in Bandehalli subwatershed (Yadgir taluk and district) is located in between $16^0$34’56.868’’ to 16^0 33’20.698’’ North latitudes and 770 22’23.981’’ to 770 20’8.43’’ East longitudes, covering an area of about 696.93 ha, bounded by Balacheda, Baddepalli and Sowrashtralli villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro watershed were interviewed for the survey.

Chapter 4

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Bandehalli-3 micro-watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Bandehalli-3 micro-watershed among them 7 (20%) were marginal farmers, 13 (37.14 %) were small farmers, 7 (20 %) were semi medium farmers, 3 (8.57 %) medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey.

Table 1: Households sampled for socio economic survey in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.29	7	20	13	37.14	7	20	3	8.57	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Bandehalli-3 micro-watershed is presented in Table 2. The data indicated that there were 91 (57.96 %) men and 66 (42.04 %) were women in the micro watershed. The average family size of landless farmers was 3.6, marginal farmers were 4.0, small farmers were 4.6, semi medium farmer was 5.3 and in medium farmers it was 4.7.

Table 2: Population characteristics of Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (18)		MF (28)		SF (60)		SMF (37)		MDF (14)		All (157)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Male	11	61.11	15	53.57	36	60	22	59.46	7	50	91	57.96
2	Female	7	38.89	13	46.43	24	40	15	40.54	7	50	66	42.04
Total		18	100	28	100	60	100	37	100	14	100	157	100
Average family size		3.6		4.0		4.6		5.3		4.7		4.5	

Age wise classification of population: The age wise classification of household members in Bandehalli-3 micro-watershed is presented in Table 3. The data indicated that 31 (19.75 %) people were in 0-15 years of age, 38 (43.31 %) were in 16-35 years of age, 52 (33.12 %) were in 36-60 years of age and 6 (3.82 %) were above 61 years of age.

Table 3: Age wise classification of household members in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (18)		MF (28)		SF (60)		SMF(37)		MDF (14)		All (157)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	3	16.67	6	21.43	11	18.33	8	21.62	3	21.43	31	19.75
2	16-35 years of age	7	38.89	13	46.43	26	43.33	17	45.95	5	35.71	68	43.31
3	36-60 years of age	8	44.44	9	32.14	20	33.33	10	27.03	5	35.71	52	33.12
4	> 61 years	0	0.00	0	0.00	3	5.00	2	5.41	1	7.14	6	3.82
Total		18	100	28	100	60	100	37	100	14	100	157	100

Education level of household members: Education level of household members in Bandehalli-3 micro-watershed is presented in Table 4. The results indicated that

Bandehalli-3 had 43.95 per cent illiterates, 12.10 per cent of them had primary school education, 11.46 per cent of them had middle school education, 19.11 per cent of them had high school education, 3.82 per cent of them had PUC education, 0.64 per cent them had Diploma education, 5.73 per cent of them had degree education, 0.64 per cent had masters and 1.91 per cent of them had other education.

Table 4: Education level of household members in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (18)		MF (28)		SF (60)		SMF (37)		MDF (14)		All (157)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	13	72.22	10	35.71	31	51.67	11	29.73	4	28.57	69	43.95
2	Functional Literate	0	0.00	0	0.00	0	0.00	1	2.70	0	0.00	1	0.64
3	Primary School	1	5.56	2	7.14	7	11.67	7	18.92	2	14.29	19	12.10
4	Middle School	2	11.11	4	14.29	6	10.00	4	10.81	2	14.29	18	11.46
5	High School	1	5.56	7	25.00	11	18.33	8	21.62	3	21.43	30	19.11
6	PUC	0	0.00	1	3.57	4	6.67	1	2.70	0	0.00	6	3.82
7	Diploma	1	5.56	0	0.00	0	0.00	0	0.00	0	0.00	1	0.64
8	Degree	0	0.00	1	3.57	1	1.67	5	13.51	2	14.29	9	5.73
9	Masters	0	0.00	0	0.00	0	0.00	0	0.00	1	7.14	1	0.64
10	Others	0	0.00	3	10.71	0	0.00	0	0.00	0	0.00	3	1.91
Total		18	100	28	100	60	100	37	100	14	100	157	100

Occupation of household heads: The data regarding the occupation of the household heads in Bandehalli-3 micro-watershed is presented in Table 5. The results indicated that, 77.14 per cent of households practicing agriculture followed by the 11.43 per cent of the household heads were general labourers, 2.86 per cent of the households head were general labour and 2.86 per cent of them were agriculture labour, government service, retired and student each.

Table 5: Occupation of household heads in Bandehalli-3 micro-watershed

S. N.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0.00	6	85.71	12	92.31	7	100	2	66.67	27	77.14
2	Agricultural Labour	0	0.00	1	14.29	0	0.00	0	0.00	0	0.00	1	2.86
3	General Labour	4	80.00	0	0.00	0	0.00	0	0.00	0	0.00	4	11.43
4	Government Service	0	0.00	0	0.00	0	0.00	0	0.00	1	33.33	1	2.86
5	Retired	0	0.00	0	0.00	1	7.69	0	0.00	0	0.00	1	2.86
6	Student	1	20.00	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86
Total		5	100	7	100	13	100	7	100	3	100	35	100

Occupation of the household members: The data regarding the occupation of the household members in Bandehalli-3 micro-watershed is presented in Table 6. The results indicated that agriculture was the major occupation for 52.23 per cent of the household members, 5.10 per cent were agricultural labourers, 8.28 per cent were general labours, 0.64 percent were in government service, 1.27 per cent of them were students and 10.79 per cent were housewives. In case of landless households 55.56 per cent were general labour, 27.78 per cent were students and 16.67 per cent were housewives. In case of marginal households 35.71 per cent were practicing agriculture, 21.02 per cent of them

were students and 8.92 per cent were housewives. In case of small farm households 57.14 per cent were practicing agriculture, 3.57 per cent were agriculture labours, 3.57 per cent were in government service, 14.29 per cent were students, and 10.71 per cent were housewives and children. In case of semi medium farmers 61.67 per cent were practicing agriculture, 23.33 per cent were students and 13.33 per cent of them were housewives. In case of semi-medium farmers 62.16 per cent were practicing agriculture, 13.51 per cent were agriculture labour, 21.62 per cent were student and 2.70 per cent were housewives. In case of medium farmers 42.86 per cent were practicing agriculture, 14.29 per cent were agriculture labour, 7.14 per cent were government service, 14.29 per cent were private service and 21.43 per cent were student.

Table 6: Occupation of family members in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (18)		MF (28)		SF (60)		SMF (37)		MDF(14)		All (157)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	16	57.14	37	61.67	23	62.16	6	42.86	82	52.23
2	Agricultural Labour	0	0	1	3.57	0	0	5	13.51	2	14.29	8	5.10
3	General Labour	12	66.67	1	3.57	0	0	0	0	0	0	13	8.28
4	Government Service	0	0	0	0	0	0	0	0	1	7.14	1	0.64
5	Private Service	0	0	0	0	0	0	0	0	2	14.29	2	1.27
6	Retired	0	0	0	0	1	1.67	0	0	0	0	1	0.64
7	Student	4	22.22	4	14.29	14	23.33	8	21.62	3	21.43	33	21.02
8	Housewife	2	11.11	3	10.71	8	13.33	1	2.70	0	0	14	8.92
9	Children	0	0	3	10.71	0	0	0	0	0	0	3	1.91
Total		18	100	28	100	60	100	37	100	14	100	157	100

Institutional participation of the household members: The data regarding the institutional participation of the household members in Bandehalli-3 micro-watershed is presented in Table 7. The results showed no participation of households in any local institutions.

Table 7: Institutional Participation of household members in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (18)		MF (28)		SF (60)		SMF (37)		MDF (14)		All (157)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	No Participation	18	100	28	100	60	100	37	100	14	100	157	100
Total		18	100	28	100	60	100	37	100	14	100	157	100

Table 8: Type of house owned by households in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Katcha	5	100	7	100	7	53.85	2	28.57	0	0	21	60
2	Pucca/RCC	0	0	0	0	6	46.15	5	71.43	3	100	14	40
Total		5	100	7	100	13	100	7	100	3	100	35	100

Type of house owned: The data regarding the type of house owned by the households in Bandehalli-3 micro-watershed is presented in Table 8. The results indicated that 60 per

cent of the households possess Katcha house, and 40 per cent of the households possess Pucca house.

Durable Assets owned by the households: The data regarding the durable assets owned by the households in Bandehalli-3 micro-watershed is presented in Table 9. The results showed that 91.43 per cent of the households possess TV, 20 per cent of the households possess Mixer grinder, 17.14 per cent of the households possess motor cycle, 5.71 per cent of the households possess car/four wheeler, 2.86 per cent possess refrigerator, 2.86 per cent of the households possess bicycle, 2.86 per cent of the households possess landline phone and 88.57 per cent of the households possess mobile phones.

Table 9: Durable Assets owned by households in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Television	3	60	7	100	13	100	6	85.71	3	100	32	91.43
2	Mixer/Grinder	1	20	0	0	2	15.38	2	28.57	2	66.67	7	20
3	Refrigerator	0	0	0	0	0	0	1	14.29	0	0	1	2.86
4	Bicycle	1	20	0	0	0	0	0	0	0	0	1	2.86
5	Motor Cycle	0	0	0	0	0	0	3	42.86	3	100	6	17.14
6	Car/Four Wheeler	0	0	0	0	0	0	1	14.29	1	33.33	2	5.71
7	Landline Phone	0	0	1	14.29	0	0	0	0	0	0	1	2.86
8	Mobile Phone	3	60	6	85.71	13	100	6	85.71	3	100	31	88.57
9	Blank	2	40	0	0	0	0	1	14.29	0	0	3	8.57

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Bandehalli-3 micro-watershed is presented in Table 10. The results showed that the average value of television was Rs. 8693, mixer grinder was Rs.2285, refrigerator was Rs. 10000, bicycle was Rs. 2000, motor cycle was Rs.54500, car/four wheeler Rs. 665000, landline was Rs.2000 and mobile phone was Rs.2166.

Table 10: Average value of durable assets owned by households in Bandehalli-3 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
1	Television	7,333	8,714	8,169	9,833	10,000	8,693
2	Mixer/Grinder	2,000	0	2,000	2,000	3,000	2,285
3	Refrigerator	0	0	0.00	10,000	0	10,000
4	Bicycle	2,000	0	0	0	0	2,000
5	Motor Cycle	0	0	0.00	59,000.00	50,000	54,500
6	Car/Four Wheeler	0	0	0.00	800,000	500,000	650,000
7	Landline Phone	0	2,000	0	0	0	2,000
8	Mobile Phone	1,714	2,400	2,142	2,642	1,500	2,166

Farm Implements owned: The data regarding the farm implements owned by the households in Bandehalli-3 micro-watershed is presented in Table 11. About 22.86 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 2.86 per cent of the households possess irrigation pump, 5.71 per cent of them possess weeder and 8.57 per cent of the households possess power tiller, tractor and sprayer respectively.

Table 11: Farm Implements owned by households in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	2	28.57	2	15.38	3	42.86	1	33.33	8	22.86
2	Plough	3	42.86	3	23.08	3	42.86	1	33.33	10	28.57
3	Irrigation Pump	0	0	0	0	1	14.29	0	0	1	2.86
4	Power Tiller	0	0	0	0	2	28.57	1	33.33	3	8.57
5	Tractor	0	0	0	0	2	28.57	1	33.33	3	8.57
6	Sprayer	0	0	0	0	2	28.57	1	33.33	3	8.57
7	Weeder	0	0	1	7.69	1	14.29	0	0	2	5.71
9	Blank	4	57.14	10	76.92	2	28.57	2	66.67	23	65.71

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Bandehalli-3 micro-watershed is presented in Table 12. The results show that the average value of bullock cart was Rs.18750, the average value of Plough was Rs. 3600, the average value of sprayer was Rs.13333, the average value of weeder was Rs. 125, the average value of tractor was Rs.666666 and the average value of irrigation pump and power tiller were Rs. 50000 respectively.

Table 12: Average value of farm implements owned by households in Bandehalli-3 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
1	Bullock Cart	20,000	17,500	18,333	20,000	18,750
2	Plough	2,000	2,000	7,333	2,000	3,600
3	Irrigation Pump	0	0	50,000	0	50,000
4	Power Tiller	0	0	50,000	50,000	50,000
5	Tractor	0	0	700,000	600,000	666,666
6	Sprayer	0	0	15,000	10,000	13,333
7	Weeder	0	50	200	0	125

Possession by the households: The data regarding the Livestock possession by the households in Bandehalli-3 micro-watershed is presented in Table 13. The results indicated that, 22.86 per cent of the households possess bullocks, 17.14 per cent of the households possess local cow, 5.71 per cent of the households possess sheep and 2.86 per cent of them possess goat.

Table 13: Livestock possession by households in Bandehalli-3 micro-watershed

Sl. No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock	1	14.29	3	23.08	2	28.57	2	66.67	8	22.86
2	Local cow	2	28.57	1	7.69	3	42.86	0	0.00	6	17.14
3	Sheep	1	14.29	0	0.00	0	0.00	1	33.33	2	5.71
4	Goat	0	0.00	1	7.69	0	0.00	0	0.00	1	2.86
5	blank	5	71.43	9	69.23	3	42.86	1	33.33	23	65.71

In case of marginal farmers 14.29 per cent of the households possess bullocks, 28.57 per cent of the households possess local cow and 14.29 per cent of the households possess sheep. In small farmers, 23.08 per cent of the households possess bullocks and 7.69 per

cent of the households possess local cow and goat respectively. In case of semi medium farmers 28.57 per cent of the households possess bullock and 42.86 per cent of the households possess local cow and 66.67 per cent and 33.33 per cent of the medium farmers possess bullock and sheep respectively.

Average Labour availability: The data regarding the average labour availability in Bandehalli-3 micro-watershed is presented in Table 14. The results indicated that, average own labour men available in the micro-watershed was 1.70, average own labour (women) available was 1.13, average hired labour (men) available was 13.67 and average hired labour (women) available was 12.53.

In case of marginal farmers, average own labour men available was 1.29, average own labour (women) was 1.14, average hired labour (men) was 6.29 and average hired labour (women) available was 6. In case of small farmers, average own labour men available was 2.08, average own labour (women) was 0.92, average hired labour (men) was 10.08 and average hired labour (women) available was 8. In case of semi medium farmers, average own labour men available was 1.57, average own labour (women) was 1.43, average hired labour (men) was 19.29 and average hired labour (women) available was 18.57. In medium farmers average own labour men available was 1.33, average own labour (women) was 1.33, average hired labour (men) was 33.33 and average hired labour (women) available was also 33.33.

Table 14: Average Labour availability in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
		N	N	N	N	N
1	Own labour Male	1.29	2.08	1.57	1.33	1.70
2	Own Labour Female	1.14	0.92	1.43	1.33	1.13
3	Hired labour Male	6.29	10.08	19.29	33.33	13.67
4	Hired labour Female	6.00	8.00	18.57	33.33	12.53

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Bandehalli-3 micro-watershed is presented in Table 15. The results indicated that, 85.71 per cent of the household opined that hired labour was adequate. About 100 per cent of the marginal farmers, small, semi medium and medium farmers have opined that the hired labour was adequate.

Table 15: Adequacy of Hired Labour in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate	7	100	13	100	7	100	3	100	30	85.71

Distribution of land (ha): The data regarding the distribution of land (ha) in Bandehalli-3 micro-watershed is presented in Table 16. The results indicated that, households of the Bandehalli-3 micro-watershed possess 55.54 ha (97.74%) of dry land and 1.29 ha (2.26%) of irrigated land. Marginal farmers possess 4.84 ha (100%) of dry land. Small farmers possess 17.18 ha (100%) of dry land. Semi medium farmers possess 19.05 ha (93.67%) of

dry land and 1.29 ha (6.33%) of irrigated land. Medium farmers possess 13.84 ha (100%) of irrigated land.

Table 16: Distribution of land (Ha) in Bandehalli-3 micro-watershed

Sl. No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	4.84	100	17.81	100	19.05	93.67	13.84	100	55.54	97.74
2	Irrigated	0.00	0.00	0.00	0.00	1.29	6.33	0.00	0.00	1.29	2.26
Total		4.84	100	17.81	100	20.34	100	13.84	100	56.83	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Bandehalli-3 micro-watershed is presented in Table 17. The results indicated that, the average value of dry land was Rs. 300,561.06 and average value of irrigated was Rs. 466,037.73. In case of marginal famers, the average land value was Rs. 764,130.44 for dry land. In case of small famers, the average land value was Rs. 409,702.34 for dry land. In case of semi medium famers, the average land value was Rs. 194,157.63 for dry land and Rs. 466,037.73 for irrigated land. In case of medium famers, the average land value was Rs. 144,444.45 for irrigated land.

Table 17: Average land value (Rs. /ha) in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
		N	N	N	N	N
1	Dry	764,130.44	409,702.34	194,157.63	144,444.45	300,561.06
2	Irrigated	0.00	0.00	466,037.73	0.00	466,037.73

Status of bore wells: The data regarding the status of bore wells in Bandehalli-3 micro watershed is presented in Table 18. The results indicated that, there were 1 functioning bore well in the micro watershed.

Table 18: Status of bore wells in Bandehalli-3 micro watershed

Sl.No.	Particulars	LL (5)	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
		N	N	N	N	N	N
1	Functioning	0	0	0	1	0	1

Source of irrigation: The data regarding the source of irrigation in Bandehalli-3 micro-watershed is presented in Table 19. The results indicated that, canal was the irrigation source for 2.86 per cent of the farmers in the micro watershed.

Table 19: Source of irrigation in Bandehalli-3 micro-watershed

Sl.No.	Particulars	SMF (7)		All (35)	
		N	%	N	%
1	Bore Well	1	14.29	1	2.86

Table 20: Depth of water in Bandehalli-3 micro watershed

Sl.No.	Particulars	SMF (7)	All (35)
		N	N
1	Bore Well	18.72	3.74

Depth of water: The data regarding the depth of water in Bandehalli-3 micro watershed is presented in Table 20.The results indicated that on an average the depth of the bore well was 3.74 meters.

Irrigated Area (ha): The data regarding the irrigated area (ha) in Bandehalli-3 micro-watershed is presented in Table 21. The results indicated that, in case of semi medium farmers there were 11 ha of irrigated land.

Table 21: Irrigated Area (ha) in Bandehalli-3 micro-watershed

Sl.No.	Particulars	SMF (7)	All (35)
1	Kharif	1.29	1.29
2	Perennial crops	3.24	3.24
3	Rabi	3.24	3.24
4	Summer	3.24	3.24
Total		11.00	11.00

Cropping pattern: The data regarding the cropping pattern in Bandehalli-3 micro-watershed is presented in Table 22. The results indicated that, farmers have grown cotton (27.14 ha), paddy (1.29 ha), redgram (17.32 ha), sorghum (5.67 ha) and groundnut (5.11ha). Marginal and small farmers have grown cotton, groundnut and redgram. Semi medium farmers have grown cotton, paddy, redgram and sorghum. Medium farmers have grown cotton and red gram.

Table 22: Cropping pattern Area (ha) in Bandehalli-3 micro-watershed

Sl. No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
1	Kharif - Cotton	0.51	8.6	9.52	8.51	27.14
2	Kharif - Red gram	0.85	7.5	3.64	5.33	17.32
3	Kharif - Sorghum	0	0	5.67	0	5.67
4	Kharif - Groundnut	3.49	1.62	0	0	5.11
5	Kharif - Paddy	0	0	1.29	0	1.29
Total		4.84	17.72	20.12	13.85	59.52

Cropping intensity: The data regarding the cropping intensity in Bandehalli-3 micro-watershed is presented in Table 23. The results indicated that, the cropping intensity in Bandehalli-3 micro-watershed was found to be 100 per cent in marginal farmers, small farmers, semi medium farmers and medium farmers respectively.

Table 23: Cropping intensity (%) in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
1	Cropping Intensity	100	100	100	100	100

Possession of Bank account: The data regarding the possession of Bank account and savings in Bandehalli-3 micro-watershed is presented in Table 24. The results indicated that, 48.57 per cent of the households have bank account and 40 per cent of them having savings. Among landless farmers 40 per cent of them possess bank account and 20 per cent of them possess savings. Among marginal farmers 57.14 percent of them possess both bank account and savings. Around 30.77 per cent of small farmers possess bank account and 23.08 per cent of them have savings correspondingly. Semi medium farmers

possess 71.43 per cent of them possess bank account and 57.14 per cent possess savings respectively and medium category of farmers possess 66.67 per cent of bank account and also savings.

Table 24: Possession of Bank account and savings in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Account	2	40.00	4	57.14	4	30.77	5	71.43	2	66.67	17	48.57
2	Savings	1	20.00	4	57.14	3	23.08	4	57.14	2	66.67	14	40.00

Borrowing status: The data regarding the possession of borrowing status in Bandehalli-3 micro-watershed is presented in Table 25. The results indicated that, 40 per cent of landless, 14.29 per cent of marginal, 15.38 per cent of small, 14.29 per cent semi medium and 33.33 per cent of medium farmers have borrowed credit from different sources.

Table 25: Borrowing status in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	2	40	1	14.29	2	15.38	1	14.29	1	33.33	7	20

Source of credit: The data regarding the source of credit availed by households in Bandehalli-3 micro watershed is presented in Table 26. The results indicated that, 100 per cent have availed loan in Grameena bank.

Table 26: Source of credit availed by households in Bandehalli-3 micro watershed

Sl.No.	Particulars	MF (2)		SF (2)		SMF (1)		MDF (1)		All (6)	
		N	%	N	%	N	%	N	%	N	%
1	Grameena Bank	2	100	2	100	1	100	1	100	6	100

Average credit amount: The data regarding the average credit amount availed by households in Bandehalli-3 micro watershed is presented in Table 27. The results indicated that, marginal, small, semi medium and medium farmers have availed Rs.50000, Rs. 75000, Rs. 200000 and 200000 respectively. Overall average credit amount availed by households in the micro watershed is 525000.

Table 27: Average Credit amount availed by households in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (2)	SF (2)	SMF (1)	MDF (1)	All (6)
		N	N	N	N	N
1	Average Credit	50,000	75,000	200,000	200,000	525000

Table 28: Purpose of credit borrowed (institutional Source) by households in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (2)		SF (2)		SMF (1)		MDF (1)		All (6)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture production	2	100	2	100	1	100	1	100	6	100

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Bandehalli-3 micro

watershed is presented in Table 28. The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Bandehalli-3 micro watershed is presented in Table 29. Results indicated that 100 per cent of them were unpaid their loan.

Table 29: Repayment status of households (Institutional) in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (2)		SF (2)		SMF (1)		MDF (1)		All (6)	
		N	%	N	%	N	%	N	%	N	%
2	Un paid	2	100	2	100	1	100	1	100	6	100

Opinion on institutional sources of credit: The data regarding opinion on institutional sources of credit by households in Bandehalli-3 micro watershed is presented in Table 30. The results indicated that 100 per cent of the households were opined that institutional credit was helped to perform timely agricultural operations.

Table 30: Opinion on institutional sources of credit in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (2)		SF (2)		SMF (1)		MDF (1)		All (6)	
		N	%	N	%	N	%	N	%	N	%
	Helped to perform timely agricultural operations	2	100	2	100	1	100	1	100	6	100

Cost of Cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Bandehalli-3 micro-watershed is presented in Table 31. The results indicated that, the total cost of cultivation for cotton was Rs. 41514.15. The gross income realized by the farmers was Rs. 94251.54. The net income from groundnut cultivation was Rs. 52737.39, thus the benefit cost ratio was found to be 1:2.27.

Table 31: Cost of Cultivation of Groundnut in Bandehalli-3 micro-watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	64.47	12309.13	29.65
2	Bullock		Pairs/day	0.27	137.22	0.33
3	Tractor		Hours	9.17	5846.75	14.08
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	32.73	3907.68	9.41
7	FYM		Quintal	21.06	2834.87	6.83
8	Fertilizer + micronutrients		Quintal	4.49	3286.44	7.92
9	Pesticides (PPC)		Kgs / ltrs	2.11	2106.78	5.07
10	Irrigation		Number	0.00	0.00	0.00
11	Depreciation charges			0.00	131.75	0.32
12	Land revenue and Taxes			0.00	4.80	0.01
II	**Cost B1**					
13	Interest on working capital				1456.31	3.51
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				32021.74	77.13
III	**Cost B2**					
15	Rental Value of Land				300.00	0.72
16	**Cost B2 = (Cost B1 + Rental value)**				32321.74	77.86
IV	**Cost C1**					
17	Family Human Labour			26.10	5418.23	13.05
18	**Cost C1 = (Cost B2 + Family Labour)**				37739.97	90.91
V	**Cost C2**					
19	Risk Premium				0.17	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**				37740.14	90.91
VI	**Cost C3**					
21	Managerial Cost				3774.01	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				41514.15	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		21.27	93930.93	
		b) Main Crop Sales Price (Rs.)			4416.67	
	By Product	e) Main Product (q)		1.92	320.61	
		f) Main Crop Sales Price (Rs.)			166.67	
b.	Gross Income (Rs.)				94251.54	
c.	Net Income (Rs.)				52737.39	
d.	Cost per Quintal (Rs./q.)				1952.01	
e.	Benefit Cost Ratio (BC Ratio)				1:2.27	

Cost of Cultivation of Paddy: The data regarding the cost of cultivation of paddy in Bandehalli-3 micro-watershed is presented in Table 32. The results indicated that, the total cost of cultivation for paddy was Rs. 49039.59. The gross income realized by the farmers was Rs. 93207.55. The net income from paddy cultivation was Rs. 44167.95. Thus the benefit cost ratio was found to be 1:1.9.

Table 32: Cost of Cultivation of Paddy in Bandehalli-3 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	61.36	12116.98	24.71
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	9.32	5592.45	11.40
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	15.53	776.73	1.58
7	FYM		Quintal	15.53	1864.15	3.80
8	Fertilizer + micronutrients		Quintal	3.11	2407.86	4.91
9	Pesticides (PPC)		Kgs / liters	2.33	2330.19	4.75
10	Irrigation		Number	1.55	0.00	0.00
11	Depreciation charges			0.00	11029.56	22.49
12	Land revenue and Taxes			0.00	4.94	0.01
II	**Cost B1**					
13	Interest on working capital				885.47	1.81
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				37008.34	75.47
III	**Cost B2**					
15	Rental Value of Land				0.00	0.00
16	**Cost B2 = (Cost B1 + Rental value)**				37008.34	75.47
IV	**Cost C1**					
17	Family Human Labour			32.62	7573.11	15.44
18	**Cost C1 = (Cost B2 + Family Labour)**				44581.45	90.91
V	**Cost C2**					
19	Risk Premium				0.00	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**				44581.45	90.91
VI	**Cost C3**					
21	Managerial Cost				4458.14	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				49039.59	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		46.60	83886.79	
		b) Main Crop Sales Price (Rs.)			1800.00	
	By Product	e) Main Product (q)		23.30	9320.75	
		f) Main Crop Sales Price (Rs.)			400.00	
b.	Gross Income (Rs.)				93207.55	
c.	Net Income (Rs.)				44167.95	
d.	Cost per Quintal (Rs./q.)				1052.27	
e.	Benefit Cost Ratio (BC Ratio)				1:1.9	

Cost of Cultivation of Sorghum: The data regarding the cost of cultivation of sorghum in Bandehalli-3 micro-watershed is presented in Table 33. The results indicated that, the total cost of cultivation for sorghum was Rs. 24576.19. The gross income realized by the farmers was Rs. 45561.21. The net income from sorghum cultivation was Rs. 20985.02. Thus the benefit cost ratio was found to be 1:1.85.

Table 33: Cost of Cultivation of Sorghum in Bandehalli-3 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	42.13	7936.93	32.30
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	5.96	4443.26	18.08
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	14.27	1860.73	7.57
6	FYM		Quintal	9.06	1811.33	7.37
7	Fertilizer + micronutrients		Quintal	1.29	1225.39	4.99
8	Pesticides (PPC)		Kgs / liters	0.00	0.00	0.00
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	2496.35	10.16
11	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
12	Interest on working capital				587.82	2.39
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				20365.11	82.87
III	**Cost B2**					
14	Rental Value of Land				333.33	1.36
15	**Cost B2 = (Cost B1 + Rental value)**				20698.44	84.22
IV	**Cost C1**					
16	Family Human Labour			7.30	1642.55	6.68
17	**Cost C1 = (Cost B2 + Family Labour)**				22340.99	90.91
V	**Cost C2**					
18	Risk Premium				1.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				22341.99	90.91
VI	**Cost C3**					
20	Managerial Cost				2234.20	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				24576.19	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		15.64	43019.17	
		b) Main Crop Sales Price (Rs.)			2750.00	
	By Product	e) Main Product (q)		7.82	2542.04	
		f) Main Crop Sales Price (Rs.)			325.00	
b.	Gross Income (Rs.)				45561.21	
c.	Net Income (Rs.)				20985.02	
d.	Cost per Quintal (Rs./q.)				1571.03	
e.	Benefit Cost Ratio (BC Ratio)				1:1.85	

Cost of cultivation of Red gram: The data regarding the cost of cultivation of redgram in Bandehalli-3 micro-watershed is presented in Table 34. The results indicated that, the total cost of cultivation for redgram was Rs. 25433.63. The gross income realized by the farmers was Rs. 49900.24. The net income from red gram cultivation was Rs. 24466.61. Thus the benefit cost ratio was found to be 1:1.96.

Table 34: Cost of Cultivation of Red gram in Bandehalli-3 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	34.76	6783.99	26.67
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	6.76	4576.82	18.00
4	Machinery		Hours	1.29	945.38	3.72
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	10.56	1127.10	4.43
6	FYM		Quintal	16.20	2678.08	10.53
7	Fertilizer + micronutrients		Quintal	2.29	1908.04	7.50
8	Pesticides (PPC)		Kgs /liters	1.00	998.58	3.93
9	Irrigation		Number	0.62	0.00	0.00
10	Depreciation charges			0.00	98.01	0.39
11	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
12	Interest on working capital				805.49	3.17
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				19924.79	78.34
III	**Cost B2**					
14	Rental Value of Land				358.33	1.41
15	**Cost B2 = (Cost B1 + Rental value)**				20283.12	79.75
IV	**Cost C1**					
16	Family Human Labour			12.81	2837.73	11.16
17	**Cost C1 = (Cost B2 + Family Labour)**				23120.85	90.91
V	**Cost C2**					
18	Risk Premium				0.63	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				23121.48	90.91
VI	**Cost C3**					
20	Managerial Cost				2312.15	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				25433.63	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		10.47	49717.11	
		b) Main Crop Sales Price (Rs.)			4750.00	
	By Product	e) Main Product (q)		1.63	183.13	
		f) Main Crop Sales Price (Rs.)			112.50	
b.	Gross Income (Rs.)				49900.24	
c.	Net Income (Rs.)				24466.61	
d.	Cost per Quintal (Rs./q.)				2429.94	
e.	Benefit Cost Ratio (BC Ratio)				1:1.96	

Cost of cultivation of Cotton: The data regarding the cost of cultivation of cotton in Bandehalli-3 micro-watershed is presented in Table 35. The results indicated that, the total cost of cultivation for cotton was Rs. 28763.94. The gross income realized by the farmers was Rs. 65783.82. The net income from cotton cultivation was Rs. 37019.88. Thus the benefit cost ratio was found to be 1:2.29.

Table 35: Cost of Cultivation of cotton in Bandehalli-3 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	36.14	6989.93	24.30
2	Bullock		Pairs/day	0.32	178.30	0.62
3	Tractor		Hours	5.28	3735.73	12.99
4	Machinery		Hours	1.22	978.62	3.40
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	8.70	4193.50	14.58
6	FYM		Quintal	14.23	2234.93	7.77
7	Fertilizer + micronutrients		Quintal	2.47	2104.71	7.32
8	Pesticides (PPC)		Kgs / ltrs	0.98	978.35	3.40
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	338.37	1.18
11	Land revenue and Taxes			0.00	3.59	0.01
II	**Cost B1**					
12	Interest on working capital				1141.44	3.97
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				22877.49	79.54
III	**Cost B2**					
14	Rental Value of Land				351.52	1.22
15	**Cost B2 = (Cost B1 + Rental value)**				23229.00	80.76
	Cost C1					
16	Family Human Labour			12.64	2919.49	10.15
17	**Cost C1 = (Cost B2 + Family Labour)**				26148.49	90.91
V	**Cost C2**					
18	Risk Premium				0.55	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				26149.03	90.91
VI	**Cost C3**					
20	Managerial Cost				2614.90	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				28763.94	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.47	65783.82	
		b) Main Crop Sales Price (Rs.)			4545.45	
b.	Gross Income (Rs.)				65783.82	
c.	Net Income (Rs.)				37019.88	
d.	Cost per Quintal (Rs./q.)				1987.50	
e.	Benefit Cost Ratio (BC Ratio)				1:2.29	

Adequacy of fodder: The data regarding the adequacy of fodder in Bandehalli-3 micro watershed is presented in Table 36. The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate and 37.14 per cent of the households opined that green fodder was adequate.

Table 36: Adequacy of fodder in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	2	28.57	4	30.77	4	57.14	2	66.67	12	34.29
2	Adequate-Green Fodder	3	42.86	4	30.77	4	57.14	2	66.67	13	37.14

Average Annual gross income of households: The results of the overall average annual gross income of the household in Bandehalli-3 is presented in table 37. The table indicated that, in case of landless farmers the average income from wage Rs. 70000. In marginal farmers the average income from wage was Rs.37142.86 and agriculture was Rs.72142.86. In small farmers the average income from service/salary was Rs. 4615.38, wage was Rs.30769.23 and agriculture was Rs.78461.54. In semi medium farmers the average income from wage was Rs.31428.57 and agriculture was Rs.137857.14. In case of medium farmers the average income from wage was Rs. 16666.67, agriculture was Rs. 340000 and goat farming was Rs.100000.

Table 37: Average Annual gross income of households in Bandehalli-3 micro-watershed (Avg value in Rs.)

Sl.No.	Particulars	LL (5)	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Service/salary	0	0	4,615.38	0	0	1,714.29
2	Wage	70,000	37,142.86	30,769.23	31,428.57	16,666.67	36,571.43
3	Agriculture	0	72,142.86	78,461.54	137,857.14	340,000	100,285.71
4	Goat Farming	0	0	0	0	100,000	8,571.43
Income(Rs.)		70,000	109,285.71	113,846.15	169,285.71	456,666.67	147,142.86

Table 38: Average annual expenditure in Bandehalli-3 micro watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (5)	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
1	Service/salary	0	0	30,000	0	0	857.14
2	Wage	42,000	4,833.33	10,090.91	6,400.00	15,000	11,342.86
3	Agriculture	0	24,000.00	28,307.69	55,714.29	116,666.67	37,142.86
Total		42,000	28,833.33	68,398.60	62,114.29	131,666.67	333,012.89
Average		8,400	4,119.05	5,261.43	8,873.47	43,888.89	9,514.65

Average annual expenditure: The data regarding the average annual expenditure in Bandehalli-3 micro watershed is presented in Table 38. The results indicate that in case of landless farmers the average annual expenditure from wage was Rs.42000. In marginal farmers the average expenditure from wage was Rs.4833.33 and agriculture was Rs. 24000. In case of small farmers the average expenditure from service/salary was Rs.30000, wage was Rs.10090.91 and agriculture was Rs.28307.69. In semi medium farmers the average expenditure from wage was Rs.6400 and agriculture was

Rs.62114.29. In case of medium farmers the average expenditure from wage was Rs. 15000 and agriculture was Rs.116666.67.

Horticulture species grown: The data regarding horticulture species grown in Bandehalli-3 micro watershed is presented in Table 39. The results indicate that, households have planted 20 mango and 2 Sapota trees in their field. Households have also planted 1 mango trees in their backyard.

Table 39: Horticulture species grown in Bandehalli-3 micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Mango	0	0	3	0	10	0	2	0	5	1	20	1
2	Sapota	0	0	0	0	0	0	2	0	0	0	2	0

***F= Field B=Back Yard**

Forest species grown: The data regarding forest species grown in Bandehalli-3 micro watershed is presented in Table 40. The results indicate that, households have planted 76 neem trees, 8 tamarind trees and 1 teak tree in their field.

Table 40. Forest species grown in Bandehalli-3 micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Teak	0	0	1	0	0	0	0	0	0	0	1	0
2	Neem	0	0	13	0	30	0	15	0	18	0	76	0
3	Tamarind	0	0	0	0	5	0	1	0	2	0	8	0

***F= Field B=Back Yard**

Additional investment capacity: The data regarding additional investment capacity in Bandehalli-3 micro watershed is presented in Table 41. The results indicate that, the average additional investment capacity for land development was Rs.5714.29 for marginal farmers, Rs.3076.92 for small farmers, Rs.5714.29 for semi medium farmers and Rs. 6666.67 for medium farmers. On an average the additional investment capacity for land development was Rs.4000.

Table 41: Additional investment capacity in Bandehalli-3 micro watershed

Sl. No.	Particulars	MF (7)	SF (13)	SMF (7)	MDF (3)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	5,714.29	3,076.92	5,714.29	6,666.67	4,000

Table 42: Source of funds for additional investment capacity in Bandehalli-3 micro-watershed

Sl. No	Item	Land development	
		N	%
1	Loan from bank	12	34.29
2	Own funds	2	5.71

Source of funds for additional investment: The data regarding source of funds for additional investment in Bandehalli-3 micro-watershed is presented in Table 42. The

results indicated that for 34.29 per cent of the households were dependent on loan from bank for land development and 5.71 per cent were dependent on their own funds.

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Bandehalli-3 micro-watershed is presented in Table 43. The results indicated that, cotton, groundnut, paddy, sorghum and redgram were sold to the extent of 100 per cent.

Table 43: Marketing of the agricultural produce in Bandehalli-3 micro-watershed

Sl. No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	420	0	420	100	4208.33
2	Groundnut	110	0	110	100	4416.67
3	Paddy	60	0	60	100	1800
4	Redgram	165	0	165	100	4777.78
5	Sorghum	90	0	90	100	2750

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Bandehalli-3 micro-watershed is presented in Table 44. The results indicated that 82.86 per cent of the households have sold their produce to local/village merchants and 2.86 per cent of the households sold their produce in regulated markets.

Table 44: Marketing Channels used for sale of agricultural produce in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	7	100	13	100	6	85.71	3	100	29	82.86
2	Regulated Market	0	0.00	0	0.00	1	14.29	0	0.00	1	2.86

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Bandehalli-3 micro-watershed is presented in Table 45. The results indicated that 8.57 per cent of the households have used cart as a mode of transport and 77.14 per cent have used tractor.

Table 45: Mode of transport of agricultural produce in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Cart	2	28.57	1	7.69	0	0.00	0	0.00	3	8.57
2	Tractor	5	71.43	12	92.31	7	100	3	100	27	77.14

Incidence of soil and water erosion problems: The data regarding Incidence of soil and water erosion problems in Bandehalli-3 micro-watershed is presented in Table 46. The results indicated that, 14.29 per cent of marginal and 7.69 per cent of small farmers faced soil and water erosion problems in the farm.

Table 46: Incidence of soil and water erosion problems in Bandehalli-3 micro-watershed

Sl. No.	Particulars	MF (7)		SF (13)		All (35)	
		N	%	N	%	N	%
1	Soil and water erosion problems in the farm	1	14.29	1	7.69	2	5.71

Interest towards soil testing: The data regarding interest shown towards soil testing in Bandehalli-3 micro-watershed is presented in Table 47. The results indicated that, 85.71 per cent of the households have shown interest in soil testing.

Table 47: Interest shown towards soil testing in Bandehalli-3 micro-watershed

Sl.No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	7	100	13	100	7	100	3	100	30	85.71

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Bandehalli-3 micro-watershed is presented in Table 48. The results indicated that, 88.57 percent used fire wood as a source of fuel, and 11.43 percent of the households used LPG.

Table 48: Usage pattern of fuel for domestic use in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	7	100	11	84.62	7	100	1	33.33	31	88.57
2	LPG	0	0.00	0	0.00	2	15.38	0	0.00	2	66.67	4	11.43

Source of drinking water: The data regarding source of drinking water in Bandehalli-3 micro-watershed is presented in Table 49. The results indicated that, piped supply was the major source for drinking water for 94.29 per cent and bore well was the drinking source for 5.71 per cent of the households.

Table 49: Source of drinking water in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	4	80	7	100	13	100	6	85.71	3	100	33	94.29
2	Bore Well	1	20	0	0	0	0	1	14.29	0	0	2	5.71

Source of light: The data regarding source of light in Bandehalli-3 micro-watershed is presented in Table 50. The results indicated that, electricity was the major source of light for 100 per cent of the population.

Table 50: Source of light in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	7	100	13	100	7	100	3	100	35	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facility in Bandehalli-3 micro-watershed is presented in Table 51. The results indicated that, 51.43 per cent of the households possess sanitary toilet i.e. 100 per cent of landless,

42.86 per cent of marginal, 46.15 per cent of small, 42.86 per cent of semi medium and 33.33 per cent of medium famers had sanitary toilet facility.

Table 51: Existence of Sanitary toilet facility in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	5	100	3	42.86	6	46.15	3	42.86	1	33.33	18	51.43

Possession of PDS card: The data regarding possession of PDS card in Bandehalli-3 micro-watershed is presented in Table 52. The results indicated that, 5.71 per cent of the sampled households possessed APL card and 94.29 per cent of the sampled households possessed BPL card.

Table 52: Possession of PDS card in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	APL	0	0.00	0	0.00	0	0.00	0	0.00	2	66.67	2	5.71
2	BPL	5	100	7	100	13	100	7	100	1	33.33	33	94.29

Participation in NREGA programme: The data regarding participation in NREGA programme in Bandehalli-3 micro-watershed is presented in Table 53. The results indicated that, 80 per cent of the households participated in NREGA programme which included 60 per cent of the landless, 85.71 percent of the marginal, 76.92 per cent of the small, 85.71 per cent of the semi medium and 100 percent of the medium farmers.

Table 53: Participation in NREGA programme in Bandehalli-3 micro-watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	3	60	6	85.71	10	76.92	6	85.71	3	100	28	80

Adequacy of food items: The data regarding adequacy of food items in Bandehalli-3 micro-watershed is presented in Table 54. The results indicated that, cereals, pulses, oilseed, vegetables, milk, egg and meat were adequate for 94.29 per cent, 82.86 per cent, 80 per cent, 88.57 per cent, 22.86 per cent, 91.43 per cent, 94.29 per cent and 85.71 per cent of the households respectively.

Table 54: Adequacy of food items in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100	6	85.71	12	92.31	7	100	3	100	33	94.29
2	Pulses	4	80.00	6	85.71	9	69.23	7	100	3	100	29	82.86
3	Oilseed	5	100	6	85.71	9	69.23	6	85.71	2	66.67	28	80.00
4	Vegetables	5	100	5	71.43	11	84.62	7	100	3	100	31	88.57
5	Fruits	0	0.00	0	0.00	6	46.15	0	0.00	2	66.67	8	22.86
6	Milk	5	100	6	85.71	11	84.62	7	100	3	100	32	91.43
7	Egg	4	80.00	7	100	11	84.62	7	100	4	133.33	33	94.29
8	Meat	4	80.00	6	85.71	10	76.92	7	100	3	100	30	85.71

Response on Inadequacy of food items: The data regarding inadequacy of food items in Bandehalli-3 micro-watershed is presented in Table 55. The results indicated that, cereals, vegetables, oilseed, vegetables, fruits, and meat were inadequate for 5.71 per cent, 17.14 per cent, 20 per cent, 11.43 per cent, 77.17 per cent and 11.43 per cent of the households and milk and egg were inadequate for 8.57 per cent of the households.

Table 55: Response on Inadequacy of food items in Bandehalli-3 micro-watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	0	0	1	14.29	1	7.69	0	0	0	0	2	5.71
2	Pulses	1	20	1	14.29	4	30.77	0	0	0	0	6	17.14
3	Oilseed	0	0	1	14.29	4	30.77	1	14.29	1	33.33	7	20
4	Vegetables	0	0	2	28.57	2	15.38	0	0	0	0	4	11.43
5	Fruits	5	100	7	100	7	53.85	7	100	1	33.33	27	77.14
6	Milk	0	0	1	14.29	2	15.38	0	0	0	0	3	8.57
7	Egg	1	20	0	0	2	15.38	0	0	0	0	3	8.57
8	Meat	1	20	1	14.29	2	15.38	0	0	0	0	4	11.43

Farming constraints: The data regarding farming constraints experienced by households in Bandehalli-3 micro-watershed is presented in Table 56. The results indicated that, Lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (85.71%), frequent incidence of pest and diseases (57.14%), inadequacy of irrigation water (42.86%), high cost of fertilizers and plant protection chemicals , high rate of interest on credit (74.29%), low price for the agricultural commodities (80 %), lack of marketing facilities in the area (74.29%), inadequate extension services (54.29%), lack of transport for safe transport of the agricultural produce to the market (80%) and less rainfall (2.86%).

Table 56: Farming constraints Experienced in Bandehalli-3 micro-watershed

Sl. No.	Particulars	MF (7)		SF (13)		SMF (7)		MDF (3)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	7	100	12	92.31	7	100	3	100	29	82.86
2	Wild animal menace on farm field	7	100	13	100	7	100	3	100	30	85.71
3	Frequent incidence of pest and diseases	5	71.43	9	69.23	4	57.14	2	66.67	20	57.14
4	Inadequacy of irrigation water	2	28.57	6	46.15	5	71.43	2	66.67	15	42.86
5	High cost of Fertilizers and plant protection chemicals	7	100	12	92.31	7	100	3	100	29	82.86
6	High rate of interest on credit	5	71.43	12	92.31	6	85.71	3	100	26	74.29
7	Low price for the agricultural commodities	6	85.71	12	92.31	7	100	3	100	28	80
8	Lack of marketing facilities in the area	7	100	11	84.62	6	85.71	2	66.67	26	74.29
9	Inadequate extension services	5	71.43	7	53.85	5	71.43	2	66.67	19	54.29
10	Lack of transport for safe transport of the Agril produce to the market.	5	71.43	13	100	7	100	3	100	28	80
11	Less rainfall	1	14.29	0	0	0	0	0	0	1	2.86

Chapter 5

SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro-watershed were interviewed for the survey.

The results indicated that 35 farmers were sampled in Bandehalli-3 micro-watershed among them 7 (20%) were marginal farmers, 13 (37.14 %) were small farmers, 7 (20 %) were semi medium farmers, 3 (8.57 %) medium farmers and 5 (14.29 %) landless farmers were also interviewed for the survey. The data indicated that there were 91 (57.96 %) men and 66 (42.04 %) were women in the micro watershed. The average family size of landless farmers was 3.6, marginal farmers were 4.0, small farmers were 4.6, semi medium farmer was 5.3 and in medium farmers it was 4.7. The data indicated that 31 (19.75 %) people were in 0-15 years of age, 38 (43.31 %) were in 16-35 years of age, 52 (33.12 %) were in 36-60 years of age and 6 (3.82 %) were above 61 years of age.

The results indicated that Bandehalli-3 had 43.95 per cent illiterates, 12.10 per cent of them had primary school education, 11.46 per cent of them had middle school education, 19.11 per cent of them had high school education, 3.82 per cent of them had PUC education, 0.64 per cent them had Diploma education, 5.73 per cent of them had degree education, 0.64 per cent had masters and 1.91 per cent of them had other education.

The results indicated that, 77.14 per cent of households practicing agriculture followed by the 11.43 per cent of the household heads were general labourers, 2.86 per cent of the households head were general labour and 2.86 per cent of them were agriculture labour, government service, retired and student each. The results indicated that agriculture was the major occupation for 52.23 per cent of the household members, 5.10 per cent were agricultural labourers, 8.28 per cent were general labours, 0.64 percent were in government service, 1.27 per cent of them were students and 10.79 per cent were housewives. In case of landless households 55.56 per cent were general labour, 27.78 per cent were students and 16.67 per cent were housewives.

In case of marginal households 35.71 per cent were practicing agriculture, 21.02 per cent of them were students and 8.92 per cent were housewives. In case of small farm households 57.14 per cent were practicing agriculture, 3.57 per cent were agriculture labours, 3.57 per cent were in government service, 14.29 per cent were students, and 10.71 per cent were housewives and children. In case of semi medium farmers 61.67 per

cent were practicing agriculture, 23.33 per cent were students and 13.33 per cent of them were housewives. In case of semi-medium farmers 62.16 per cent were practicing agriculture, 13.51 per cent were agriculture labour, 21.62 per cent were student and 2.70 per cent were housewives. In case of medium farmers 42.86 per cent were practicing agriculture, 14.29 per cent were agriculture labour, 7.14 per cent were government service, 14.29 per cent were private service and 21.43 per cent were student.

The results showed no participation of households in any local institutions. The results indicated that 60 per cent of the households possess Katcha house, and 40 per cent of the households possess Pucca house. The results showed that 91.43 per cent of the households possess TV, 20 per cent of the households possess Mixer grinder, 17.14 per cent of the households possess motor cycle, 5.71 per cent of the households possess car/four wheeler, 2.86 per cent possess refrigerator, 2.86 per cent of the households possess bicycle, 2.86 per cent of the households possess landline phone and 88.57 per cent of the households possess mobile phones.

The results showed that the average value of television was Rs. 8693, mixer grinder was Rs.2285, refrigerator was Rs. 10000, bicycle was Rs. 2000, motor cycle was Rs.54500, car/four wheeler Rs. 665000, landline was Rs.2000 and mobile phone was Rs.2166. The results indicated that about 22.86 per cent of the households possess bullock cart, 28.57 per cent of them possess plough, 2.86 per cent of the households possess irrigation pump, 5.71 per cent of them possess weeder and 8.57 per cent of the households possess power tiller, tractor and sprayer respectively.

The results show that the average value of bullock cart was Rs.18750, the average value of Plough was Rs. 3600, the average value of sprayer was Rs.13333, the average value of weeder was Rs. 125, the average value of tractor was Rs.666666 and the average value of irrigation pump and power tiller were Rs. 50000 respectively. The results indicated that, 22.86 per cent of the households possess bullocks, 17.14 per cent of the households possess local cow, 5.71 per cent of the households possess sheep and 2.86 per cent of them possess goat.

Results indicated that in case of marginal farmers 14.29 per cent of the households possess bullocks, 28.57 per cent of the households possess local cow and 14.29 per cent of the households possess sheep. In small farmers, 23.08 per cent of the households possess bullocks and 7.69 per cent of the households possess local cow and goat respectively. In case of semi medium farmers 28.57 per cent of the households possess bullock and 42.86 per cent of the households possess local cow and 66.67 per cent and 33.33 per cent of the medium farmers possess bullock and sheep respectively.

The results indicated that, average own labour men available in the micro-watershed was 1.70, average own labour (women) available was 1.13, average hired labour (men) available was 13.67 and average hired labour (women) available was 12.53.

Results showed that, in case of marginal farmers, average own labour men available was 1.29, average own labour (women) was 1.14, average hired labour (men) was 6.29 and average hired labour (women) available was 6. In case of small farmers, average own labour men available was 2.08, average own labour (women) was 0.92, average hired labour (men) was 10.08 and average hired labour (women) available was 8. In case of semi medium farmers, average own labour men available was 1.57, average own labour (women) was 1.43, average hired labour (men) was 19.29 and average hired labour (women) available was 18.57. In medium farmers average own labour men available was 1.33, average own labour (women) was 1.33, average hired labour (men) was 33.33 and average hired labour (women) available was also 33.33.

The results indicated that, 85.71 per cent of the household opined that hired labour was adequate. About 100 per cent of the marginal farmers, small, semi medium and medium farmers have opined that the hired labour was adequate. The results indicated that, households of the Bandehalli-3 micro-watershed possess 55.54 ha (97.74%) of dry land and 1.29 ha (2.26%) of irrigated land. Marginal farmers possess 4.84 ha (100%) of dry land. Small farmers possess 17.18 ha (100%) of dry land. Semi medium farmers possess 19.05 ha (93.67%) of dry land and 1.29 ha (6.33%) of irrigated land. Medium farmers possess 13.84 ha (100%) of irrigated land.

The results indicated that, the average value of dry land was Rs. 300,561.06 and average value of irrigated was Rs. 466,037.73. In case of marginal famers, the average land value was Rs. 764,130.44 for dry land. In case of small famers, the average land value was Rs. 409,702.34 for dry land. In case of semi medium famers, the average land value was Rs. 194,157.63 for dry land and Rs. 466,037.73 for irrigated land. In case of medium famers, the average land value was Rs. 144,444.45 for irrigated land. The results indicated that, there were 1 functioning bore well in the micro watershed. The results indicated that, canal was the irrigation source for 2.86 per cent of the farmers in the micro watershed. The results indicated that on an average the depth of the bore well was 3.74 meters. The results indicated that, in case of semi medium farmers there were 11 ha of irrigated land.

The results indicated that, farmers have grown cotton (27.14 ha), paddy (1.29 ha), redgram (17.32 ha), sorghum (5.67 ha) and groundnut (5.11ha). Marginal and small farmers have grown cotton, groundnut and redgram. Semi medium farmers have grown cotton, paddy, redgram and sorghum. Medium farmers have grown cotton and red gram. The results indicated that, the cropping intensity in Bandehalli-3 micro-watershed was found to be 100 per cent in marginal farmers, small farmers, semi medium farmers and medium farmers respectively.

The results indicated that, 48.57 per cent of the households have bank account and 40 per cent of them having savings. Among landless farmers 40 per cent of them possess bank account and 20 per cent of them possess savings. Among marginal farmers 57.14

percent of them possess both bank account and savings. Around 30.77 per cent of small farmers possess bank account and 23.08 per cent of them have savings correspondingly. Semi medium farmers possess 71.43 per cent of them possess bank account and 57.14 per cent possess savings respectively and medium category of farmers possess 66.67 per cent of bank account and also savings.

The results indicated that, 40 per cent of landless, 14.29 per cent of marginal, 15.38 per cent of small, 14.29 per cent semi medium and 33.33 per cent of medium farmers have borrowed credit from different sources. The results indicated that, 100 per cent have availed loan in Grameena bank. The results indicated that, marginal, small, semi medium and medium farmers have availed Rs.50000, Rs. 75000, Rs. 200000 and 200000 respectively. Overall average credit amount availed by households in the micro watershed is 525000. The results indicated that, 100 per cent of the households have borrowed loan for agriculture production. Results indicated that 100 per cent of them were unpaid their loan. The results indicated that 100 per cent of the households were opined that institutional credit was helped to perform timely agricultural operations.

The results indicated that, the total cost of cultivation for cotton was Rs. 41514.15. The gross income realized by the farmers was Rs. 94251.54. The net income from groundnut cultivation was Rs. 52737.39, thus the benefit cost ratio was found to be 1:2.27. The results indicated that, the total cost of cultivation for paddy was Rs. 49039.59. The gross income realized by the farmers was Rs. 93207.55. The net income from paddy cultivation was Rs. 44167.95. Thus the benefit cost ratio was found to be 1:1.9.

The results indicated that, the total cost of cultivation for sorghum was Rs. 24576.19. The gross income realized by the farmers was Rs. 45561.21. The net income from sorghum cultivation was Rs. 20985.02. Thus the benefit cost ratio was found to be 1:1.85.The results indicated that, the total cost of cultivation for redgram was Rs. 25433.63. The gross income realized by the farmers was Rs. 49900.24. The net income from red gram cultivation was Rs. 24466.61. Thus the benefit cost ratio was found to be 1:1.96. The results indicated that, the total cost of cultivation for cotton was Rs. 28763.94. The gross income realized by the farmers was Rs. 65783.82. The net income from cotton cultivation was Rs. 37019.88. Thus the benefit cost ratio was found to be 1:2.29.

The results indicate that, 34.29 per cent of the households opined that dry fodder was adequate and 37.14 per cent of the households opined that green fodder was adequate. The table indicated that, in case of landless farmers the average income from wage Rs. 70000. In marginal farmers the average income from wage was Rs.37142.86 and agriculture was Rs.72142.86. In small farmers the average income from service/salary was Rs. 4615.38, wage was Rs.30769.23 and agriculture was Rs.78461.54. In semi medium farmers the average income from wage was Rs.31428.57 and agriculture was Rs.137857.14. In case of medium farmers the average income from wage was Rs. 16666.67, agriculture was Rs. 340000 and goat farming was Rs.100000.

The results indicate that in case of landless farmers the average annual expenditure from wage was Rs.42000. In marginal farmers the average expenditure from wage was Rs.4833.33 and agriculture was Rs. 24000. In case of small farmers the average expenditure from service/salary was Rs.30000, wage was Rs.10090.91 and agriculture was Rs.28307.69. In semi medium farmers the average expenditure from wage was Rs.6400 and agriculture was Rs.62114.29. In case of medium farmers the average expenditure from wage was Rs. 15000 and agriculture was Rs.116666.67. The results indicate that, households have planted 20 mango and 2 Sapota trees in their field. Households have also planted 1 mango trees in their backyard. The results indicate that, households have planted 76 neem trees, 8 tamarind trees and 1 teak tree in their field. The results indicate that, the average additional investment capacity for land development was Rs.5714.29 for marginal farmers, Rs.3076.92 for small farmers, Rs.5714.29 for semi medium farmers and Rs. 6666.67 for medium farmers. On an average the additional investment capacity for land development was Rs.4000.

The results indicated that for 34.29 per cent of the households were dependent on loan from bank for land development and 5.71 per cent were dependent on their own funds. The results indicated that, cotton, groundnut, paddy, sorghum and redgram were sold to the extent of 100 per cent. The results indicated that 82.86 per cent of the households have sold their produce to local/village merchants and 2.86 per cent of the households sold their produce in regulated markets. The results indicated that 8.57 per cent of the households have used cart as a mode of transport and 77.14 per cent have used tractor. The results indicated that, 14.29 per cent of marginal and 7.69 per cent of small farmers faced soil and water erosion problems in the farm.

The results indicated that, 85.71 per cent of the households have shown interest in soil testing. The results indicated that, 88.57 percent used fire wood as a source of fuel, and 11.43 percent of the households used LPG. The results indicated that, piped supply was the major source for drinking water for 94.29 per cent and bore well was the drinking source for 5.71 per cent of the households. The results indicated that, electricity was the major source of light for 100 per cent of the population. The results indicated that, 51.43 per cent of the households possess sanitary toilet i.e. 100 per cent of landless, 42.86 per cent of marginal, 46.15 per cent of small, 42.86 per cent of semi medium and 33.33 per cent of medium famers had sanitary toilet facility.

The results indicated that, 5.71 per cent of the sampled households possessed APL card and 94.29 per cent of the sampled households possessed BPL card. The results indicated that, 80 per cent of the households participated in NREGA programme which included 60 per cent of the landless, 85.71 percent of the marginal, 76.92 per cent of the small, 85.71 per cent of the semi medium and 100 percent of the medium farmers. The results indicated that, cereals, pulses, oilseed, vegetables, milk, egg and meat were

adequate for 94.29 per cent, 82.86 per cent, 80 per cent, 88.57 per cent, 22.86 per cent, 91.43 per cent, 94.29 per cent and 85.71 per cent of the households respectively.

The results indicated that, cereals, vegetables, oilseed, vegetables, fruits, and meat were inadequate for 5.71 per cent, 17.14 per cent, 20 per cent, 11.43 per cent, 77.17 per cent and 11.43 per cent of the households and milk and egg were inadequate for 8.57 per cent of the households. The results indicated that, lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (85.71%), frequent incidence of pest and diseases (57.14%), inadequacy of irrigation water (42.86%), high cost of fertilizers and plant protection chemicals , high rate of interest on credit (74.29%), low price for the agricultural commodities (80 %), lack of marketing facilities in the area (74.29%), inadequate extension services (54.29%), lack of transport for safe transport of the agricultural produce to the market (80%) and less rainfall (2.86%).