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

GHANAPUR-2 (4D2D6B2c) MICROWATERSHED

Balichakra Hobli, Yadgir Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

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. The challenges 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 Ghanapur-2 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 plots 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: 02.03.2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Ghanapur-2 *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 the 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, behavior and use potentials of the soils in the microwatershed.*

The present study covers an area of 572 ha in Yadgir taluk & 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 534 ha (95%) in the microwatershed is covered by soils and 38 ha (22%) by others (habitation and water bodies). The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 5 soil series and 8 soil phases (management units) and 3 land management units.*
- *The length of crop growing period is about 120-150 days starting from 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 250 m grid interval.*
- *Land suitability for growing 26 major agricultural and horticultural crops was assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area in the microwatershed is suitable for agriculture.*
- *About 83 per cent area of the microwatershed has soils that are very deep (>150 cm) and 10 per cent soils are very shallow to moderately shallow (<25-75 cm).*
- *About 10 per cent area in the microwatershed has loamy soils and 84 per cent clayey soils.*
- *Entire area of the microwatershed has non gravelly (<15%) soils at the surface.*
- *About 2 per cent area of the microwatershed is very low (<50 mm/m) in available water capacity, 8 per cent medium (101-150 mm/m) and 83 per cent area is very high (>200 mm/m) in available water capacity.*
- *Entire area in the microwatershed has very gently sloping (1-3% slope) lands.*

- *An area of about 46 per cent each are slightly (e1) and moderately (e2) eroded and 2 per cent area is severely (e3) eroded.*
- *An area of about 4 per cent soils is slightly alkaline (pH 7.3-7.8), 69 per cent soils are moderately alkaline (pH 7.8 - 8.4) and 20 per cent soils are strongly alkaline (*pH 8.4-9.0*).*
- *The Electrical Conductivity (EC) of the soils in the entire area of the microwatershed is dominantly <2 dsm^{-1} indicating that the soils are non-saline.*
- *About 54 per cent of soils are low (<0.5%), 30 per cent of soils are medium (0.5-0.75%) and 9 per cent of soils are high (>0.75%) in organic carbon.*
- *About 36 per cent area is low (<23 kg/ha), 54 per cent area is medium (23-57 kg/ha) and 3 per cent area is high (>57 kg/ha) in available phosphorus.*
- *About 1 per cent is low (<145 kg/ha), 56 per cent is medium (145-337 kg/ha) and 37 per cent is high (>337 kg/ha) in available potassium.*
- *Available sulphur is low (<10 ppm) in an area of about 54 per cent, 30 per cent of the soils are medium (10 -20 ppm) and high (>20 ppm) in 9 per cent area of the microwatershed.*
- *Available boron is low (<0.5 ppm) in an area of about 23 per cent, medium (0.5-1.0 ppm) in an area of 70 per cent and high (>1.0 ppm) in <1 per cent area of the microwatershed.*
- *Available iron is deficient (<4.5 ppm) in an area of about 2 per cent and sufficient (>4.5 ppm) in 91 per cent area of the microwatershed.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in an area of about 88% and sufficient in 5 per cent area of the microwatershed.*
- *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 Microwatershed

Crop	Suitability Area in ha (%)			Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)			Highly suitable (S1)	Moderately suitable (S2)
Sorghum	-	*524(92)*		*Sapota*	-	-
Maize	-	-		*Pomegranate*	-	*476(83)*
Bajra	-	*524(92)*		*Musambi*	-	*476(83)*
Groundnut	-	-		*Lime*	-	*476(83)*
Sunflower	-	*476(84)*		*Amla*	-	*524(92)*
Redgram	-	*420(73)*		*Cashew*	-	-
Bengal gram	*56 (10)*	*468(82)*		*Jackfruit*	-	-
Cotton	*56 (10)*	*468(82)*		*Jamun*	-	*476(83)*
Chilli	-	*525(92)*		*Custard apple*	-	*524(92)*
Tomato	-	-		*Tamarind*	-	*476(83)*
Drumstick	-	*476(83)*		*Mulberry*	-	-
Mango	-	-		*Marigold*	-	*524(92)*
Guava	-	-		*Chrysanthemum*	-	*524(92)*

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the 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.*
- *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 not only supplementing the farm income but also provide fodder and fuel and generate lot of biomass which would help in maintaining an ecological balance and also contribute to mitigating the climate change.*

Chapter 1

INTRODUCTION

Land is a scarce resource and basic unit for any material production. It can support the needs of the growing population, provided they use the land in a rational and judicious manner. But what is happening in many areas of the state is a cause for concern to everyone involved in the management of land resources at the grassroots level. 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. The limited land area is under severe stress and strain due to increasing population pressure and competing demands of various land uses. Due to this, every year there is significant diversion of farm lands and water resources for non-agricultural purposes. Apart from this, due to lack of interest in farmers for farming, large tracts of cultivable lands are turning into fallows in many areas and this trend is continuing at an alarming rate.

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 situations 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. The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is an urgent need to generate a 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 not only the surface but also consider the other parameters which are critical for productivity *viz.*, soils, climate, water, minerals and rocks, 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 the 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 other states.

The land resource inventory aims to provide site-specific database for Ghanapur-2 microwatershed in Yadgir Taluk & 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 Ghanapur-2 microwatershed is located in the northern part of Karnataka in Yadgir Taluk & District, Karnataka State (Fig.2.1). It lies between 16° 42’ and 16° 44’ North latitudes and 77° 18’ and 77° 21’ East longitudes covering an area of about 572 ha. It is about 30 km south of Yadgir town and is surrounded by Gopalapura on the northern side, Yaleri on the eastern, western and southern side and Thotalura village on the southern side

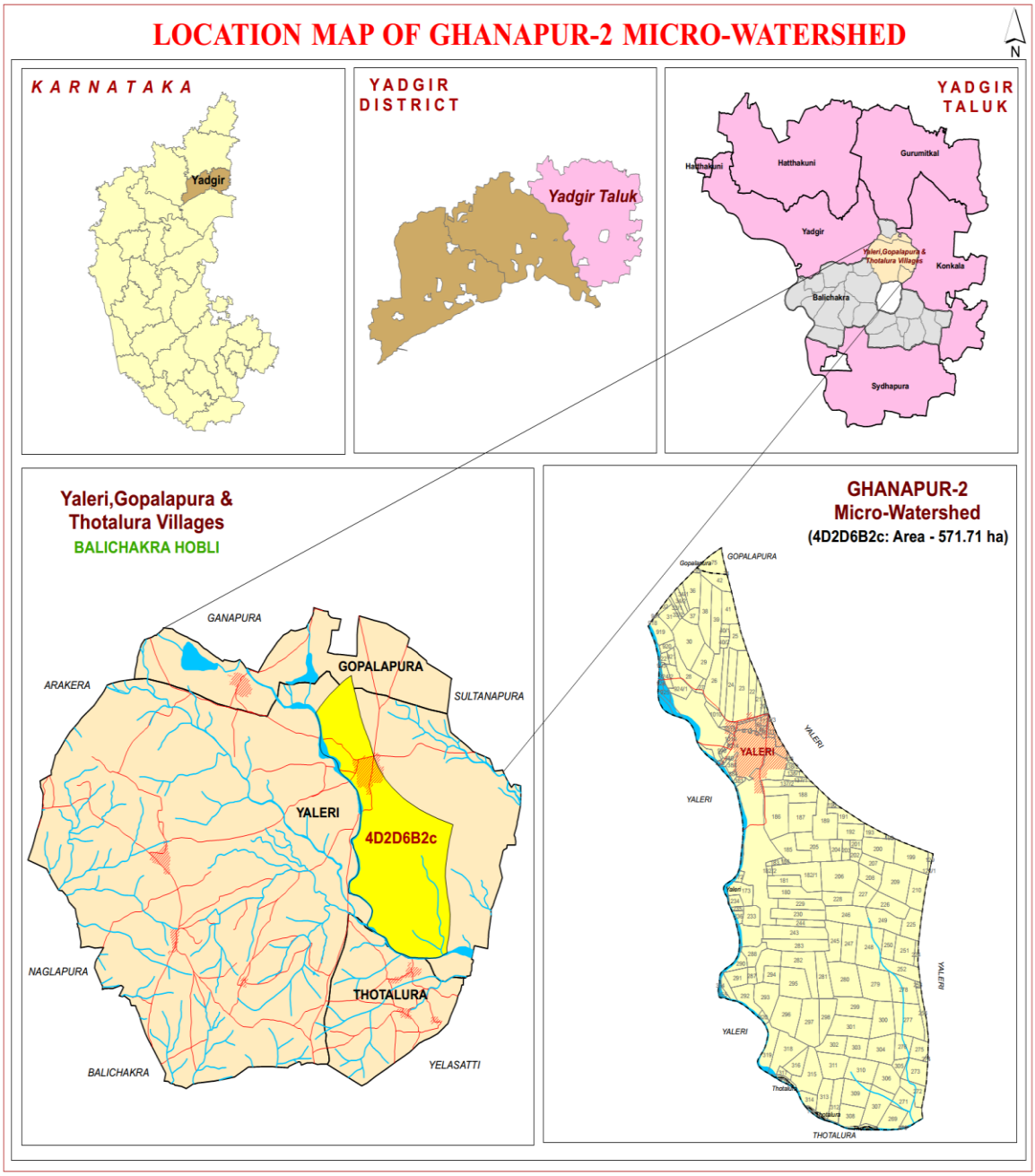


Fig.2.1 Location map of Ghanapur-2 Microwatershed

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 Ghanapur-2 microwatershed. The most widespread and characteristic development of alluvium in the watershed region lying between the rivers Krishna and Bhima is a wide belt, the underlying formation is gneiss and alluvial soils occur over gneiss, limestone and shale. 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 area has been further subdivided into five landforms, *viz;* mounds/ridges, summits, side slopes and very gently sloping uplands, plains and valleys based on slope and its relief features. The elevation ranges from 374-381 m above MSL. The mounds and ridges are mostly covered by rock outcrops.

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 coldest 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, August and 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, Yadgir District

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**		

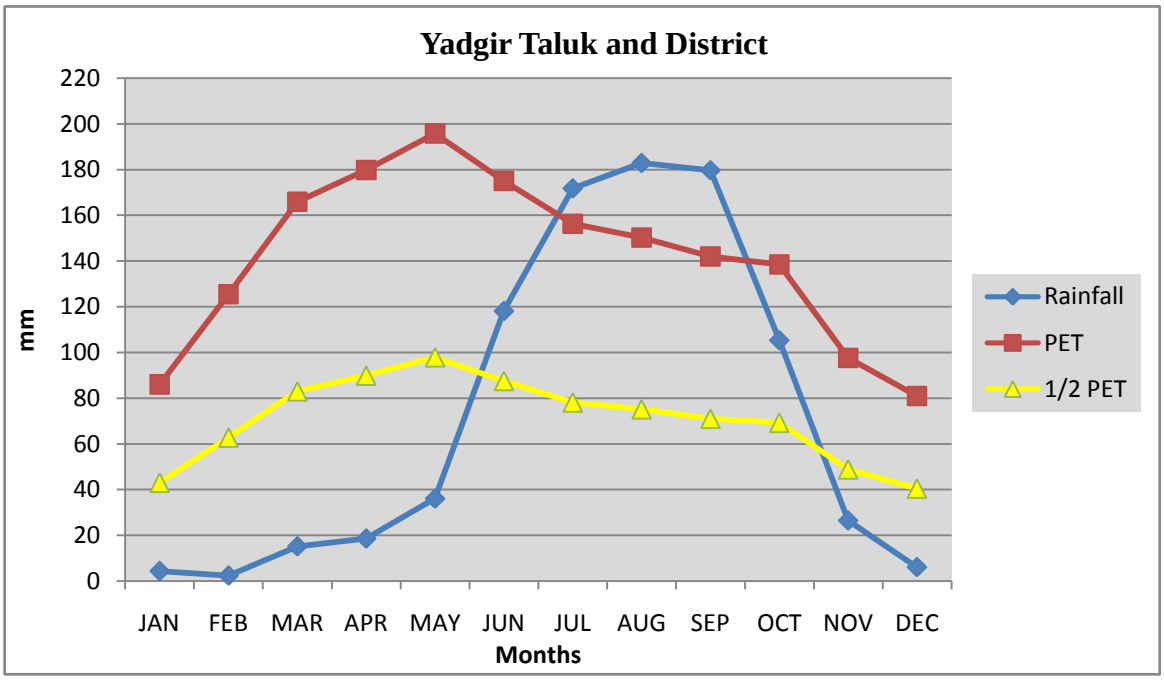


Fig 2.3 Rainfall distribution in Yadgir Taluk, Yadgir District

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 district 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, red gram, mango, pomegranate, marigold and sapota. The cropping intensity is 120 per cent in the taluk. 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 Ghanapur-2 microwatershed is presented in Fig.2.4. The different crops and cropping systems adopted in the microwatershed is presented in Figures 2.5 a & b.

Table 2.2 Land Utilization in Yadgir District

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.	Cropping intensity	-	119.8
5.	Trees and grooves	737	0.14
6.	Forest	33773	6.54
7.	Cultivable wasteland	2385	0.46
8.	Permanent Pasture land	11755	2.28
9.	Barren land	27954	5.41
10.	Non- Agriculture land	29623	5.73
11.	Current Fallows	105212	20.4

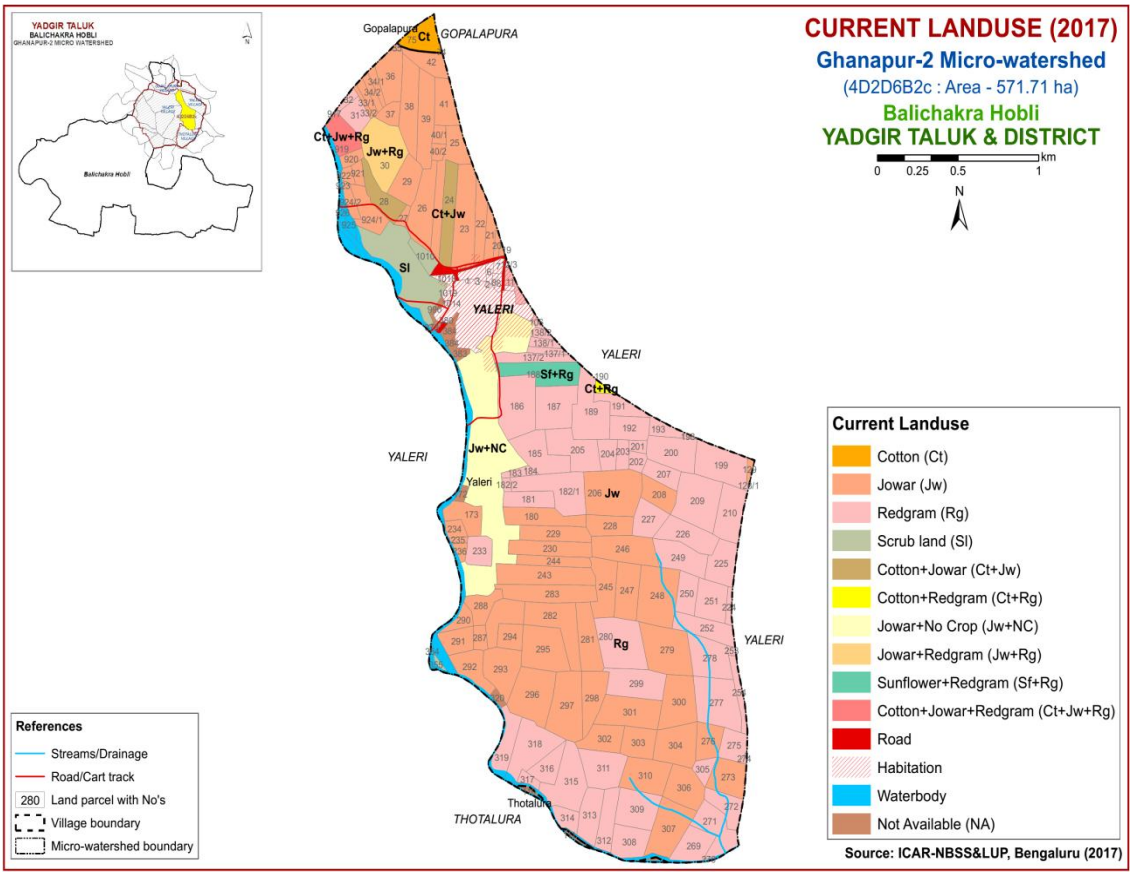


Fig.2.4 Current Land Use map of Ghanapur-2 Microwatershed

Fig 2.5 a. Different Crops and Cropping Systems in Ghanapur-2 Microwatershed

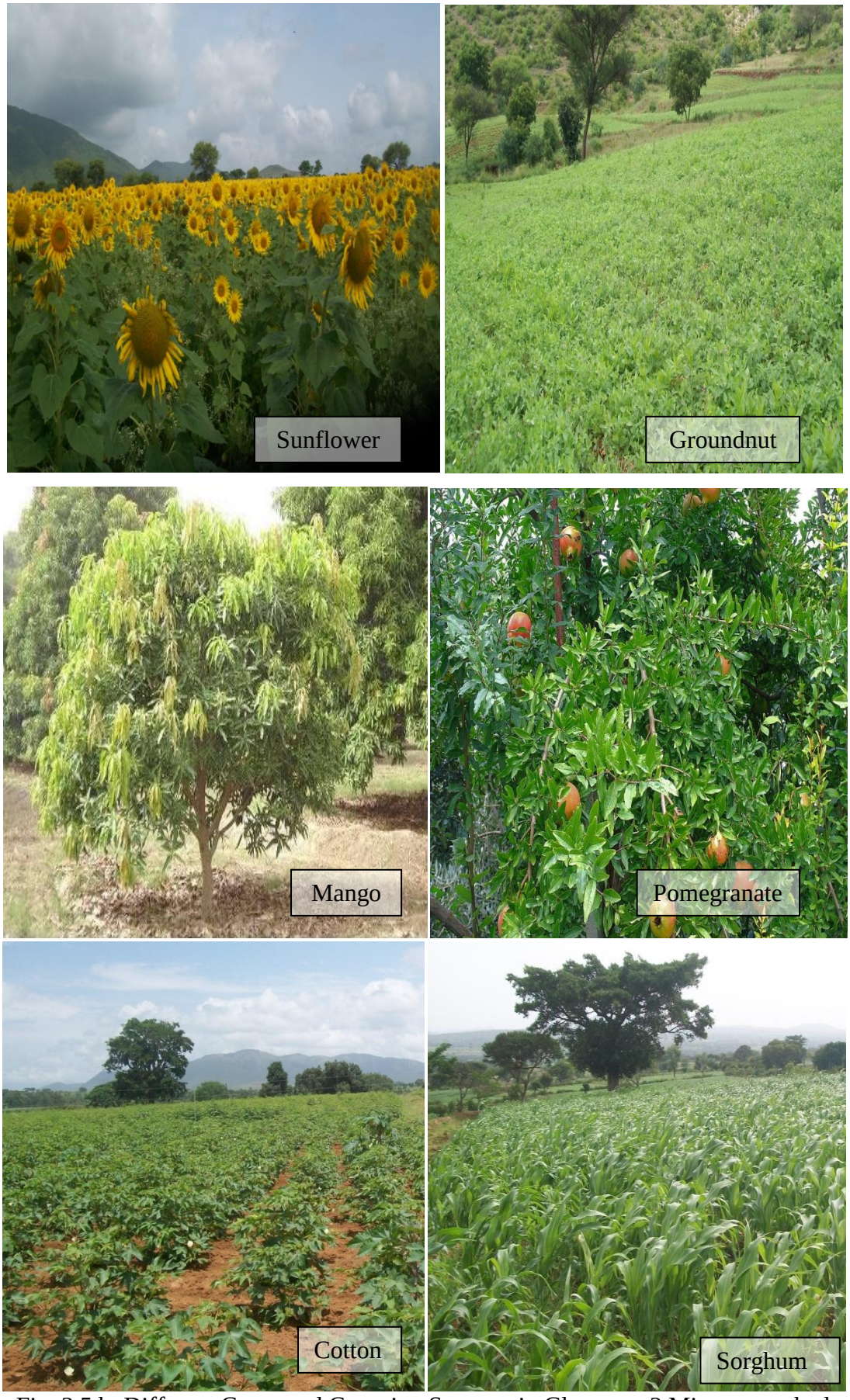


Fig. 2.5 b. Different Crops and Cropping Systems in Ghanapur-2 Microwatershed

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 Ghanapur-2 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 an area of 572 ha. 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 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 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 also 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. They were divided into five landforms, *viz;* ridges and mounds, gently 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 –

DSe 12 –

DSe 2 – Very genetly sloping

DSe 21 – Very gently sloping, dark gray tone

DSe 22 – Very gently sloping, medium gray tone

DSe 23 – Very gently sloping, yellowish grey tone

DSe 24 – Very gently sloping, whitish grey tone

DSe 25 – Very gently sloping, whitish/ eroded/ calcareous tone

DSe 26- Very gently sloping, medium pink

DSe 3 – Valley/ Lowland

DSe 31 – Whitish gray/Calcareous

DSe 32 – Gray with pink patches

DSe 33 – Medium gray tone

DSe 34 – Lightish gray tone

DSe 35 – Dark gray tone

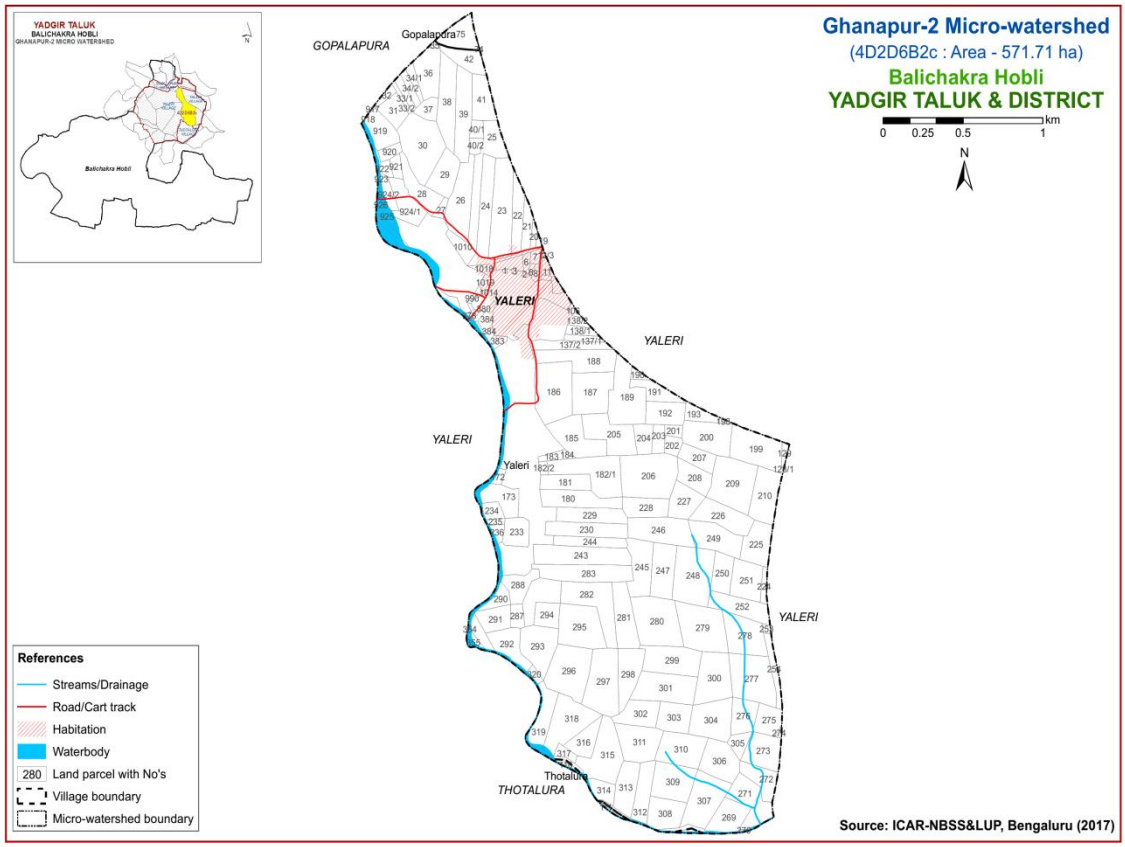


Fig 3.1 Scanned and Digitized Cadastral map of Ghanapur-2 Microwatershed

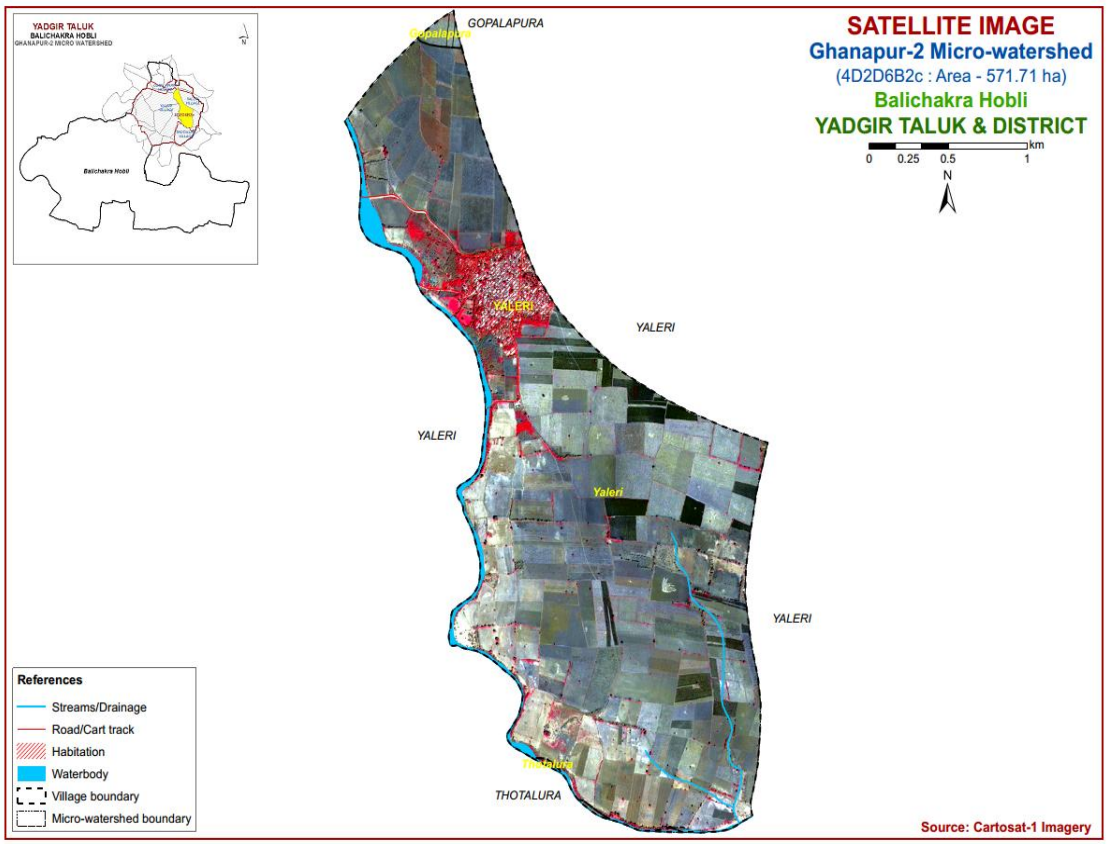


Fig.3.2 Satellite Image of Ghanapur-2 Microwatershed

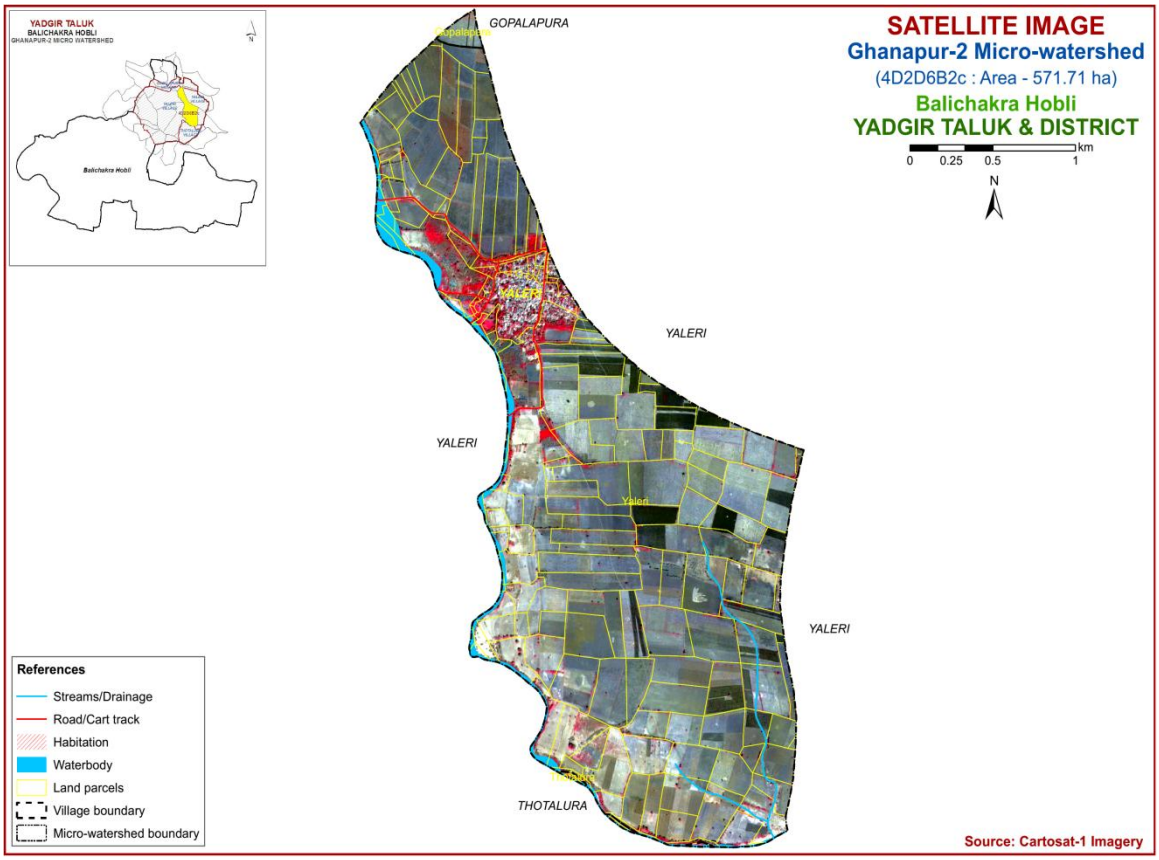


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Ghanapur-2 Microwatershed

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).

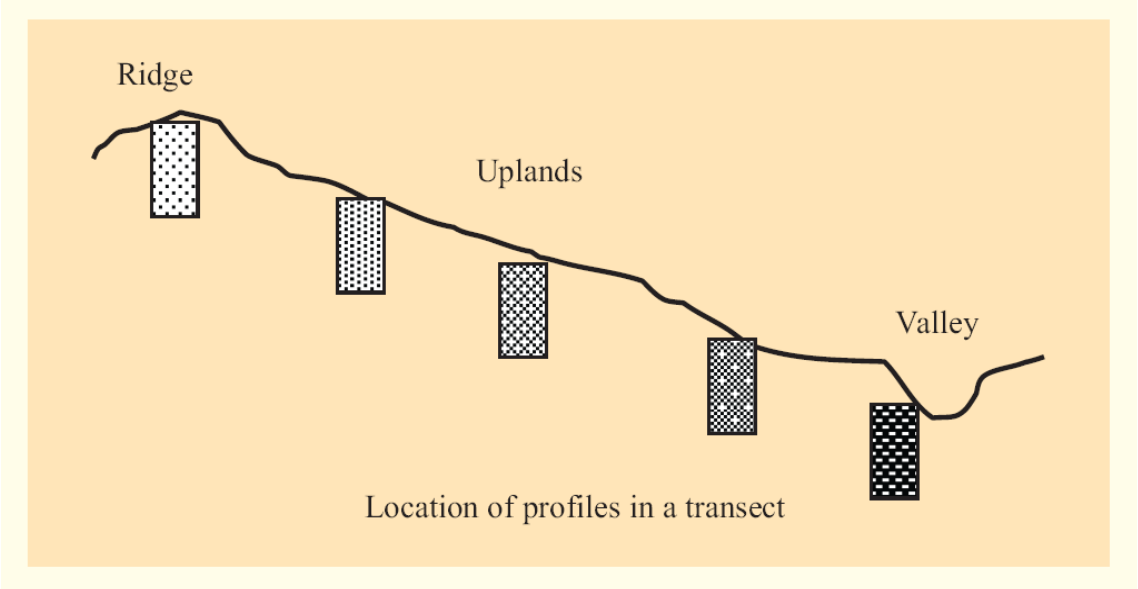


Fig: 3.4. Location of profiles in a transect

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, 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 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, calcareousness, 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 the soil series are given in Table 3.1. Based on the above characteristics, 5 soil series were identified in the Ghanapur-2 microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series

(Characteristics are of Series Control Section)

Sl. no.	Soil Series	Depth (cm)	Colour (moist)	Texture	Gravel (%)	Horizon sequence	Calcareousness
Soils of Granite Gneiss Landscape							
1	MDR (Madhwara)	>150	10YR 3/1,3/2,2/1,2/2	scl	-	Ap-Bw	e
2	BDP (Baddeppalli)	<25	7.5YR 3/2,3/4 5YR 3/4	scl	-	Ap-Ac	es
3	SGR (Sangwar)	>150	10 YR 3/1,4/1	c	-	Ap-Bss	es
Soils of Alluvial Landscape							
4	BLD (Balched)	50-75	10YR 3/2,2/1	cl	-	Ap-Bw	e
5	HGN (Hegganakera)	>150	10 YR 4/2,4/1,3/1,4/1	c	-	Ap-BA-Bss	e

3.4 Soil Mapping

The area under each soil series was further separated into 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 map (Fig.3.5) in the form of symbols. During the survey many 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 map unit boundaries on the soil map. The soil map shows the geographic distribution of 8 soil mapping units representing 5 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 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 soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units (LMU's)

The 8 soil phases identified and mapped in the microwatershed were grouped into 3 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 Ghanapur-2 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 Units are expected to behave similarly for a given level of management.

3.6 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 from farmer's fields (56 samples) for fertility status (major and micronutrients) at 250 m grid interval in the year 2017 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.

Soil No*	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
Soils of Granite Gneiss Landscape				
	MDR	Madhwara soils are very deep (>150 cm), moderately well drained, have very dark gray to very dark brown, slightly calcareous, sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation		**38 (6.73)**
61		MDRmB2	Clay surface, slope 1-3%, moderate erosion	20(3.5)
133		MDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	18(3.23)
	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		**9 (1.53)**
119		BDPiB3	Sandy clay surface, slope 1-3%, severe erosion	9(1.53)
	SGR	Sangwar soils are very deep (>150 cm), moderately well drained, have dark gray to very dark gray, calcareous, cracking clay black soils occurring on very gently sloping lowlands under cultivation		**56 (9.83)**
141		SGRcB2	Sandy loam surface, slope 1-3%, moderate erosion	54(9.49)
142		SGRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	2(0.34)
Soils of Alluvial landscape				
	BLD	Balched soils are moderately shallow (50-75 cm), moderately well drained, have very dark gray to very dark grayish brown, slightly calcareous, clay loam soils occurring on very gently sloping plains under cultivation		**48 (8.45)**
76		BLDmB2	Clay surface, slope 1-3%, moderate erosion	48(8.45)
	HGN	Hegganakera soils are very deep (>150 cm), moderately well drained, have dark gray to very dark grayish brown and brown, slightly calcareous, cracking clay black soils occurring on very gently sloping plains under cultivation		**382 (66.74)**
95		HGNmB2	Clay surface, slope 1-3%, moderate erosion	119(20.8)
138		HGNmB1	Clay surface, slope 1-3%, slight erosion	263(45.94)

Table 3.2 Soil map unit description of Ghanapur-2 Microwatershed

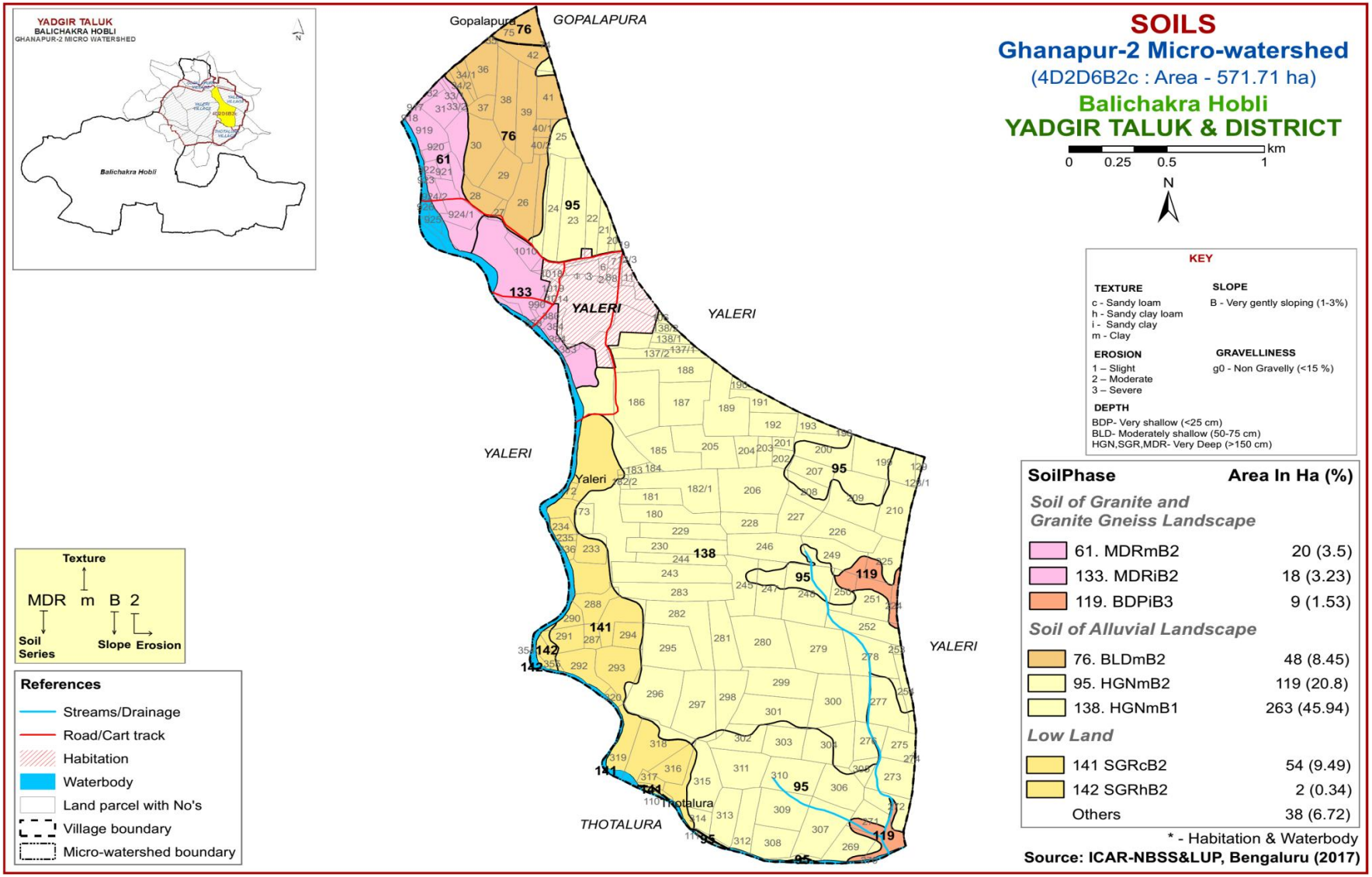


Fig 3.5 Soil Phase or Management Units - Ghanapur-2 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Ghanapur-2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 5 soil series are identified. 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 5 soil series identified followed by 8 soil phases (management units) mapped are furnished below. The physical and chemical characteristics of soil series identified in Ghanapur-2 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 characteristic 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, 3 soil series are identified and mapped. Of these, MDR series occupies an area of 38 ha (7%) followed by BDP 9 ha (2%). In low lands, SGR series occupies maximum area of 56 ha (10%). Brief description of each series identified and number of soil phases mapped is given below.

4.1.1 Madhwara (MDR) Series: Madhwara soils are very deep (>150 cm), well drained, have black to very dark brown and very dark gray to very dark grayish brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Madhwara series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 10 to 16 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 2 to 3. Texture varies from sandy clay and clay. The thickness of B horizon is >150 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy clay loam to sandy clay and is slightly calcareous. The available water capacity is very high (>200 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Madhwara (MDR) Series

4.1.2 Baddeppalli (BDP) Series: Baddeppalli soils are very shallow (<25cm), 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). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Baddeppalli (BDP) Series

4.1.3 Sangwar (SGR) Series: Sangwar soils are very deep (>150 cm), moderately well drained, have very dark gray to dark gray, calcareous cracking clay soils. They are developed from colluvio-alluvium of granite gneiss and occur on very gently to gently

sloping lowlands under cultivation. The Sangwar series has been classified as a member of the fine, smectitic, (calcareous) isohyperthermic family of Typic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 9 to 20 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 2 with sandy clay loam to sandy clay and clay texture. The thickness of B horizon ranges from 157 to 174 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. Its texture varies from sandy clay to clay and is calcareous. The available water capacity is very high (>200 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Sangwar (SGR) Series

4.2 Soils of Alluvial landscape

In this landscape, 2 soil series are identified and mapped. Of these, HGN series occupies maximum area of 382 ha (67%) and BLD 48 ha (8%). Brief description of each series identified and number of soil phases mapped is given below.

4.2.1 Balched (BLD) Series: Balched soils are moderately shallow (50-75 cm), moderately well drained, have black to very dark grayish brown, slightly calcareous clay loam soils. They are developed from alluvium and occur on very gently to gently sloping plains under cultivation. The Balched series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 50-75 cm. Thickness of A horizon ranges from 5 to 10 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 to 4 and chroma 1to 3. The texture varies from sandy clay to clay. The thickness of B horizon ranges from 41 to 69 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. The texture is clay loam and is slightly calcareous. The available water capacity is medium (101-150 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Balched (BLD) Series

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

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 7 to 9 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 3 with clay texture. The thickness of B horizon ranges from 152 to 175 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 3. Its texture is clay and is slightly calcareous. These are sodic with ESP ranging from 7 to 14 per cent. The available water capacity is very high (>200 mm/m). Two soil phases were identified and mapped.


Landscape and Soil Profile characteristics of Hegganakera (HGN) Series

Table: 4.1 Physical and Chemical characteristics of soil series identified in Ghanapur-2 microwatershed

Soil Series: Madhawara (MDR) **Pedon:** T_2 P_2

Location: $16^0$43'48.9"N $77^0$18'38.3"E, Yaleri village, Balichakra hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine-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
0-11	Ap	58.94	20.74	20.32	5.41	7.28	13.31	20.89	12.06	-	scl	16.47	8.85
11-30	Bw1	55.52	19.32	25.16	5.00	7.19	13.12	19.69	10.52	-	scl	18.25	10.18
30-53	Bw2	53.95	19.15	26.90	4.68	7.48	12.58	19.65	9.56	-	scl	26.99	14.02
53-117	Bw3	52.68	19.51	27.81	2.84	5.47	14.72	20.82	8.83	-	scl	37.86	17.40
117-160	Bw4	49.95	17.27	32.79	2.11	5.07	14.15	20.49	8.13	-	scl	44.15	20.38

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}							%	%
0-11	8.31	-	-	0.33	0.46	2.76	-	-	0.45	0.47	-	20.57	1.01	100	2.26
11-30	9.25	-	-	0.20	0.31	4.20	-	-	0.19	1.40	-	23.98	0.95	100	5.84
30-53	9.78	-	-	0.40	0.19	5.76	-	-	0.16	1.53	-	24.53	0.91	100	6.22
53-117	9.94	-	-	0.88	0.23	4.80	-	-	0.18	9.09	-	24.31	0.87	100	37.40
117-160	9.98	-	-	0.93	0.15	3.00	-	-	0.24	11.09	-	28.27	0.86	100	39.23

Contd...

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: Sangwar **(**SGR) **Pedon:** R-4

Location: $16^0$32'25.9"N $77^0$12'52.6"E, Bheemanahalli village, Sydhapura hobli, Yadgir taluka and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, (calcareous) isohyperthermic Sodic 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
0-8	Ap	37.30	18.18	44.52	4.91	6.76	12.10	4.80	8.72	-	c	32.36	23.18
8-30	BA	42.04	17.77	40.19	8.28	16.34	7.42	6.13	3.87	-	c	29.89	20.87
30-70	Bss1	33.77	18.63	47.60	5.45	11.66	6.21	6.75	3.70	-	c	37.04	26.13
70-100	Bss2	26.95	18.65	54.40	5.39	9.79	4.95	4.07	2.75	-	c	43.07	32.05
100-150	Bss3	14.35	17.32	68.33	2.69	4.15	2.35	2.69	2.47	-	c	55.74	38.19

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	8.30	-	-	6.49	1.48	6.69	-	-	1.32	10.09	-	34.77	0.78	100	29.02
8-30	9.09	-	-	2.54	0.64	6.76	-	-	0.75	10.00	-	33.76	0.84	100	29.62
30-70	9.23	-	-	2.6	0.28	6.63	-	-	0.42	11.55	-	38.98	0.82	100	29.64
70-100	9.39	-	-	3.01	0.36	6.89	-	-	0.73	27.73	-	42.46	0.78	100	65.33
100-150	9.28	-	-	4	0.24	7.15	-	-	0.80	27.78	-	47.67	0.70	100	58.27

Contd...

Soil Series: Balched (BLD) **Pedon:** R-40

Location: $16^0$44'19.4"N $77^0$19'40.9"E Yaleri village, Balichakra 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 coars (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	38.19	26.03	35.79	2.32	6.22	9.60	14.87	5.17	15	cl	22.13	11.07
7-28	Bw1	37.87	23.59	38.54	3.30	6.06	9.15	12.77	6.60	-	cl	23.75	14.43
28-54	Bw2	35.71	28.94	35.36	4.10	2.16	10.46	11.76	7.23	-	cl	25.47	16.56

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	8.19	-	-	0.22	0.54	2.32	27.16	6.43	0.38	0.31	34.28	38.20	1.07	90	0.80
7-28	8.56	-	-	0.14	0.42	3.18	29.26	6.83	0.14	0.51	36.75	39.91	1.04	92	1.27
28-54	8.70	-	-	0.16	0.38	3.92	29.79	7.14	0.08	0.91	37.92	42.91	1.21	88	2.13

Contd...

Soil Series: Hegganakera (HGN) **Pedon:** R-12

Location: $16^0$46'19.9"N $77^0$04'34.0"E, Thumakura village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, smectitic, 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
0-8	Ap	20.20	25.22	54.58	2.32	2.76	3.53	8.17	3.42	-	c	42.47	25.59
8-24	BA	21.18	21.70	57.12	2.07	3.28	4.69	7.31	3.82	-	c	41.88	24.67
24-50	Bss1	18.76	21.67	59.57	1.20	2.51	3.93	7.09	4.03	-	c	40.46	23.34
50-86	Bss2	16.74	22.24	61.02	0.88	1.53	4.27	6.02	4.05	-	c	42.18	24.76
86-146	Bss3	18.64	20.20	61.16	2.30	2.41	3.73	6.36	3.84	-	c	40.03	28.61
146-170	Bss4	16.08	19.33	64.59	0.88	2.75	3.41	5.95	3.08	-	c	40.28	29.90

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	8.77	-	-	1.33	1.16	8.19	-	-	1.10	5.21	-	36.23	0.66	100	14.38
8-24	8.93	-	-	1.11	0.64	5.46	-	-	0.87	4.23	-	35.50	0.62	100	11.93
24-50	8.85	-	-	0.984	0.32	3.38	-	-	0.71	3.78	-	36.69	0.62	100	10.30
50-86	8.54	-	-	0.562	0.24	3.38	-	-	0.58	3.07	-	39.16	0.64	100	7.84
86-146	8.45	-	-	0.526	0.24	3.38	-	-	0.62	2.82	-	38.52	0.63	100	7.31
146-170	8.64	-	-	0.517	0.20	4.29	-	-	0.60	2.99	-	36.87	0.57	100	8.12

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 interpretative and 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, gravelliness, 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 very 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 8 soil map units identified in the Ghanapur-2 microwatershed are grouped under 2 land capability classes and 4 land capability subclasses. Entire area in the microwatershed is suitable for agriculture and about 38 ha (7%) is covered by others (habitation and water bodies) (Fig. 5.1).

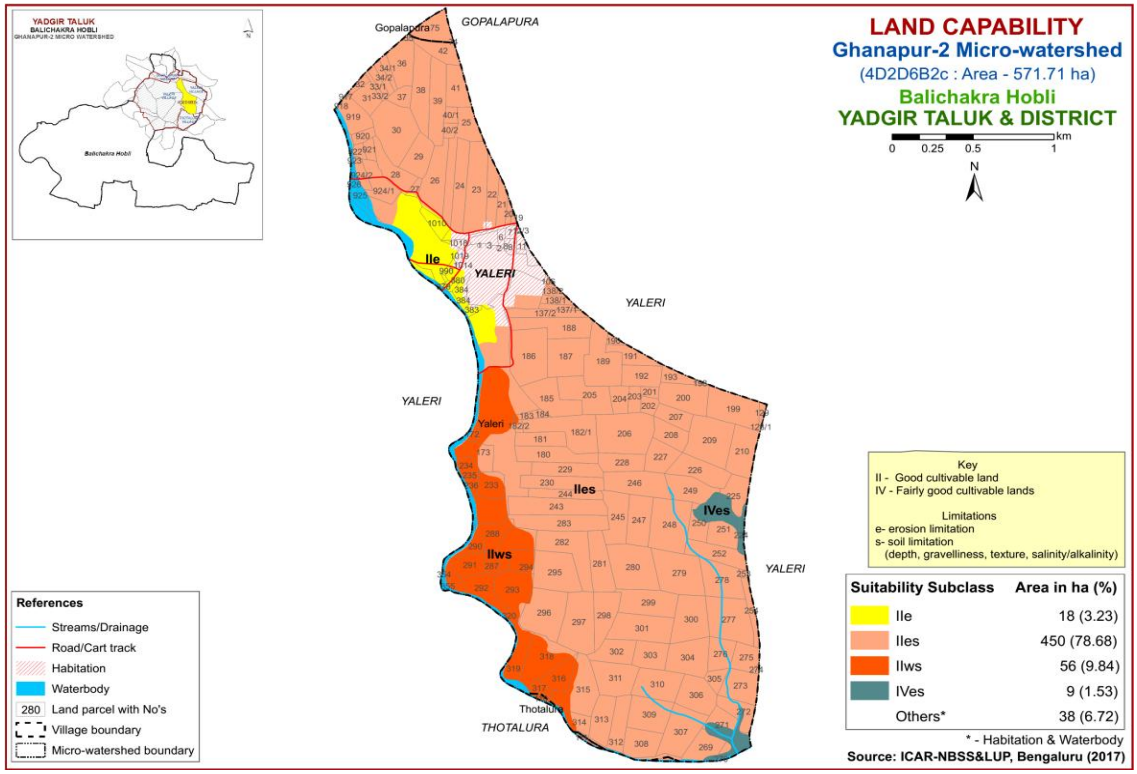


Fig. 5.1 Land Capability map of Ghanapur-2 Microwatershed

Good cultivable lands (Class II) cover a maximum area of about 92 per cent and are distributed in the major part of the microwatershed with minor problems of soil, erosion and drainage. Fairly good cultivable lands (Class IV) cover a very small area of about 2 per cent and are distributed in the eastern and southern part of the microwatershed with severe limitations of erosion and soil.

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 given in Fig. 5.2.

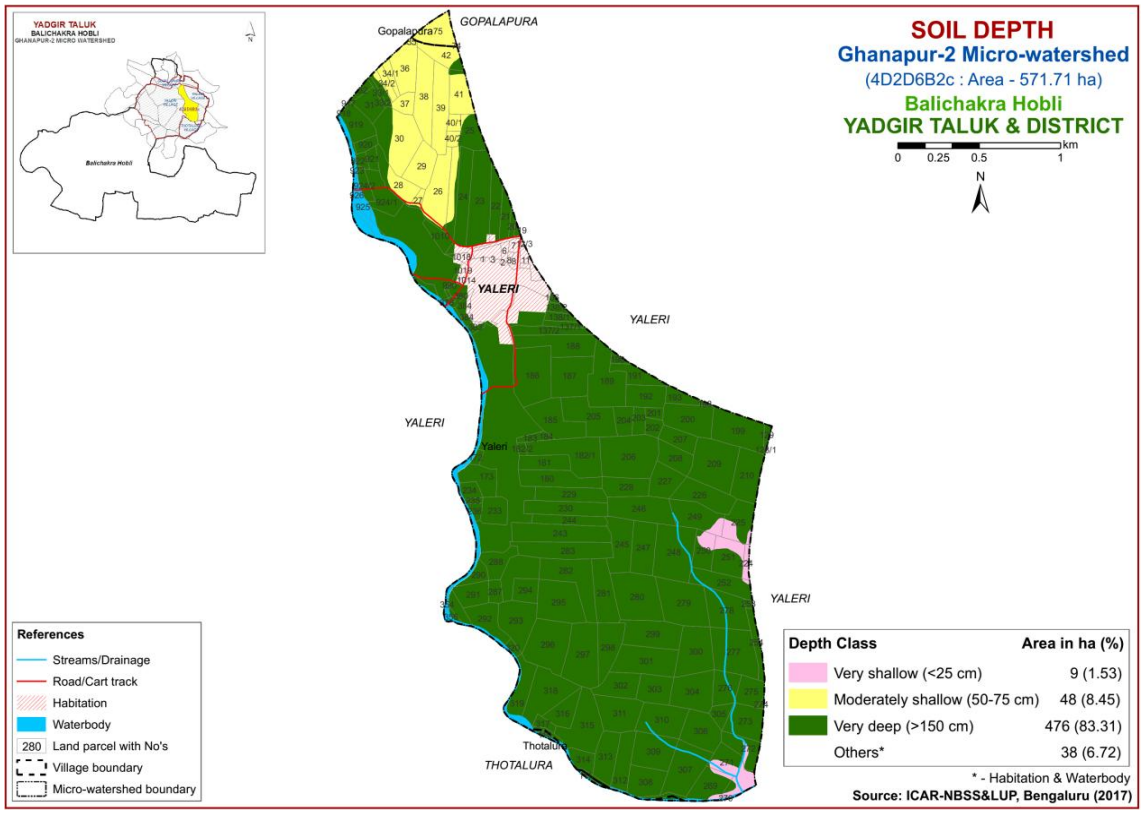


Fig. 5.2 Soil Depth map of Ghanapur-2 Microwatershed

Very shallow (<25 cm) soils occur in an area of about 9 ha (2%) and are distributed in the eastern and southern part of the microwatershed. Moderately shallow (50-75 cm) soils occupy an area of about 48 ha (8%) and are distributed in the northern

part of the microwatershed. Very deep (>150 cm) soils occur in a maximum area of 476 ha (83%) and are distributed in all parts of the microwatershed.

The most productive lands 476 ha (83%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are very deep (>150 cm depth) soils occurring in the microwatershed. Problem soils cover a small area of 9 ha (2%) that are very shallow (<25 cm depth) where occasionally some short duration crops may be grown. The probability of crop failure is very high.

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.

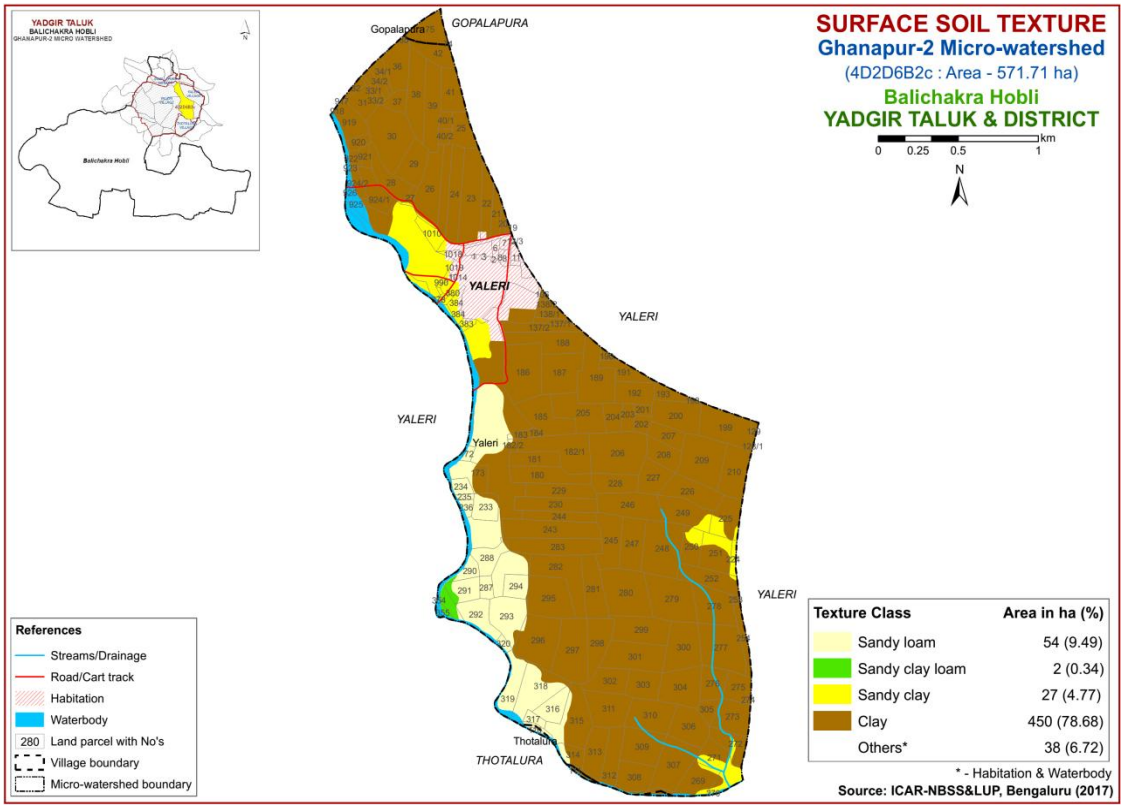


Fig. 5.3 Surface Soil Texture map of Ghanapur-2 Microwatershed

An area of about 56 ha (10%) has soils that are loamy at the surface and are distributed in the western and southern part of the microwatershed. Maximum area of

about 477 ha (84%) has soils that are clayey at the surface and are distributed in all parts of the microwatershed.

The most productive lands with respect to surface soil texture are clayey and loamy soils (94%) that have high potential for soil-water retention and availability, and nutrient retention and availability, but clayey soils have more problems of drainage, infiltration, workability and other physical problems.

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 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 geographic distribution in the microwatershed are shown in Figure 5.4.

Non gravelly (<15%) soils cover an entire area of the microwatershed. These are the most productive soils, where all climatically adapted short and long duration crops can be grown.

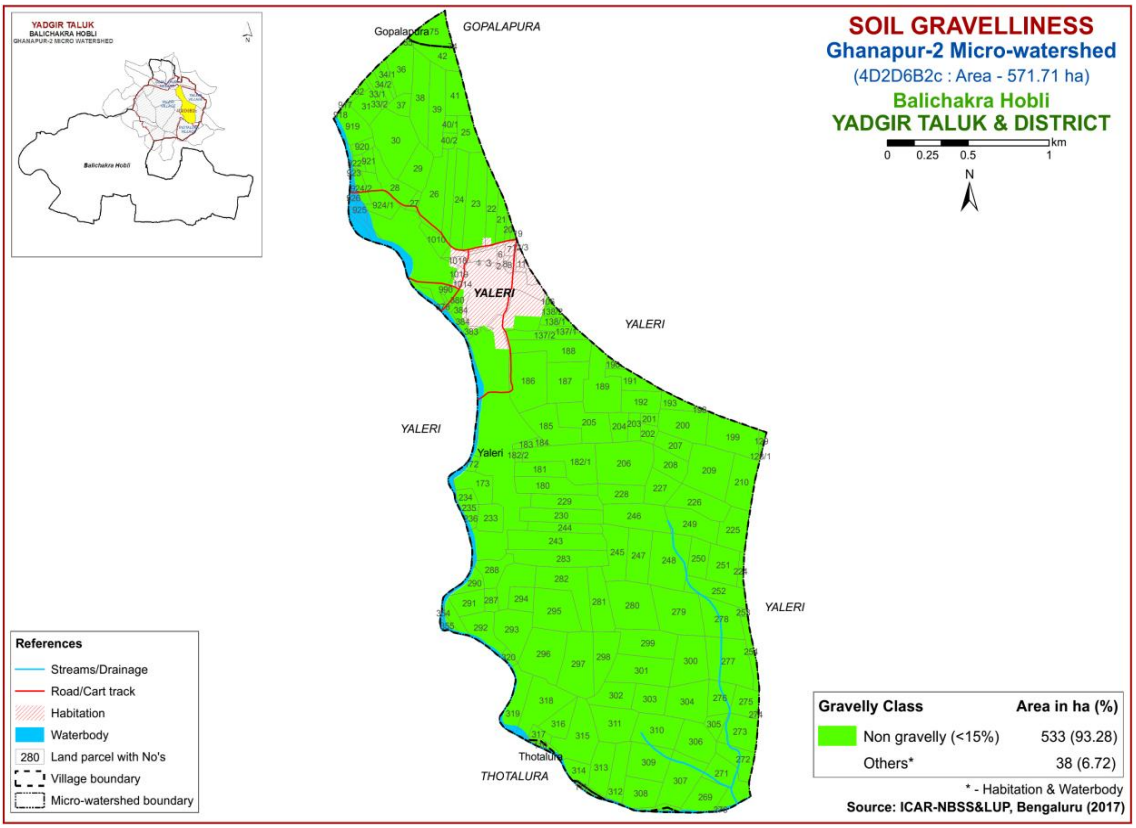


Fig. 5.4 Soil Gravelliness map of Ghanapur-2 Microwatershed

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 values, an AWC map was generated. The area extent and their geographic distribution of different AWC classes in the microwatershed is given in Figure 5.5.

An area of about 9 ha (2%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the eastern and southern part of the microwatershed. An area of about 48 ha (8%) are medium (101-150 mm/m) in available water capacity and are distributed in the northern part of the microwatershed. Maximum area of about 476 ha (83%) are very high (>200 mm/m) in available water capacity and are distributed in all parts of the microwatershed.

About 9 ha (2%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. The most productive soils cover about 476 ha (83%) where all climatically adapted long duration crops can be grown.

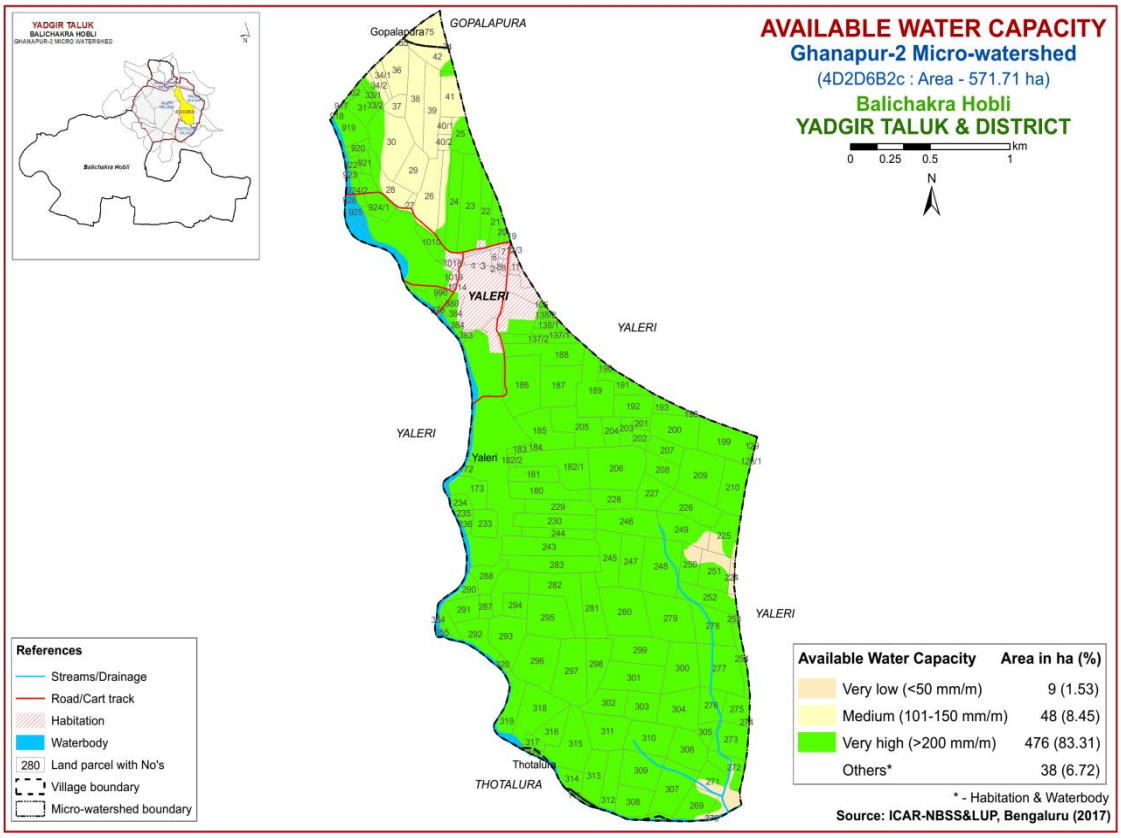


Fig. 5.5 Soil Available Water Capacity map of Ghanapur-2 Microwatershed

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 a single slope class and a slope map was generated showing the area extent and their geographic distribution in the microwatershed (Fig. 5.6).

Entire area of the microwatershed falls under very gently sloping (1-3% slope) lands and have high potential in respect of soil slopes. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

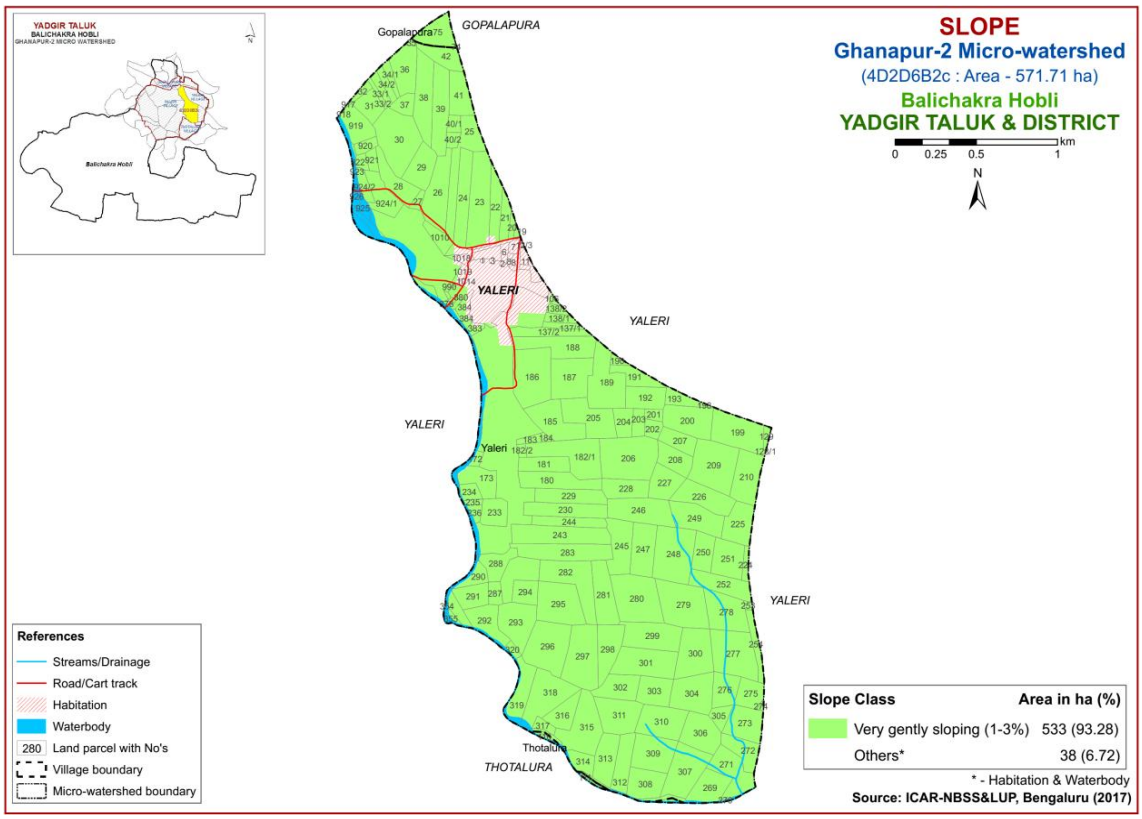


Fig. 5.6 Soil Slope map of Ghanapur-2 Microwatershed

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 generated. The area extent and their spatial distribution in the microwatershed is given in Figure 5.7.

Soils that are slightly eroded (e1) cover 263 ha (46%) and moderately eroded (e2) cover an area of 262 ha (46%) and are distributed in all parts of the microwatershed. Severely eroded (e3) soils cover an area of about 9 ha (2%) and are distributed in the southern and eastern part of the microwatershed.

An area of 271 ha (48%) in the microwatershed is problematic because of moderate and severe erosion. For these areas, taking up soil and water conservation and other land development measures are needed.

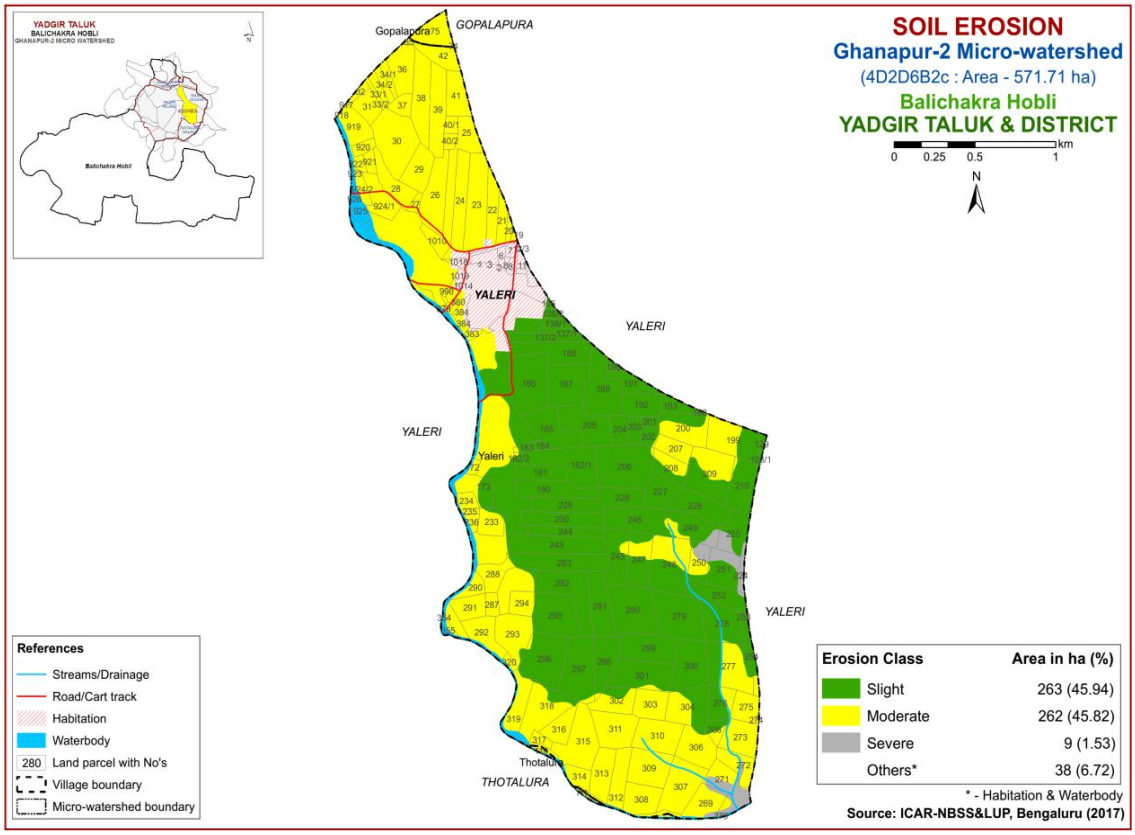


Fig. 5.7 Soil Erosion map of Ghanapur-2 Microwatershed

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 250 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, boron, 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 analysis of the Ghanapur-2 microwatershed for soil reaction (pH) showed that an area of about 25 ha (4%) is slightly alkaline (pH 7.3-7.8) and are distributed in the southern part of the microwatershed. Maximum area of about 392 ha (69%) is moderately alkaline (pH 7.8-8.4) and are distributed in all parts of the microwatershed. Strongly alkaline (pH 8.4-9.0) soils occupy an area of about 117 ha (20%) and are distributed in the western, central, southern and eastern part of the microwatershed (Fig. 6.1). Thus, all the soils in the microwatershed are alkaline in reaction.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is low (<0.5%) in a maximum area of about 309 ha (54%) and are distributed in all parts of the microwatershed. Medium (0.5-0.75%) in an area of about 173 ha (30%) and are distributed in the northern, central, eastern, western and southern part of the microwatershed. An area of about 52 ha (9%) are high (>0.75%) in organic carbon and are distributed in the northern, eastern and southern part of the microwatershed (Fig. 6.3).

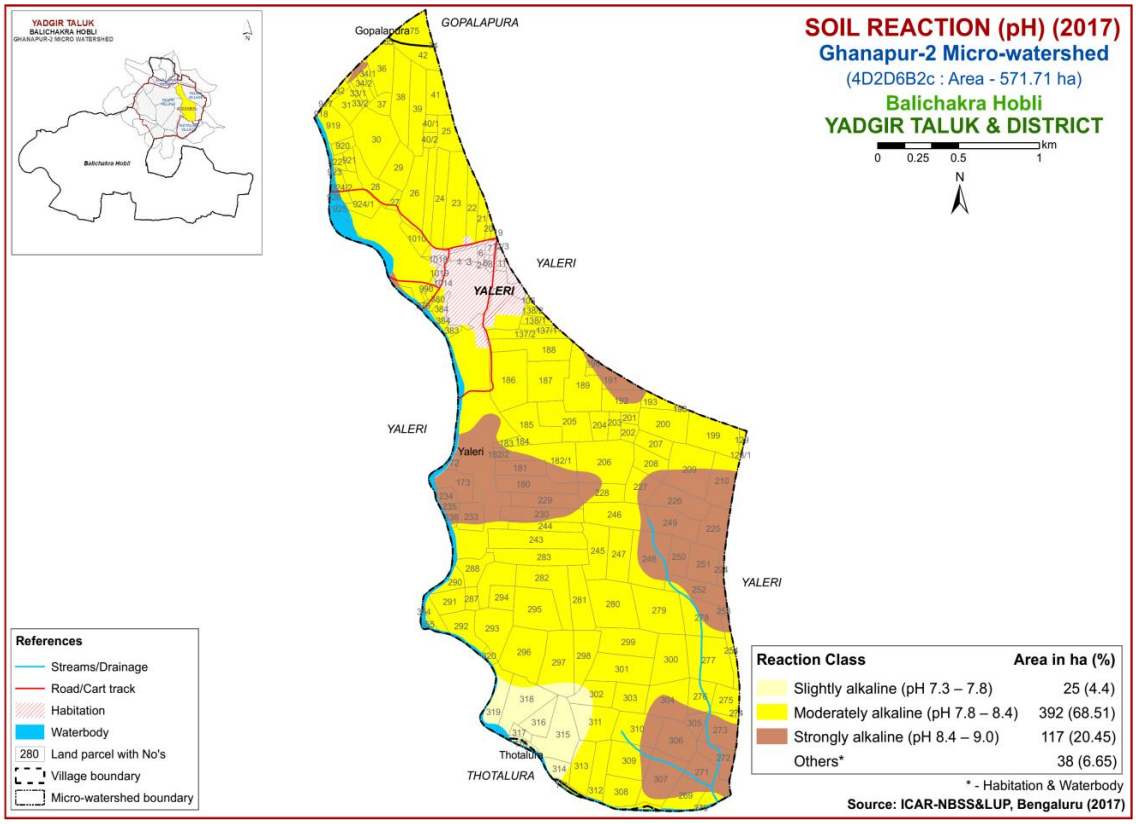


Fig.6.1 Soil Reaction (pH) map of Ghanapur-2 Microwatershed

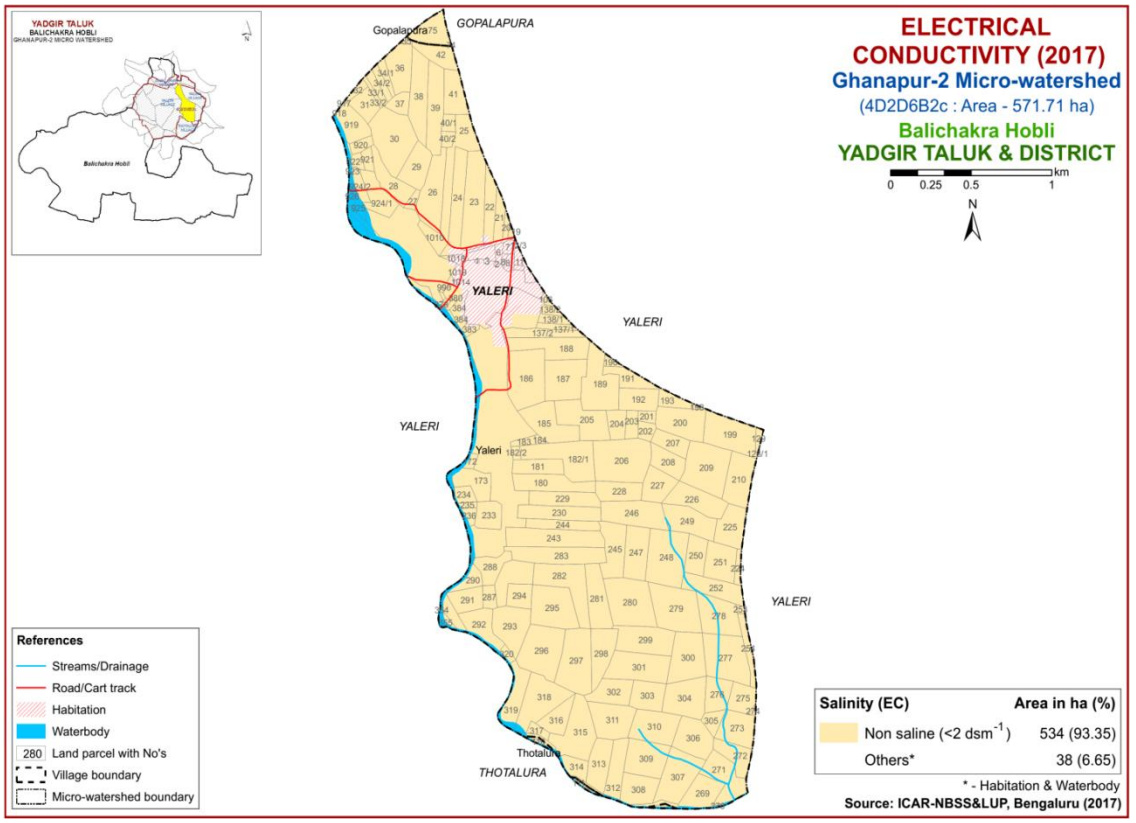


Fig.6.2 Electrical Conductivity (EC) map of Ghanapur-2 Microwatershed

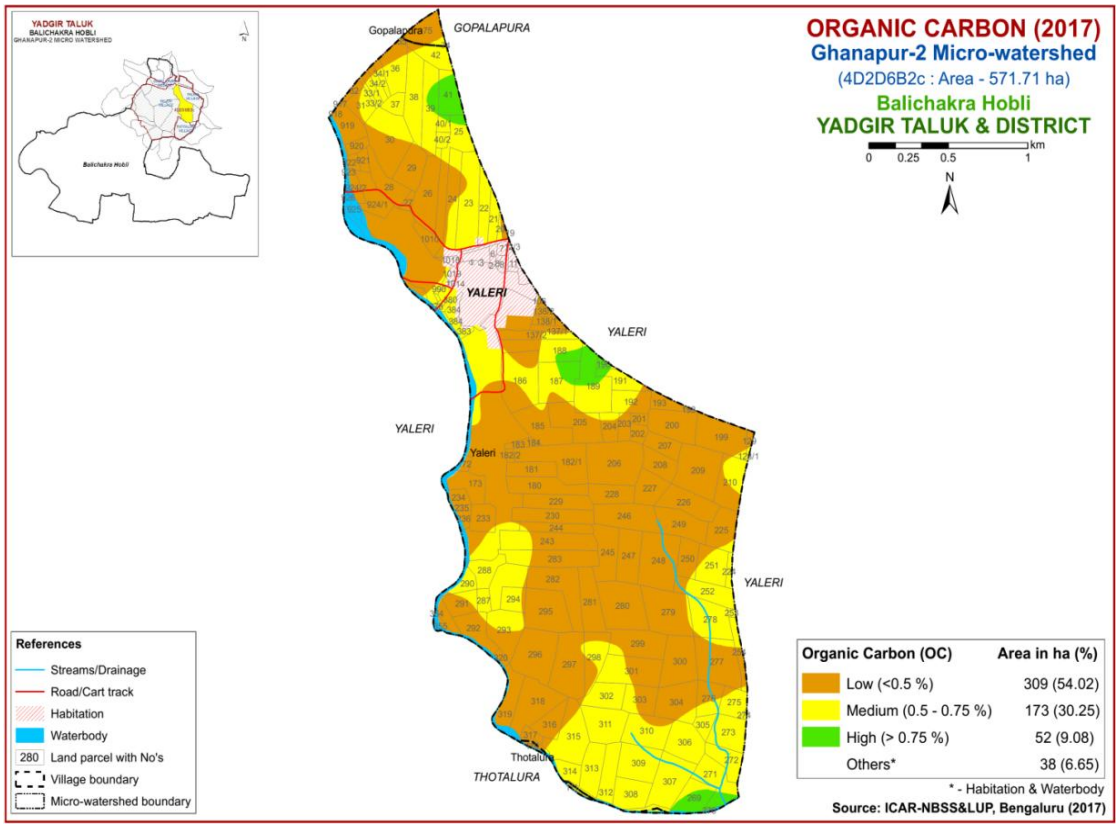


Fig.6.3 Soil Organic Carbon map of Ghanapur-2 Microwatershed

6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in an area of 208 ha (36%) and are distributed in the northern, central, eastern, western and souhern part of the microwatershed. Medium (23-57 kg/ha) in a maximum area of about 311 ha (54%) and are distributed in all parts of the microwatershed (Fig. 6.4). An area of about 15 ha (3%) is high (>57 kg/ha) in available phosphorous and are distributed in the northern part of the microwatershed.

6.5 Available Potassium

An area of about 5 ha (1%) is low (<145 kg/ha) in available potassium and are distributed in the eastern part of the microwatershed. Medium (145-337 kg/ha) in maximum area of about 318 ha (56%) and are distributed in all parts of the microwatershed (Fig. 6.5). High (>337 kg/ha) in an area of 211 ha (37%) and are distributed in the northern, central, western and southern part of the microwatershed.

6.6 Available Sulphur

Maximum area of about 309 ha (54%) is low (<10 ppm) in available sulphur content and are distributed in all parts of the microwatershed. Medium (10-20 ppm) in an area of about 173 ha (30%) and are distributed in the central and southern part of the microwatershed (Fig. 6.6). An area of about 52 ha (9%) is high (>20 ppm) in available sulphur content and are distributed in the southern part of the microwatershed.

6.7 Available Boron

An area of about 133 ha (23%) is low (<0.5 ppm) in available boron content and are distributed in the northern, central, eastern, western and southern part of the microwatershed. Medium (0.5-1.0 ppm) in a maximum area of 399 ha (70%) and are distributed in all part of the microwatershed. An area of about 2 ha (0.32%) is high (>1.0 ppm) in available boron and are distributed in the eastern part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Available iron content is deficient (<4.5 ppm) in an area of about 12 ha (2%) and are distributed in the northern and western part of the microwatershed. Sufficient (>4.5 ppm) in an area of 522 ha (9%) in 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).

6.10 Available Copper

Available copper content is sufficient (>0.2 ppm) in the entire microwatershed area (Fig. 6.10).

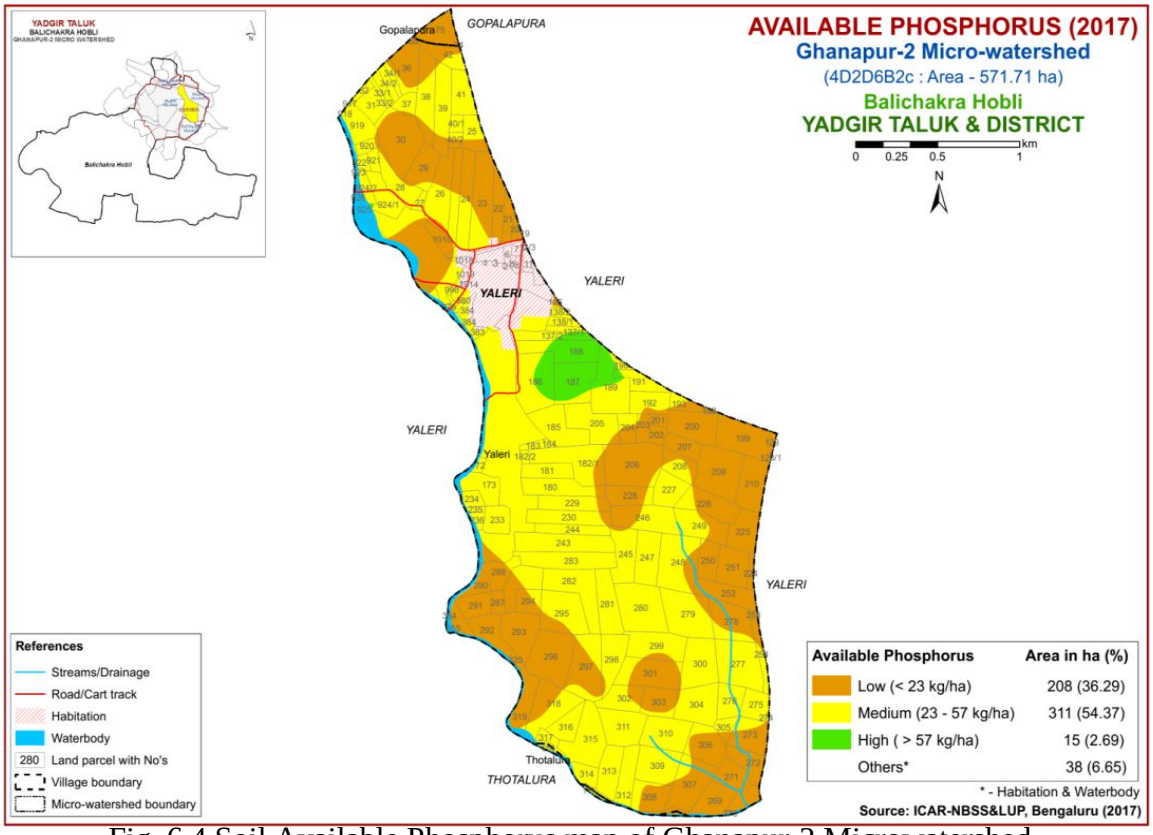


Fig. 6.4 Soil Available Phosphorus map of Ghanapur-2 Microwatershed

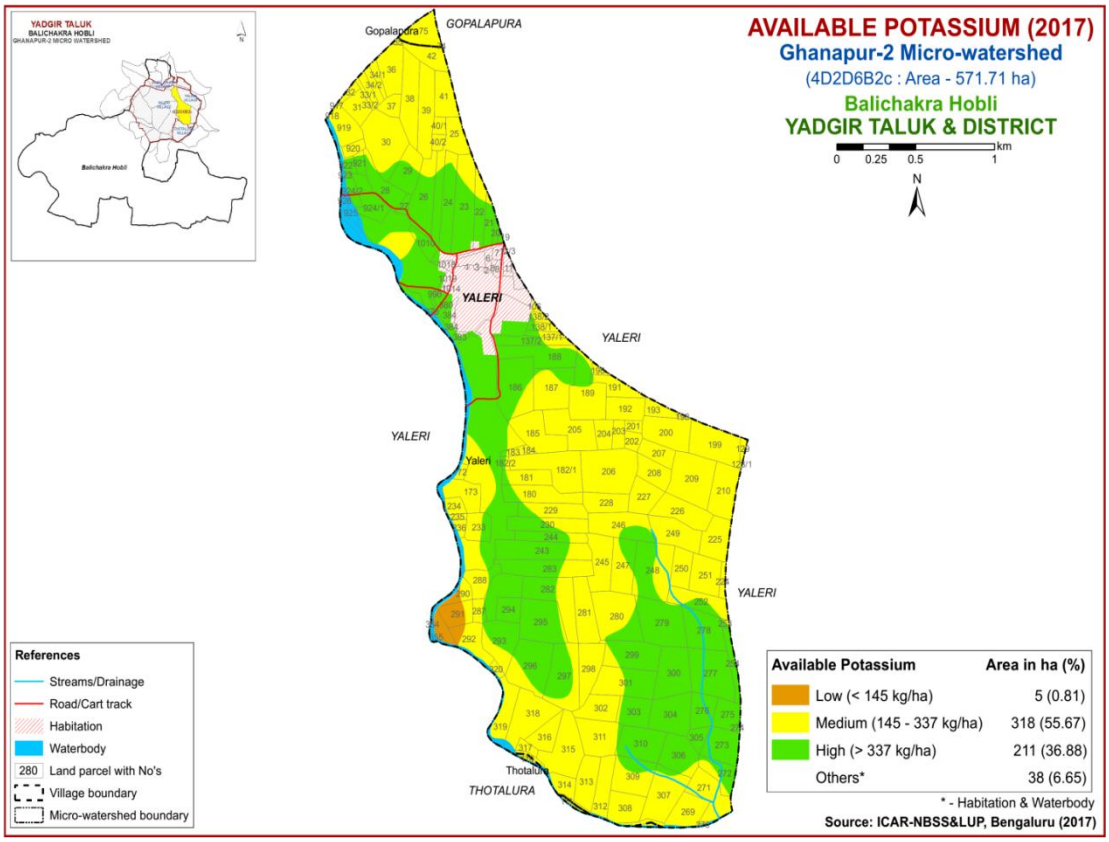


Fig.6.5 Soil Available Potassium map of Ghanapur-2 Microwatershed

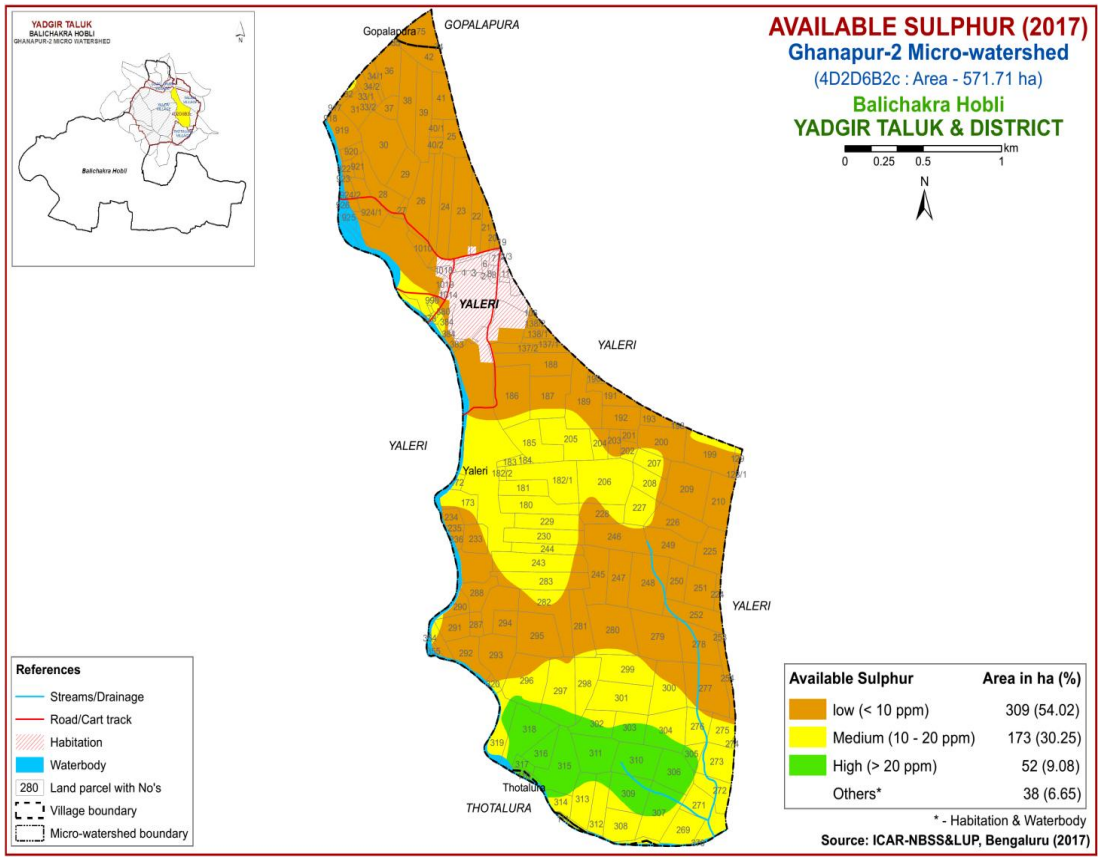


Fig.6.6 Soil Available Sulphur map of Ghanapur-2 Microwatershed

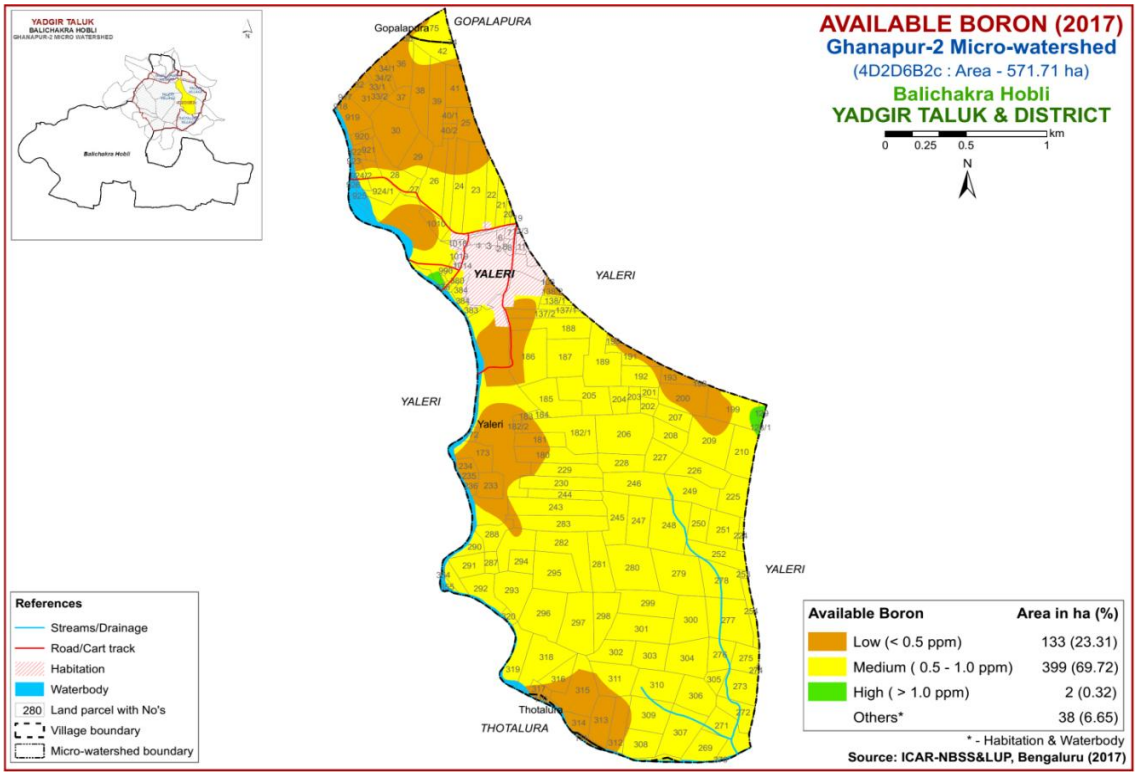


Fig.6.7 Soil Available Boron map of Ghanapur-2 Microwatershed

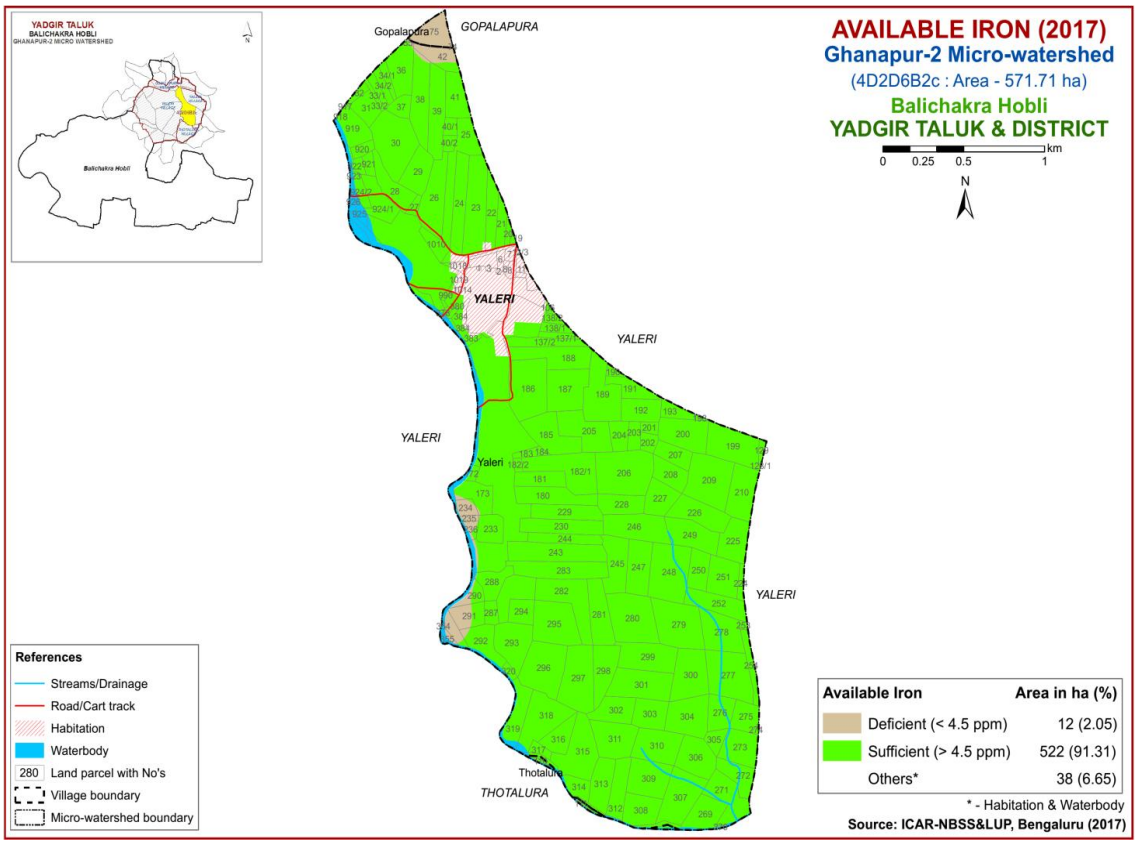


Fig.6.8 Soil Available Iron map of Ghanapur-2 Microwatershed

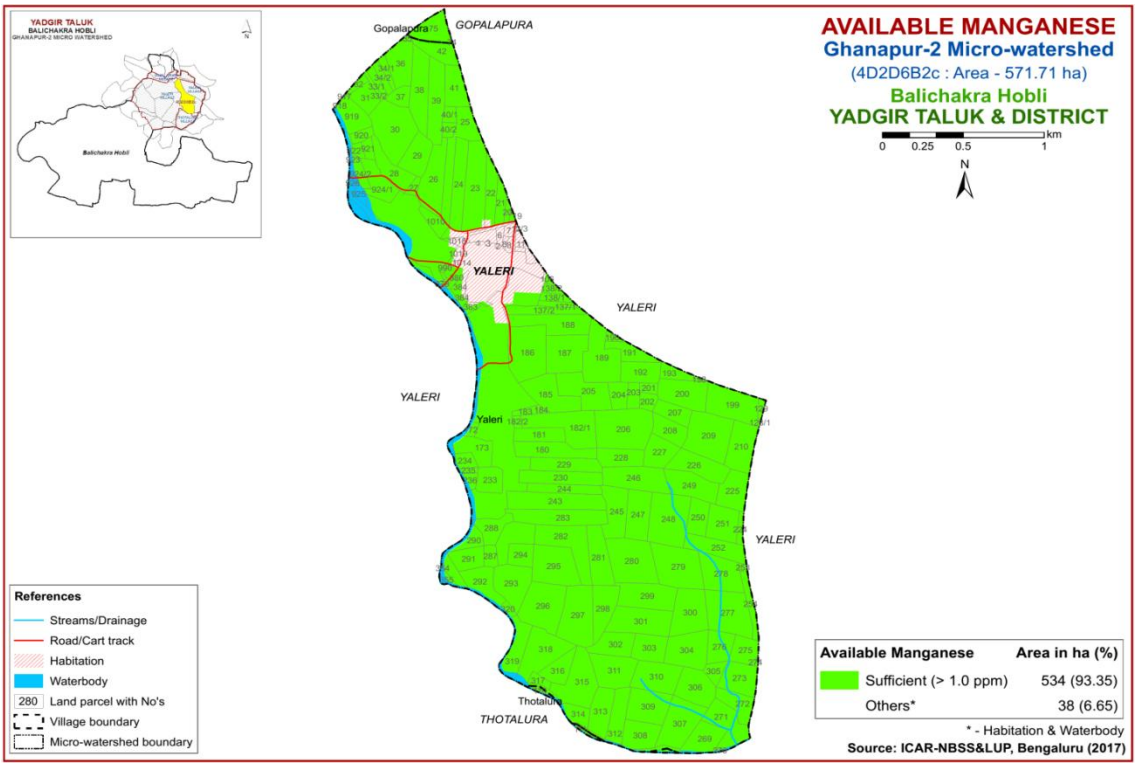


Fig.6.9 Soil Available Manganese map of Ghanapur-2 Microwatershed

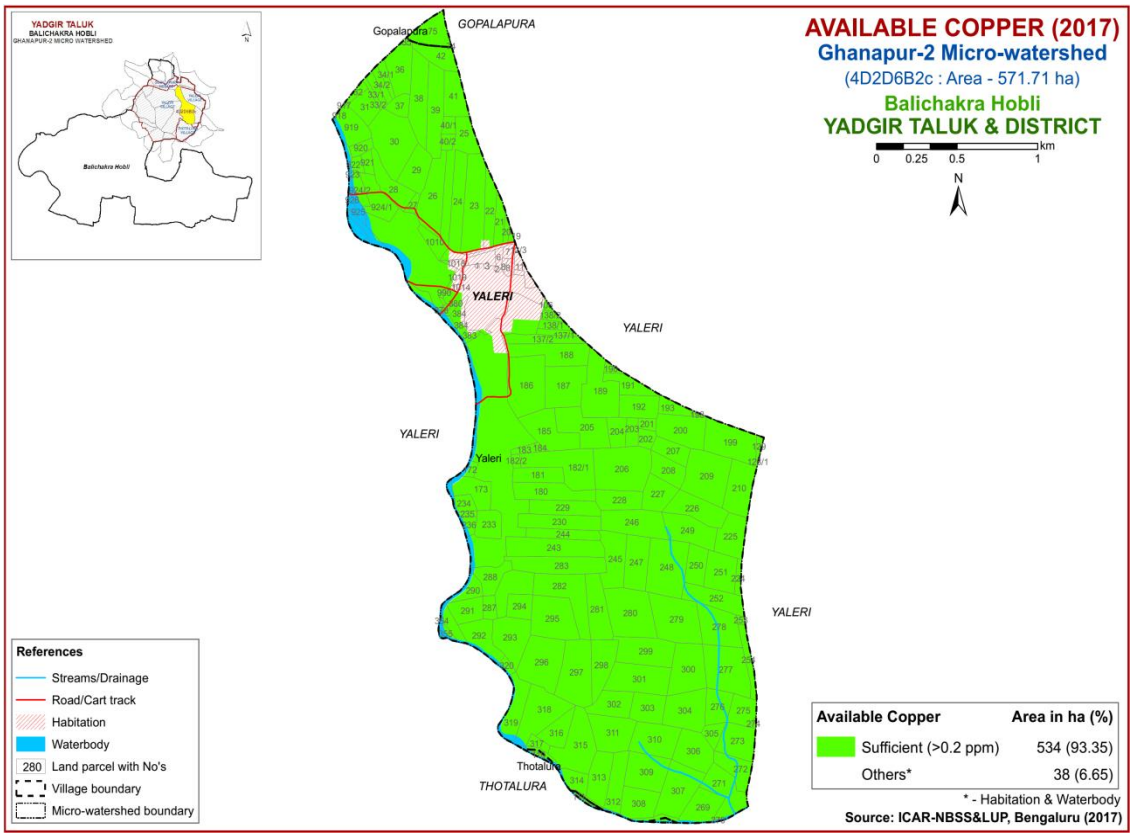


Fig.6.10 Soil Available Copper map of Ghanapur-2 Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in the entire microwatershed area of about 504 ha (88%) and are distributed in all parts of the microwatershed. Sufficient in an area of about 29 ha (5%) and are distributed in the southern part of the microwatershed (Fig 6.11).

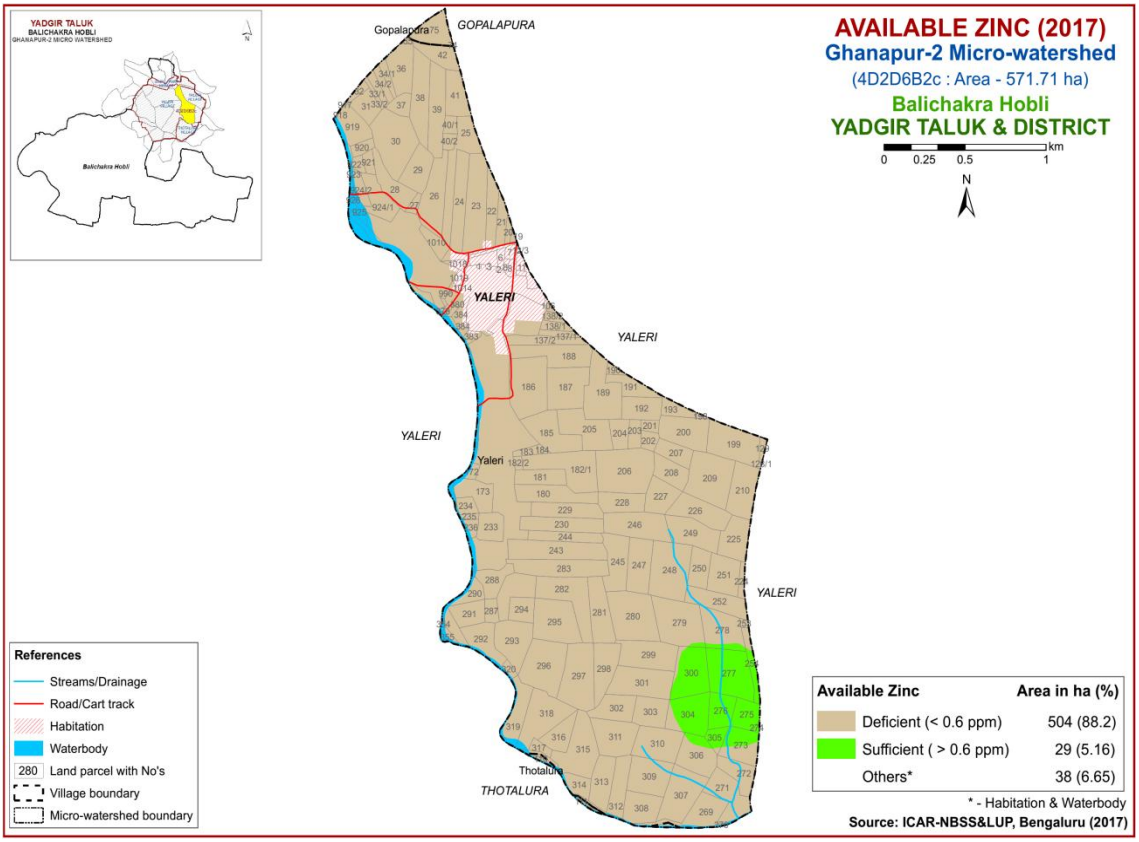


Fig.6.11 Soil Available Zinc map of Ghanapur-2 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Ghanapur-2 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, 'w' for drainage, 's' for sodicity and 'z' for calcareousness. These limitations are indicated as lower case letters to the Class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are 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 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 Karnataka in an area of 10.47 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and Tumakuru 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.

No highly suitable (Class S1) lands are available for growing Sorghum in the microwatershed. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing sorghum and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, drainage and rooting depth. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing sorghum and are distributed in

the eastern and southern part of the microwatershed with severe limitation of rooting depth.

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. Well 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

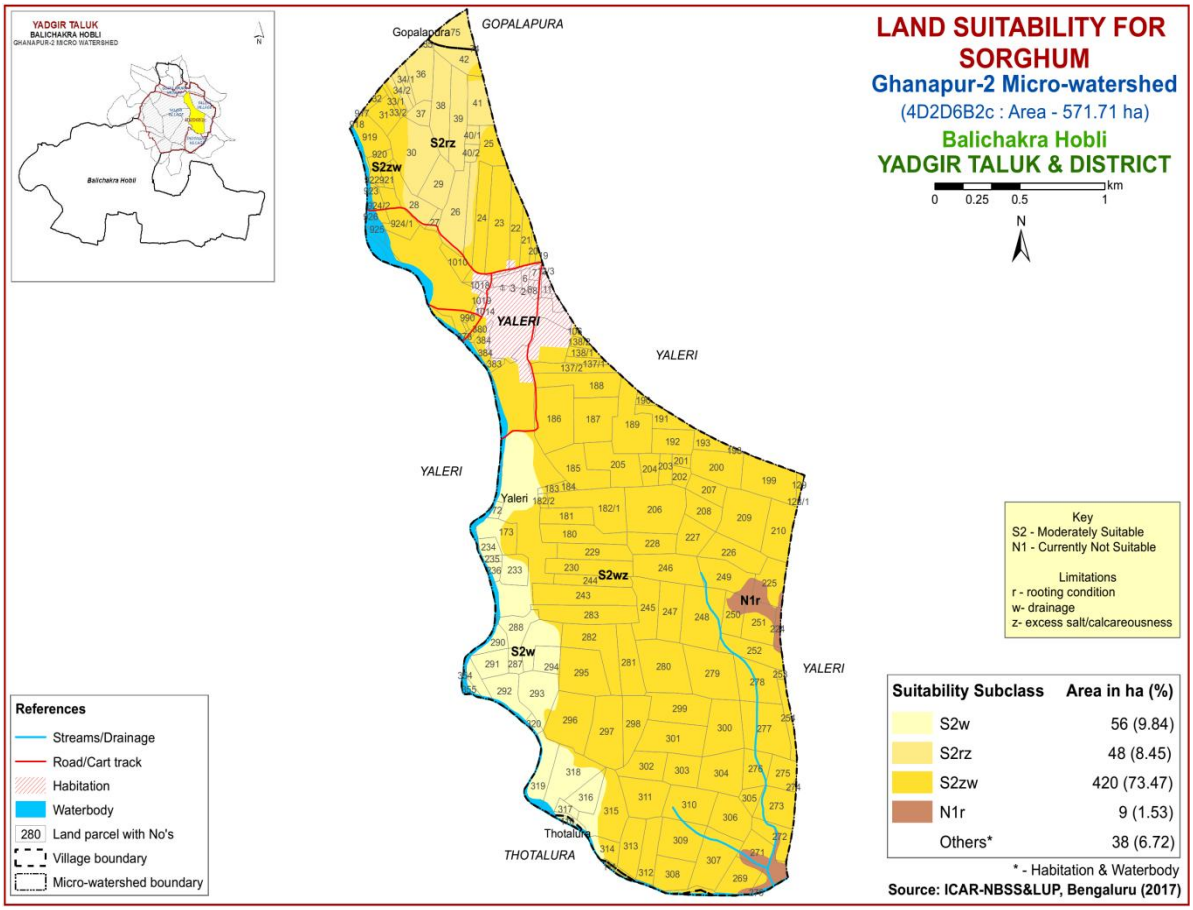


Fig. 7.1 Land Suitability map of Sorghum

Table 7.1 Soil-Site Characteristics of Ghanapur-2 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 (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Sur-face	Sub-surface	Surface (%)	Sub-surface (%)								
MDRmB2	866	150	WD	>150	c	scl	-	-	>200	1-3	moderate	8.31	0.33	2.26	20.57	100
MDRiB2	866	150	WD	>150	sc	scl	-	-	>200	1-3	moderate	8.31	0.33	2.26	20.57	100
BDPiB3	866	150	WD	<25	sc	scl	-	-	<50	1-3	severe	8.58	0.26	0.35	18.10	100
SGRcB2	866	150	MWD	>150	sl	c	-	-	>200	1-3	moderate	8.30	6.49	29.02	34.77	100
SGRhB2	866	150	MWD	>150	scl	c	-	-	>200	1-3	moderate	8.30	6.49	29.02	34.77	100
BLDmB2	866	150	MWD	50-75	c	cl	-	-	101-150	1-3	moderate	8.19	0.22	0.80	38.20	90
HGNiB3	866	150	MWD	>150	sc	c	-	-	>200	1-3	severe	8.77	1.33	14.38	36.23	100
HGNmB2	866	150	MWD	>150	c	c	-	-	>200	1-3	moderate	8.77	1.33	14.38	36.23	100

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

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 almost 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.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing maize in the microwatershed. Marginally suitable lands (Class S3) for growing maize occupy an maximum area of 524 ha (92%) and occur in all parts of the microwatershed. They have major limitations of texture, drainage and calcareousness. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing maize and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

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)	dS m^{-1}	<1.0	1.0-2.0	2.0-4.0	
Sodicity (ESP)	%	<10	10-15	>15	

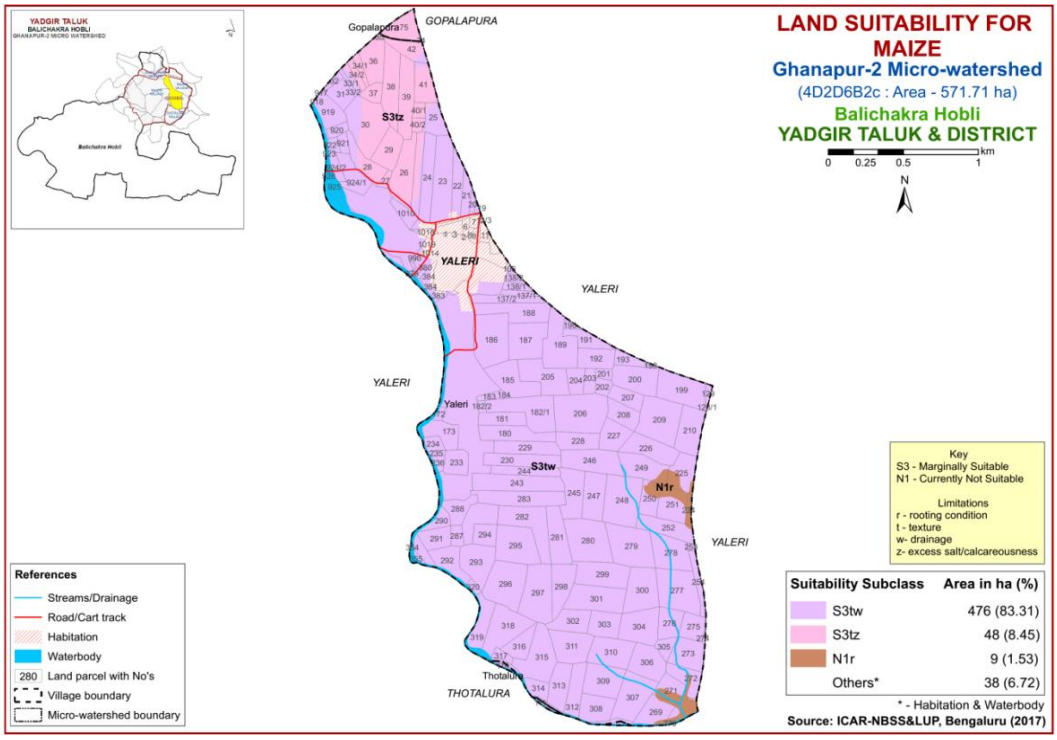


Fig. 7.2 Land Suitability map of Maize

7.3 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 7.4) 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 7.3.

Table 7.4 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. Well 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

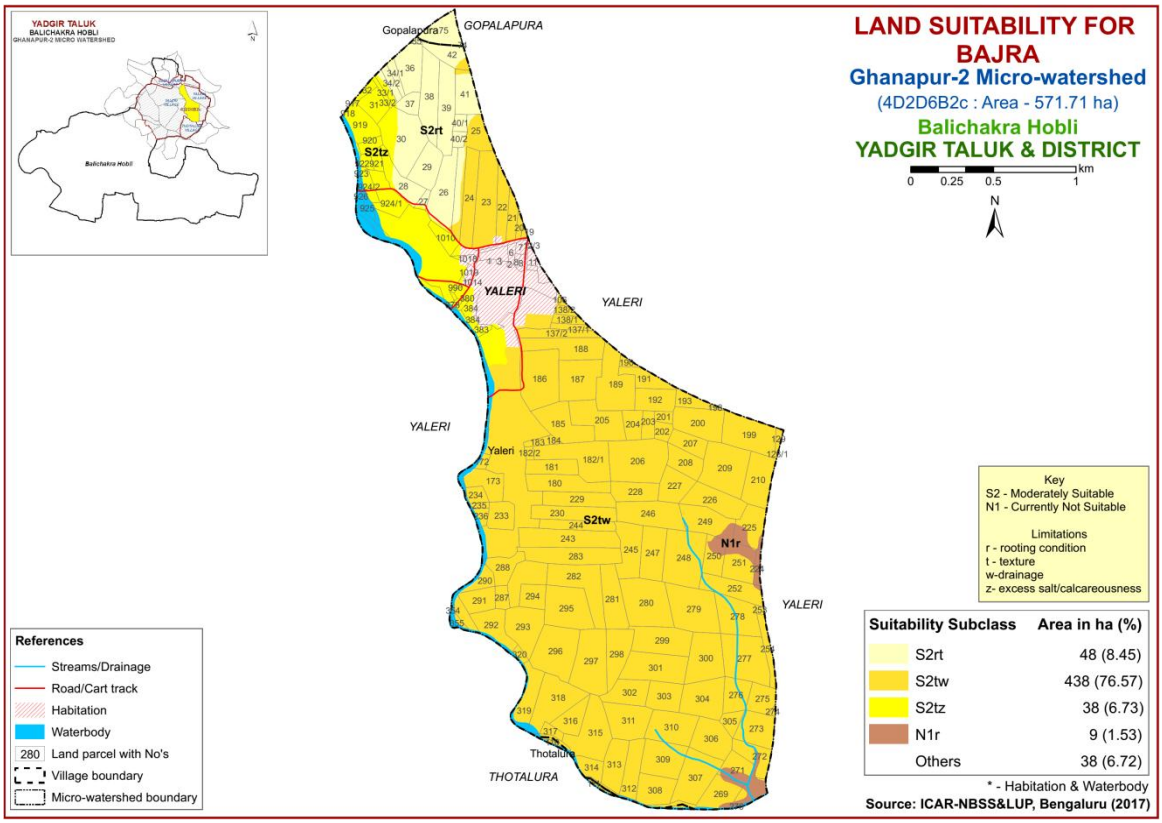


Fig. 7.3 Land Suitability map of Bajra

No highly suitable (Class S1) lands are available for growing Bajra in the microwatershed. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing bajra and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage, calcareousness and rooting depth. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing Bajra and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

Groundnut is one of the major oilseed crop grown in an area of 6.54 lakh ha in Karnataka in most of the districts either as rainfed or irrigated crop. The crop requirements for growing groundnut (Table 7.5) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing groundnut was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.4.

No highly suitable (Class S1) and moderately suitable (Class S2) lands for growing Groundnut. Maximum area of about 525 ha (92%) is marginally suitable (Class S3) for growing Groundnut and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing Groundnut and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

Table 7.5 Crop 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	
Surface soil texture	Class	l, cl,sil, sc, sicl	sc, sic, c,	s,ls,sl,c (>60%)	S,fragmental
Soil depth	Cm	>75	50-75	25-50	<25
Gravel content	% vol.	<35	35-50	>50	
$CaCO_3$ in root zone	%	high	Medium	low	
Salinity (EC)	dSm^{-1}	<2.0	2.0-4.0	4.0-8.0	
Sodicity (ESP)	%	<5	5-10	>10	

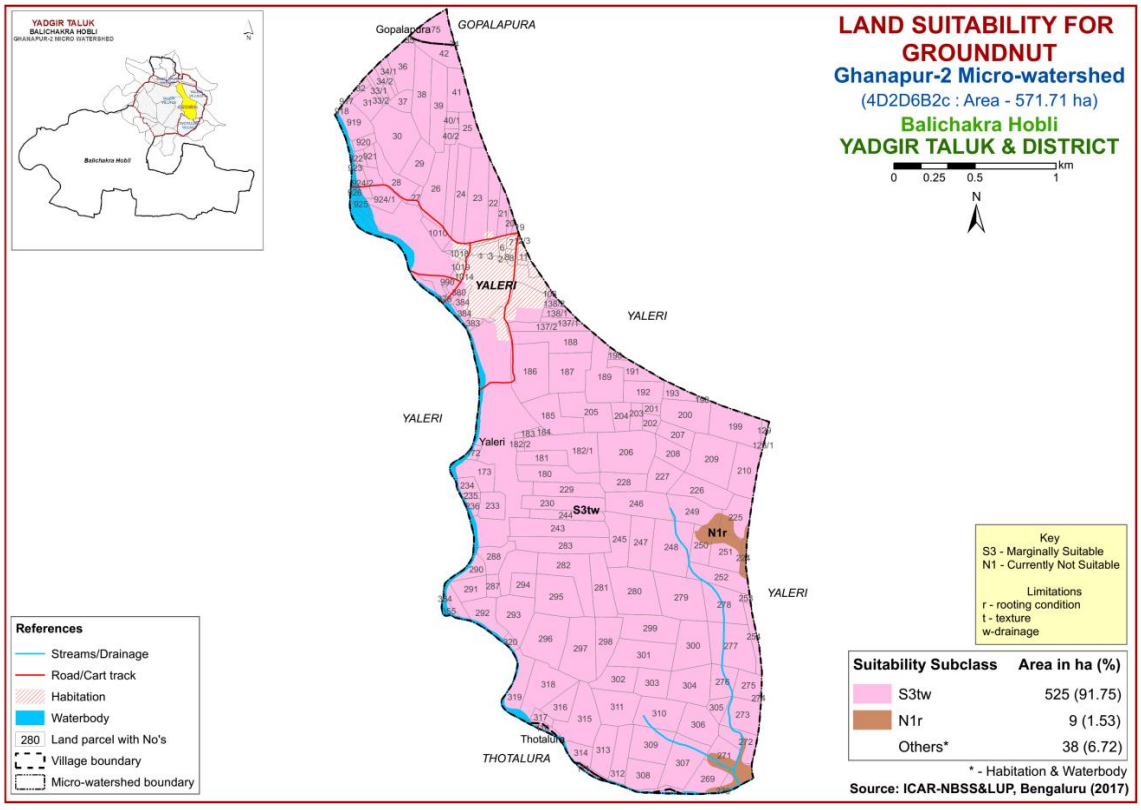


Fig. 7.4 Land Suitability map of Groundnut

7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 4.1 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.6) 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 7.5.

Table 7.6 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 rained	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)	dS m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

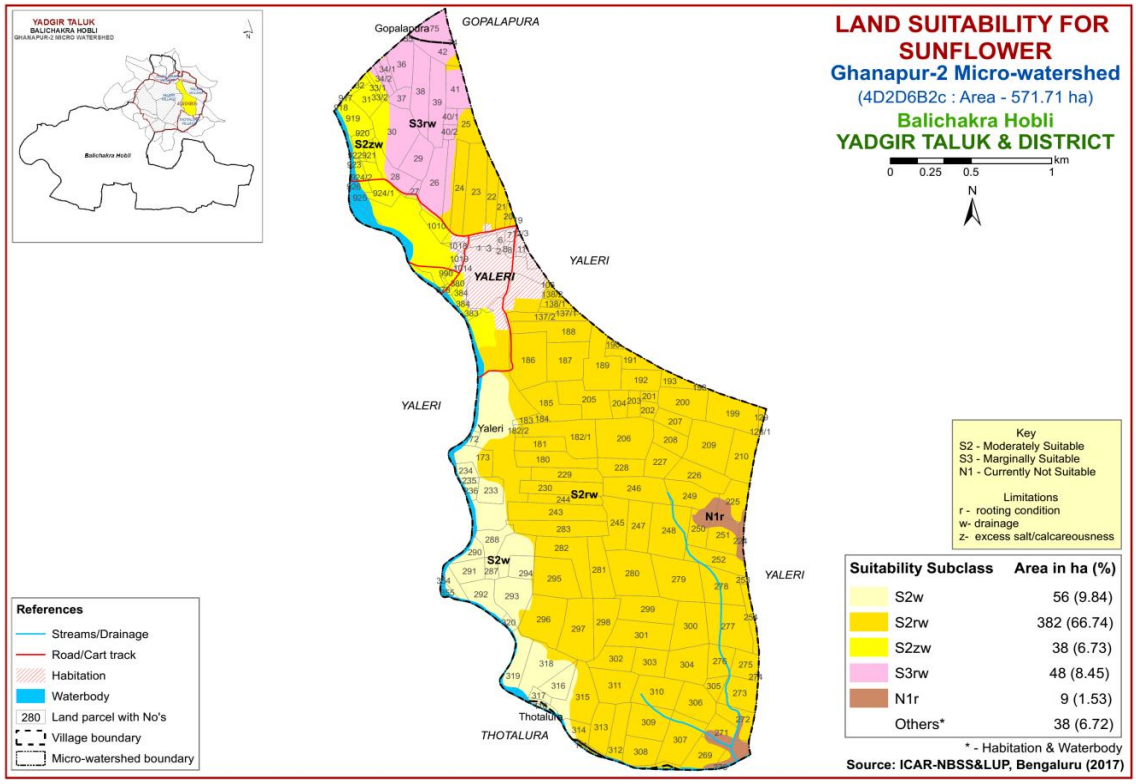


Fig. 7.5 Land Suitability map of Sunflower

No highly suitable (Class S1) lands available for growing sunflower in the microwatershed. Maximum area of about 476 ha (84%) is moderately suitable (Class S2) for sunflower and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness and rooting depth. An area of about 48 ha (8%) is marginally suitable (Class S3) for sunflower and are distributed in the northern part of the microwatershed. They have major limitations of rooting depth and drainage. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing sunflower and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

7.6 Land suitability criteria for Red gram (*Cajanus Cajan)*

Redgram is one of the most important pulse crop grown in an area of 7.28 lakh ha in almost all the districts of the State. The crop requirements for growing red gram (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing redgram 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 Land suitability criteria for Redgram

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. 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
Sub Surface soil texture	Class	l,scl,sil,cl, sl	sicl, sic, c(m)	ls	
Soil depth	cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	3-60	>60
Salinity (EC)	ds m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

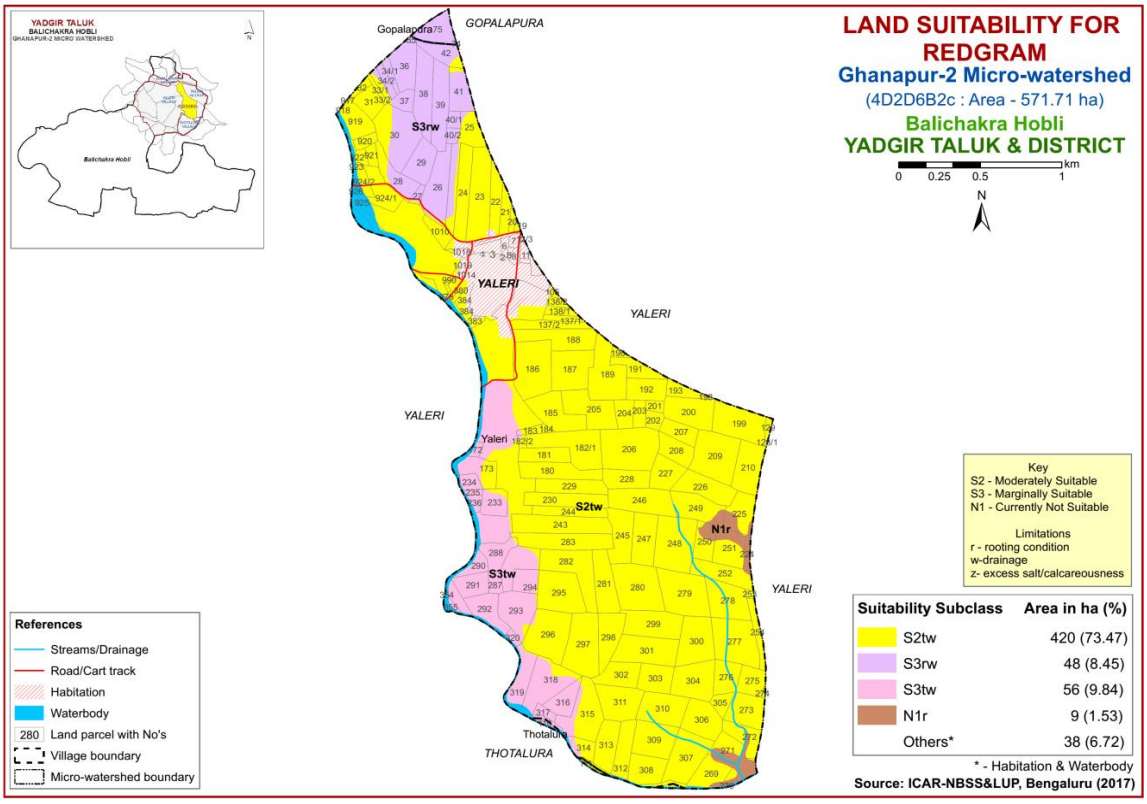


Fig. 7.6 Land Suitability map of Redgram

No highly suitable (Class S1) lands available for growing Redgram in the microwatershed. Maximum area of about 420 ha (73%) is moderately suitable (Class S2) for Redgram and are distributed in all parts of the microwatershed with minor limitations of drainage and texture. An area of about 104 ha (18%) is marginally suitable (Class S3) for Redgram and are distributed in the northern, western and southern part of the microwatershed. They have major limitations of rooting depth, texture and drainage. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing Redgram and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

7.7 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 7.8) 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 are given in Figure 7.7.

Highly suitable (Class S1) lands for growing Bengal gram cover an area of about 56 ha (10%) and are distributed in the western and southern part of the microwatershed. Maximum area of about 468 ha (82%) is moderately suitable (Class S2) for growing Bengal gram and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness and rooting depth. No marginally suitable lands (Class S3) for growing Bengal gram. An area of about 9 ha (2%) is currently not suitable (Class N1) for growing Bengal gram and are distributed in the eastern and southern part of the microwatershed with severe limitation of rooting depth.

Table 7.8 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	

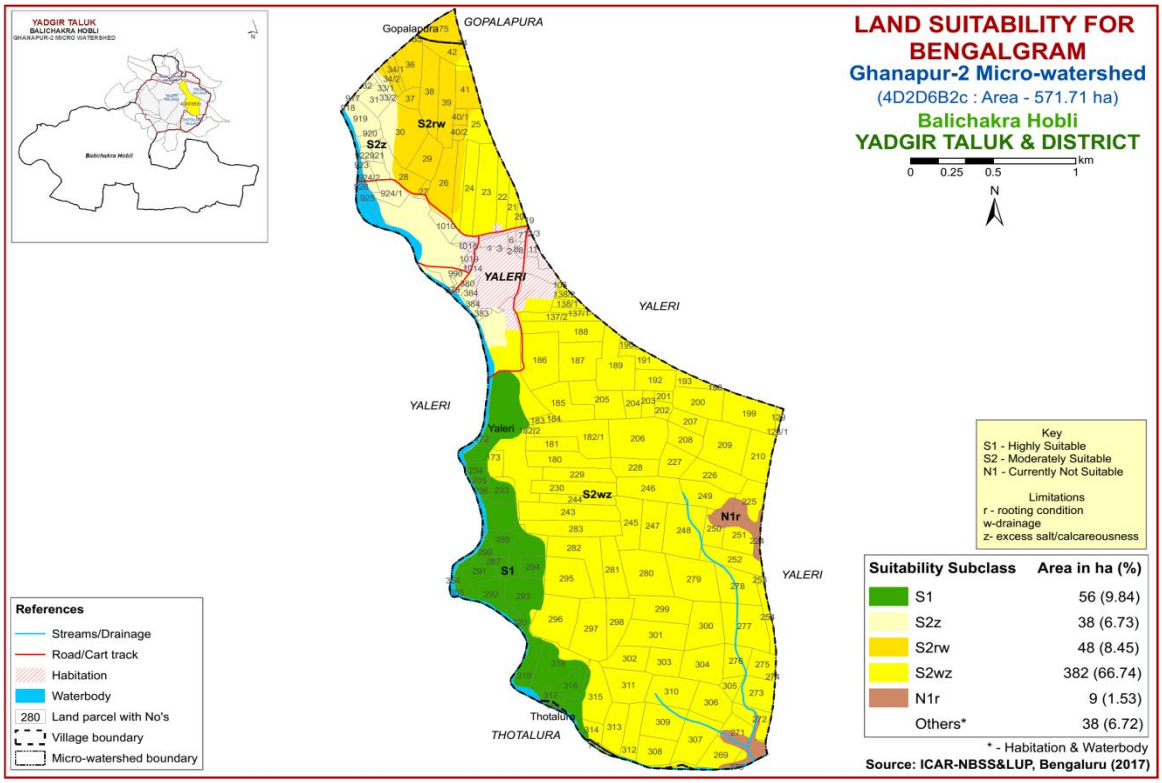


Fig. 7.7 Land Suitability map of Bengal gram

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is 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 7.9) 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 7.8.

Highly suitable (Class S1) lands for growing cotton cover an area of about 56 ha (10%) and are distributed in the western and southern part of the microwatershed. Maximum area of about 468 ha (82%) is moderately suitable (Class S2) for growing cotton and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness and rooting depth. No Marginally suitable lands (Class S3) for growing cotton. An area of about 9 ha (2%) is not suitable (Class N1) for cotton and are distributed in the southern and eastern part of the microwatershed with severe limitation of rooting depth.

Table 7.9 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

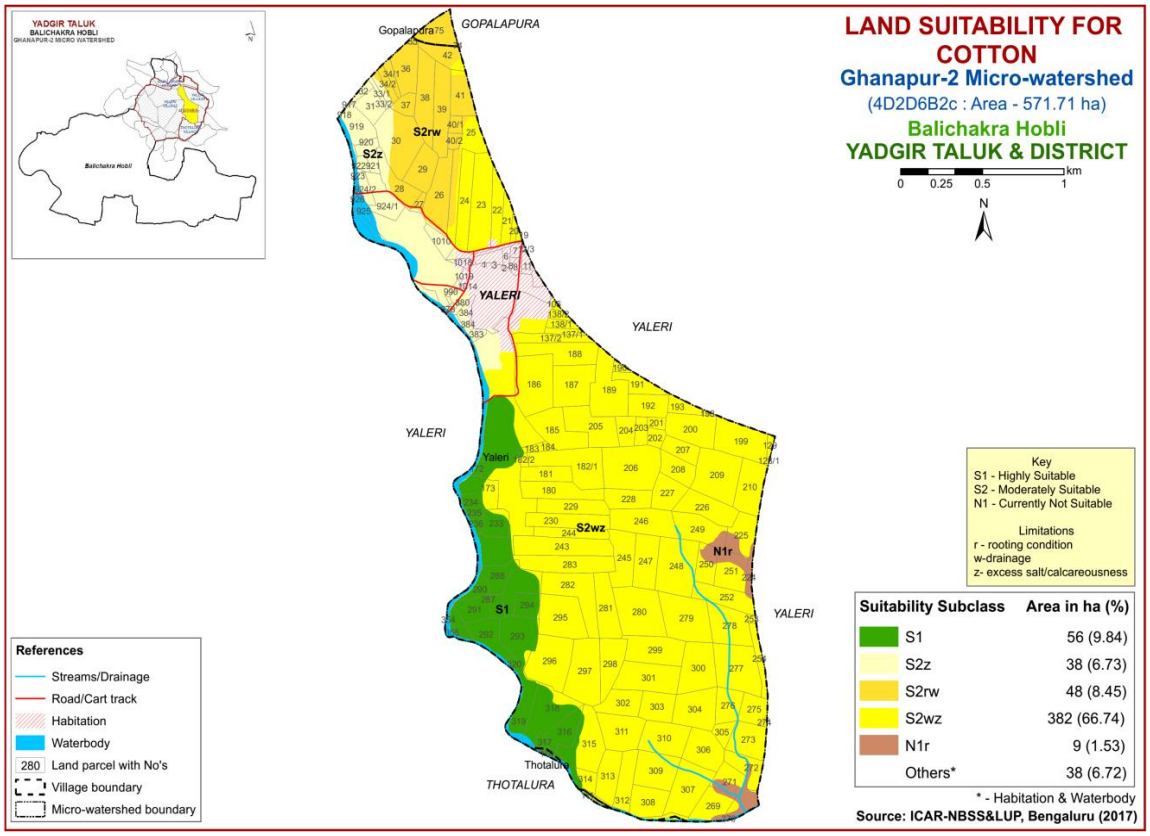


Fig. 7.8 Land Suitability map of Cotton

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important vegetable 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.

No highly (Class S1) suitable lands for growing chilli in the microwatershed. Maximum area of about 525 ha (92%) is moderately suitable (Class S2) for growing chilli and are distributed in all parts of the microwatershed with minor limitations of drainage and texture. No Marginally suitable lands (Class S3) for growing chilli. An area of about 9 ha (2%) is not suitable (Class N1) for Chilli and are distributed in the southern and eastern part of the microwatershed with severe limitation of rooting depth.

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	Very 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	

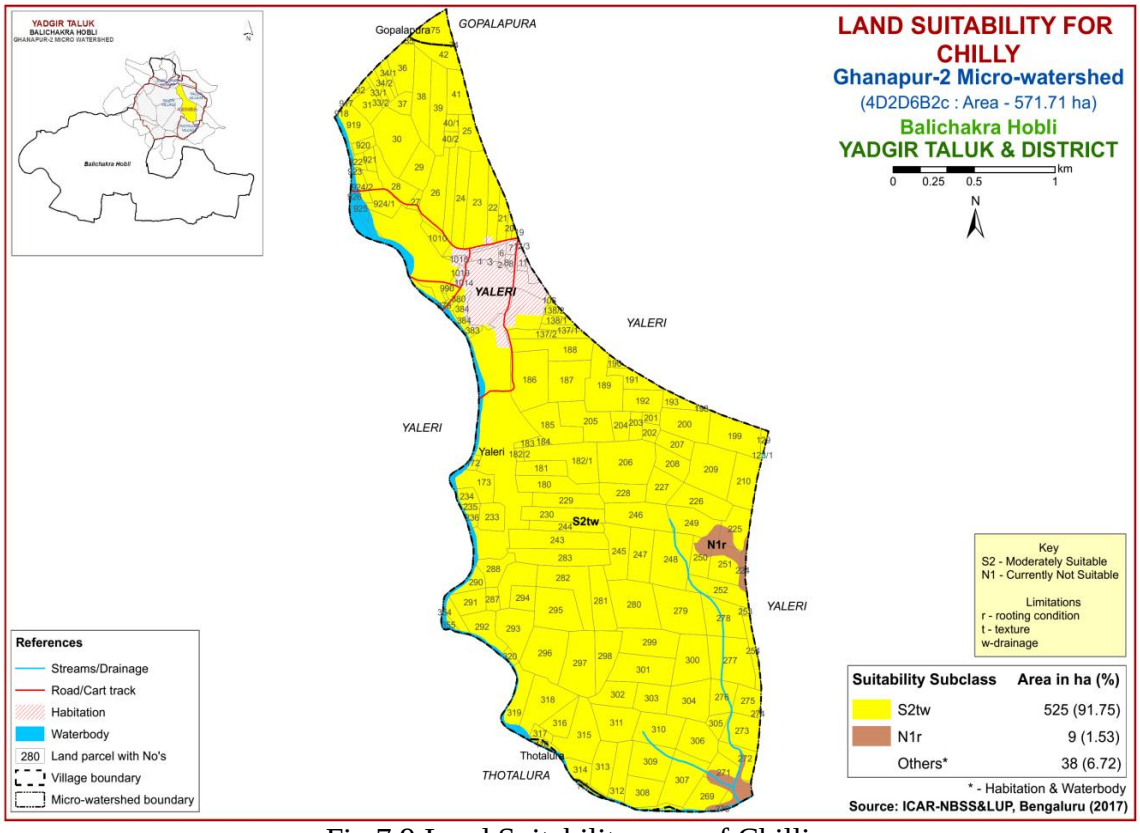


Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum)*

Tomato is one of the most important vegetable 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.

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

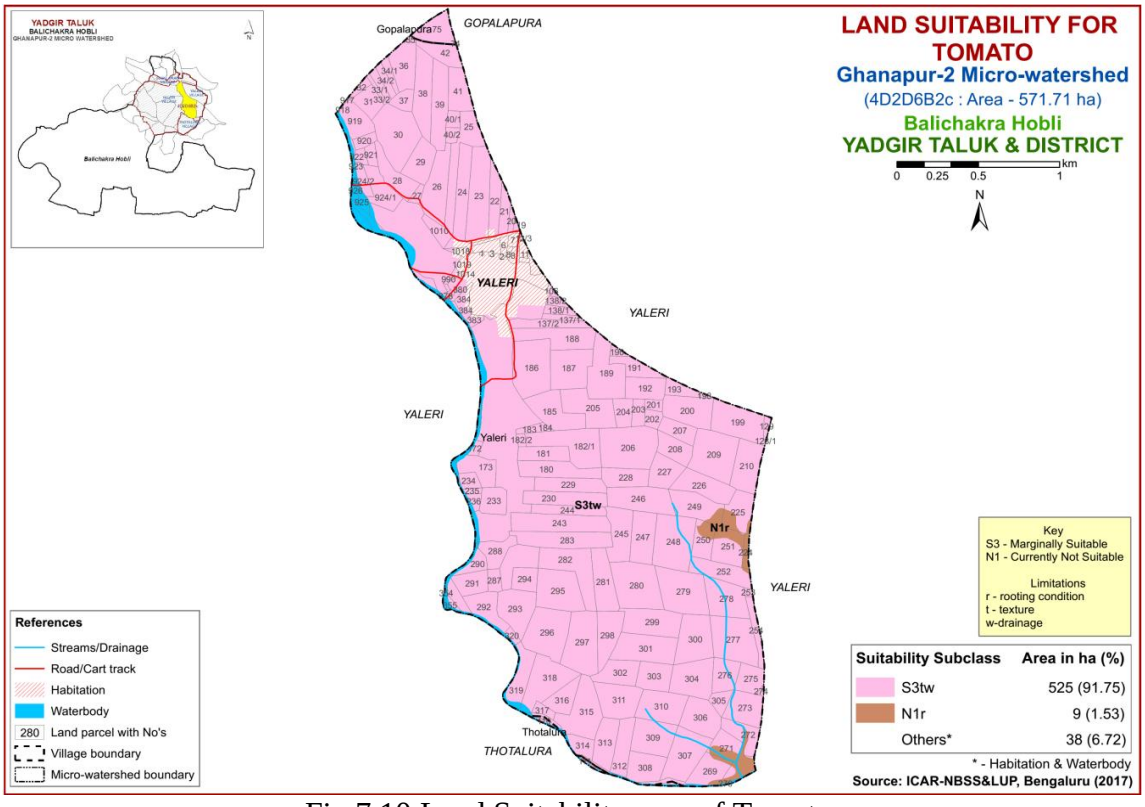


Fig 7.10 Land Suitability map of Tomato

No highly suitable (Class S1) and moderately suitable (Class S2) lands for growing Tomato in the microwatershed. Marginally suitable lands (Class S3) occupy major area of about 525 ha (92%) and are distributed in all parts of the microwatershed. They have moderate limitations of texture and drainage. An area of about 9 ha (2%) is not suitable (Class N1) for Tomato and are distributed in the southern and eastern part of the microwatershed with severe limitation of rooting depth.

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.

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

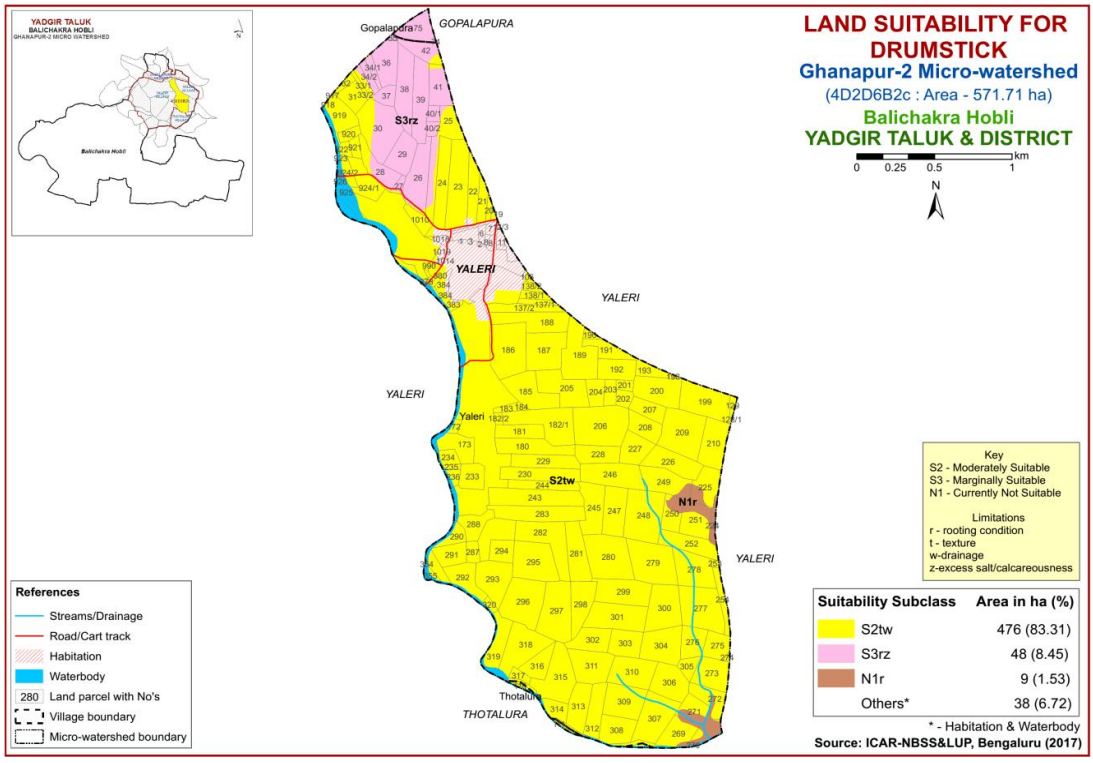


Fig 7.11 Land Suitability map of Drumstick

No highly (Class S1) suitable lands for growing drumstick in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for drumstick and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 48 ha (8%) is marginally suitable (Class S3) for growing drumstick and are distributed in the northern part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. An area of about 9 ha (2%) is not suitable (Class N1) for growing drumstick with severe limitation of rooting depth and are distributed in the eastern and southern part of the microwatershed

7.12 Land suitability for Mango (*Mangifera indica*)

Mango is one of the most important fruit crop grown in an area of 1.73 lakh ha in almost all the districts of the State. The crop requirements (Table 7.13) for growing mango 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 geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.12.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mango in the microwatershed. Maximum area of 476 ha (84%) is marginally suitable (Class S3) for growing mango with moderate limitations of drainage, texture and calcareousness and are distributed in the major part of the microwatershed. An area of about 57 ha (10%) is not suitable (Class N1) for growing mango and occur in the southern and eastern part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.13 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	Temp.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 imp.drained	Poor drained	Very 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	7.6-8.5,5.0-5.4	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	

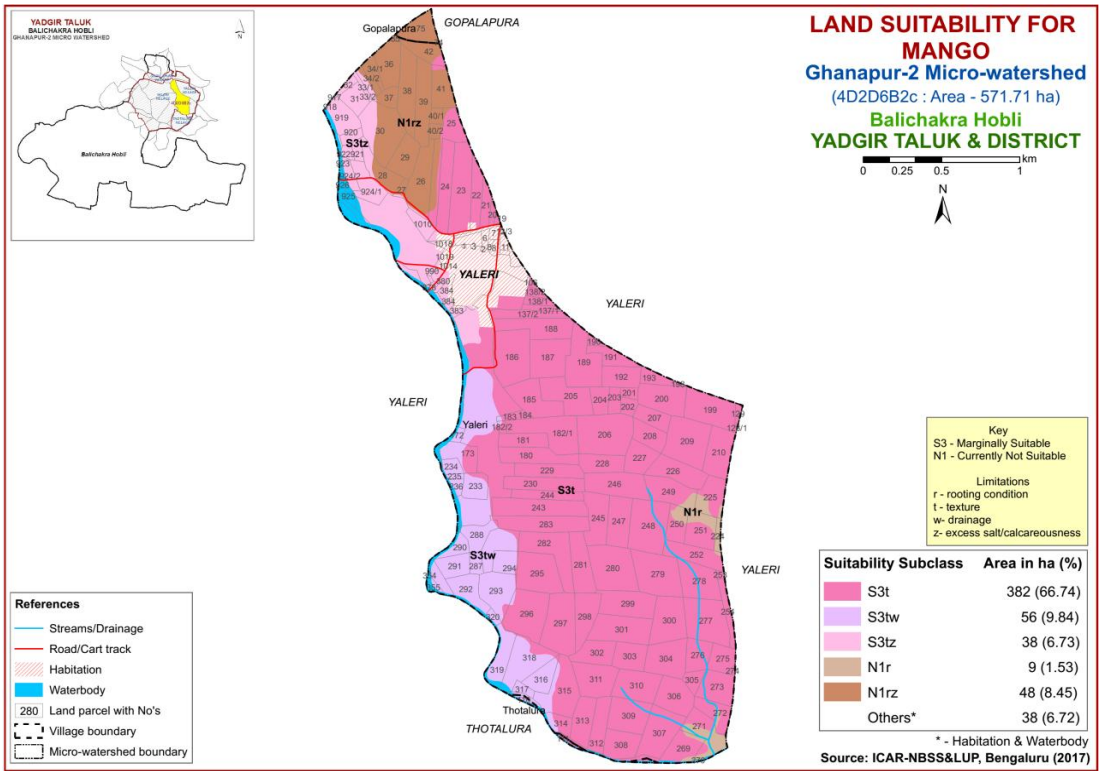


Fig. 7.12 Land Suitability map of Mango

7.13 Land suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of 0.06 lakh ha in almost all the districts of the State. The crop requirements (Table 7.14) for growing guava were matched with the soil-site characteristics (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 7.13.

Table 7.14 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

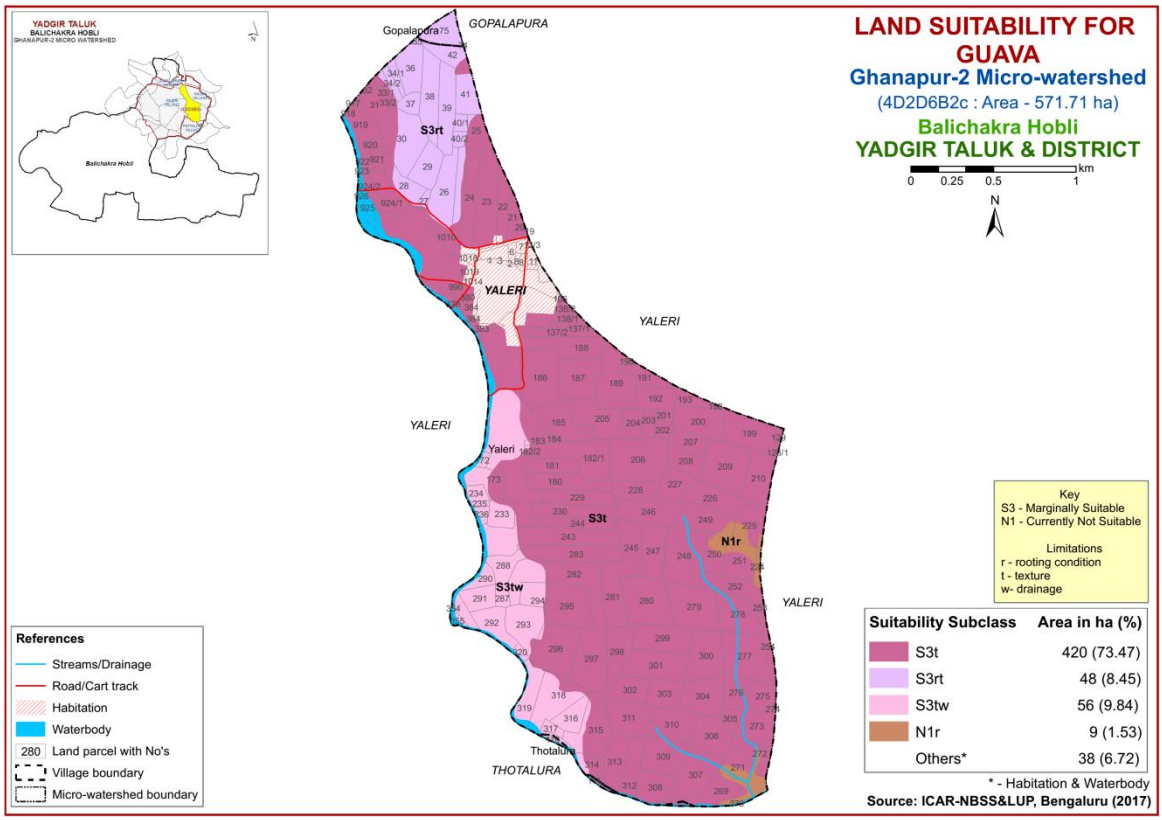


Fig. 7.13 Land Suitability map of Guava

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing guava in the microwatershed. Maximum area of 524 ha (91%) is marginally suitable (Class S3) for growing guava with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 9 ha (2%) is not suitable (Class N1) for growing guava with severe limitation of rooting depth.

7.14 Land suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of 29373 ha in almost all the districts of the State. The crop requirements (Table 7.15) for growing sapota 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 are given in Figure 7.14.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing sapota in the microwatershed. Maximum area of 524 ha (92%) is marginally suitable (Class S3) for growing sapota with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 9 ha (2%) is not suitable (Class N1) for growing sapota with severe limitation of rooting depth.

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

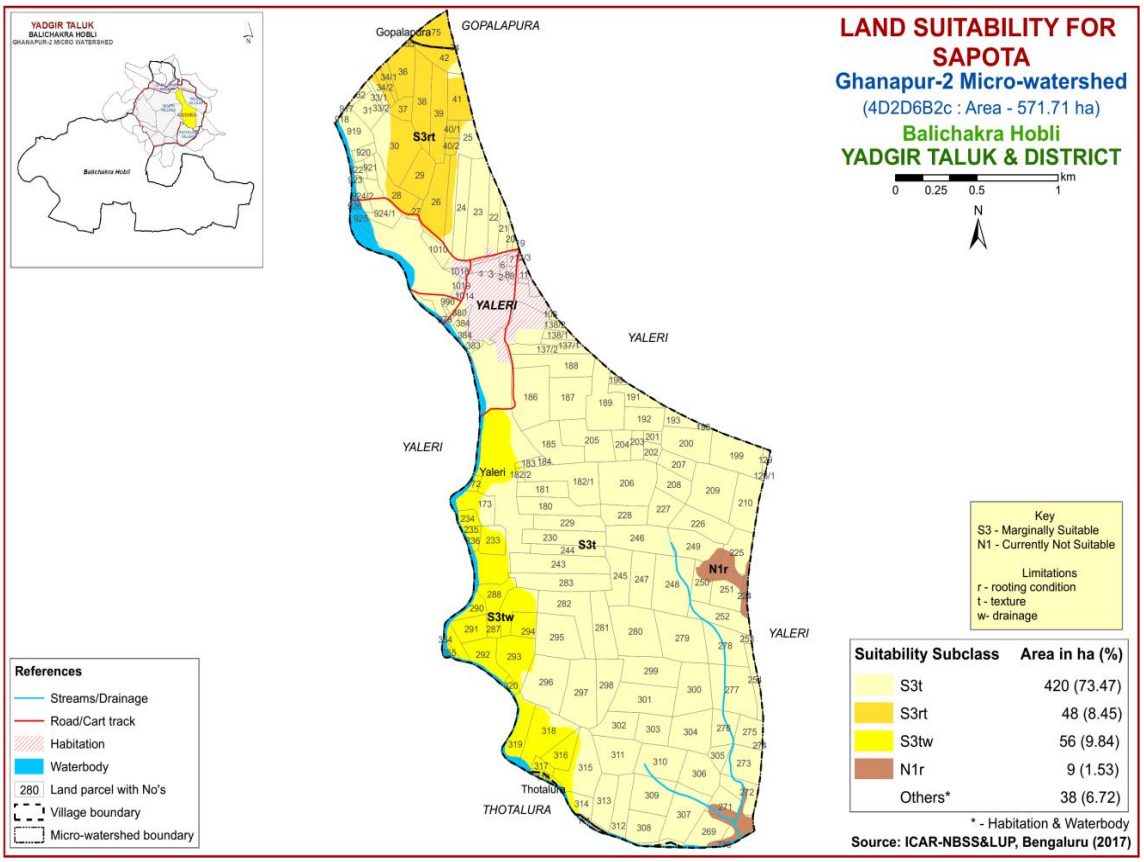


Fig. 7.14 Land Suitability map of Sapota

7.15 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in Karnataka, mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga

districts. The crop requirements for growing pomegranate (Table 7.16) 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 7.15.

Table 7.16 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	

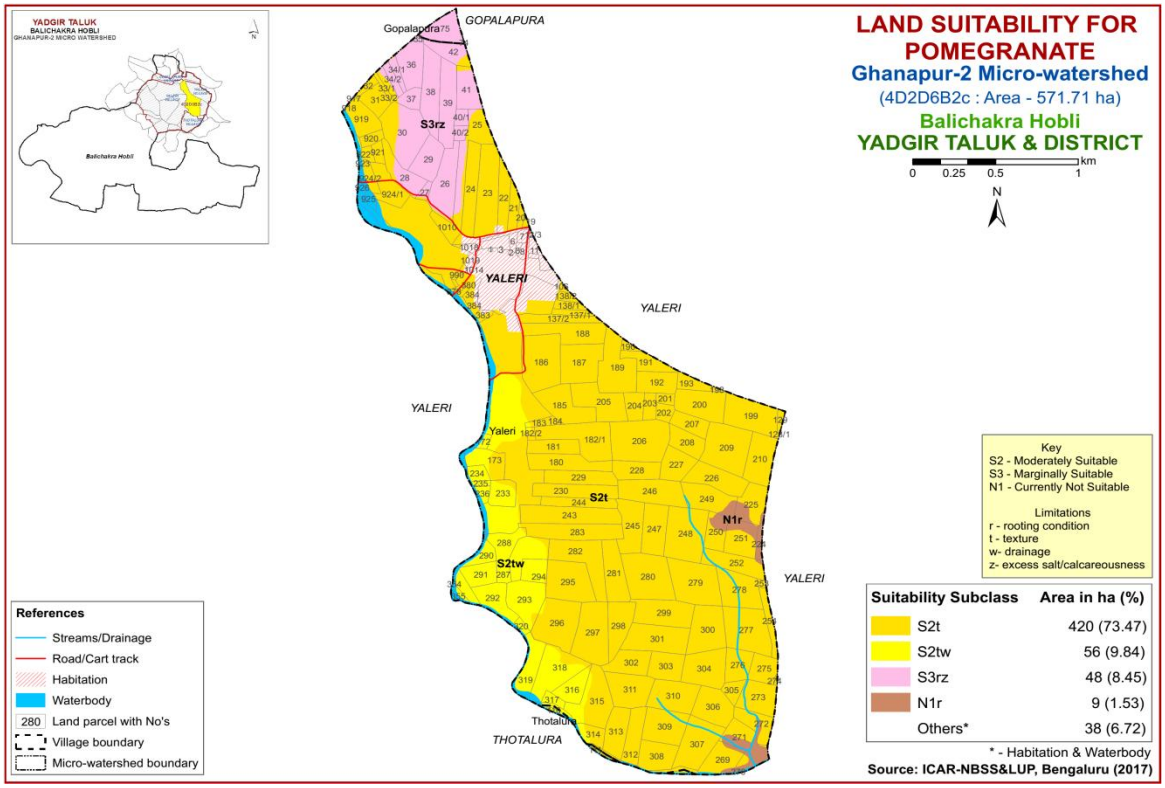


Fig 7.15 Land Suitability map of Pomegranate

No highly (Class S1) suitable lands available for growing pomegranate in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for growing pomegranate and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 48 ha (8%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the northern part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. An area of 9 ha (2%) is not suitable (Class N1) for growing pomegranate with severe limitation of rooting depth.

7.16 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the important fruit crop grown in an area of 3446 ha in almost all the districts of the State. The crop requirements for growing musambi (Table 7.17) 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 7.16.

No highly (Class S1) suitable lands are available for growing Musambi in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for growing Musambi and are distributed in all parts of the microwatershed. They have minor limitations of calcareousness and drainage. An area of about 48 ha (8%) is marginally suitable (Class S3) for growing Musambi and are distributed in the northern part of the microwatershed. They have moderate limitations of rooting depth and calcareousness. An area of about 9 ha (2%) is not suitable (Class N1) for growing Musambi with severe limitation of rooting depth and are distributed in the eastern and southern part of the microwatershed.

Table 7.17 Crop suitability criteria for Musambi

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. to imperfectly 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	5.5-6.47.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
Rooting conditions	Soil depth	cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Erosion	Slope	%	<3	3-5	5-10	

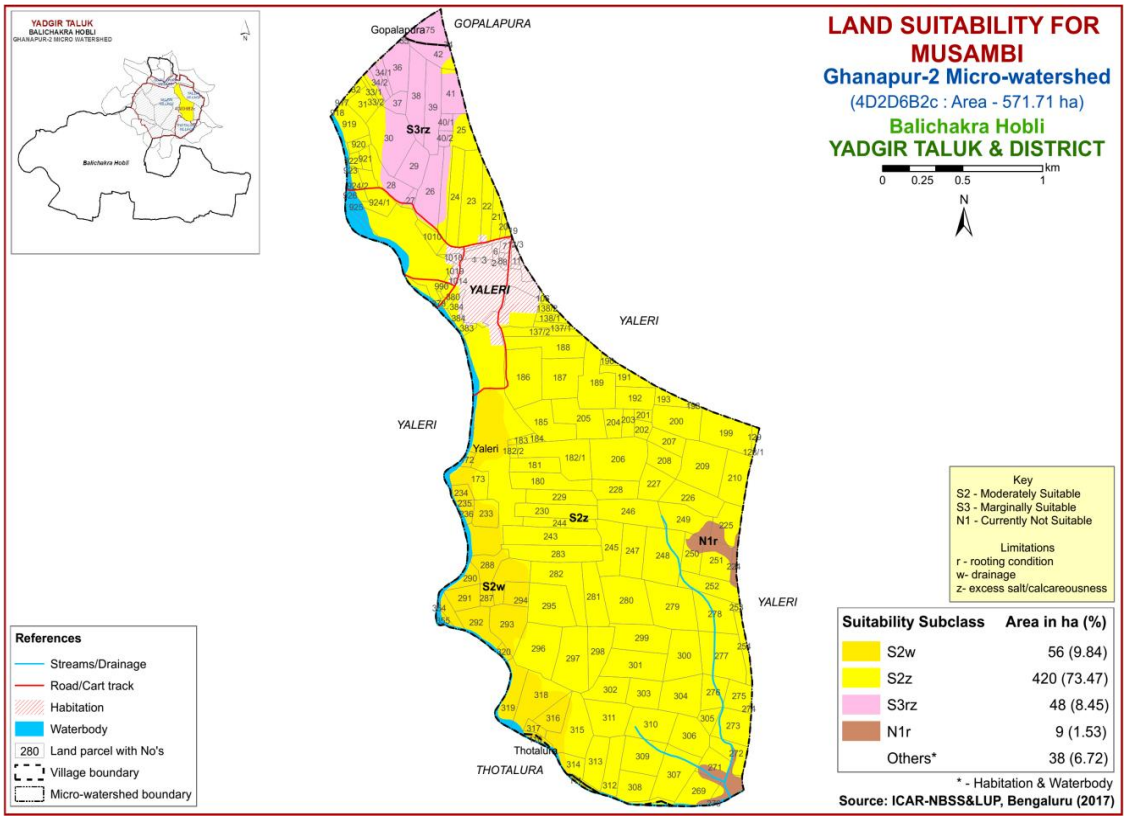


Fig. 7.16 Land Suitability map of Musambi

7.17 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.18) 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 geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7. 17.

Table 7.18 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	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 imp. 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 34calcareous	Upto 5	5-10	>10
Rooting conditions	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	

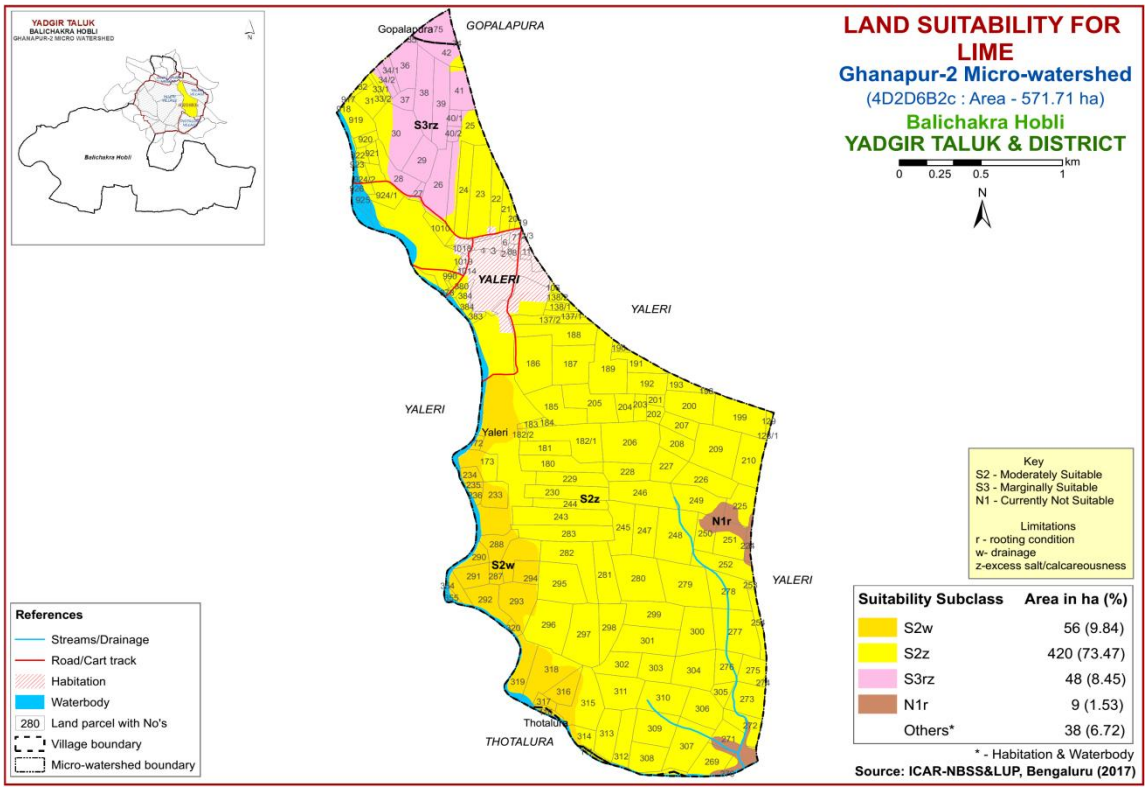


Fig. 7.17 Land Suitability map of Lime

No highly (Class S1) suitable lands available for growing lime in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for growing lime and is distributed in all parts of the microwatershed. They have minor limitations of calcareousness and drainage. An area of about 48 ha (8%) is marginally suitable (Class S3) for growing lime and are distributed in the northern part of the microwatershed. They have moderate limitations of rooting depth and texture. An area of about 9 ha (2%) is not suitable (Class N1) for growing lime with severe limitation of rooting depth and are distributed in the eastern and southern part of the microwatershed.

7.18 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the medicinal fruit crop grown in almost all the districts of the State. The crop requirements for growing amla (Table 7.19) 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 7.18.

No highly suitable (Class S1) lands are available for growing Amla in the microwatershed. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing Amla and are distributed in all parts of the microwatershed. They have minor limitations of drainage, calcareousness, texture and rooting depth. No Marginally suitable lands (Class S3) are available for growing Amla. An area of about 9 ha (2%) is not

suitable for growing Amla with severe limitation of rooting depth and are distributed in eastern and southern part of the microwatershed.

Table 7.19 Land 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

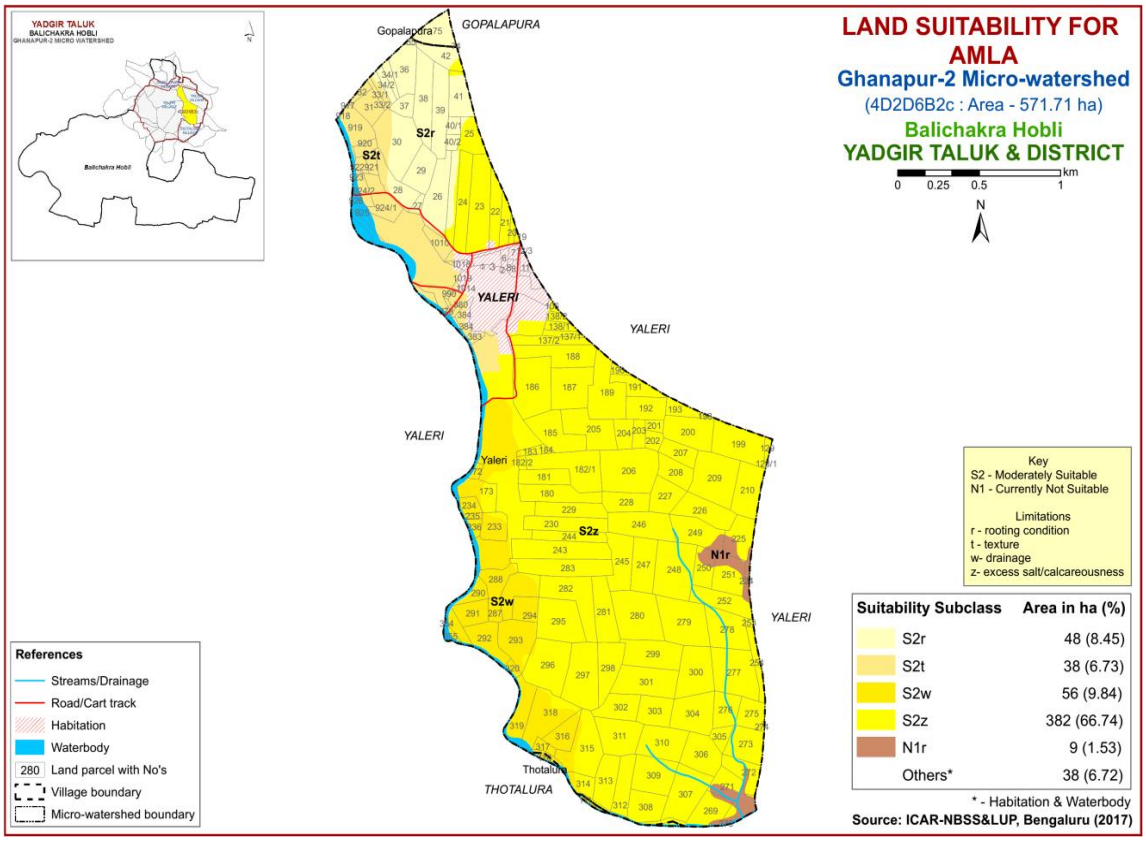


Fig. 7.18 Land Suitability map of Amla

7.19 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important plantation nut crop grown in an area of 0.7 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.20) 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 geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.19.

No highly suitable (Class S1), moderately suitable (Class S2) and marginally suitable lands (Class S3) are available for growing Cashew in the microwatershed. Entire area of about 533 ha (94%) is not suitable (Class N1) for growing cashew and occur in all parts of the microwatershed with severe limitations of texture, rooting depth, drainage and calcareousness.

Table 7.20 Land 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	sc,c(red),scl,cl,	-	ls, sl	c (black)
	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	

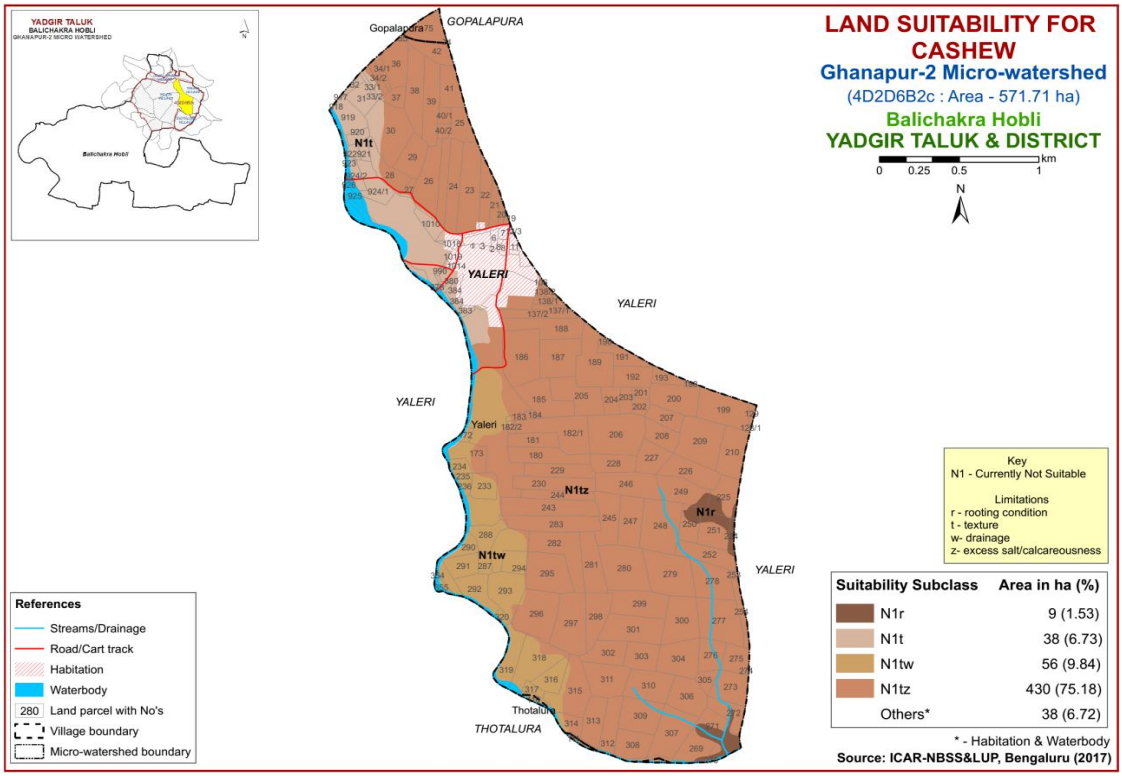


Fig. 7.19 Land Suitability map of Cashew

7. 20 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is one of the most important fruit crop grown in an area of 5368 ha in almost all the districts of the State. The crop requirements for growing jackfruit (Table 7.21) 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 are given in Figure 7.20.

Table 7.21 Land 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	V. 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	-

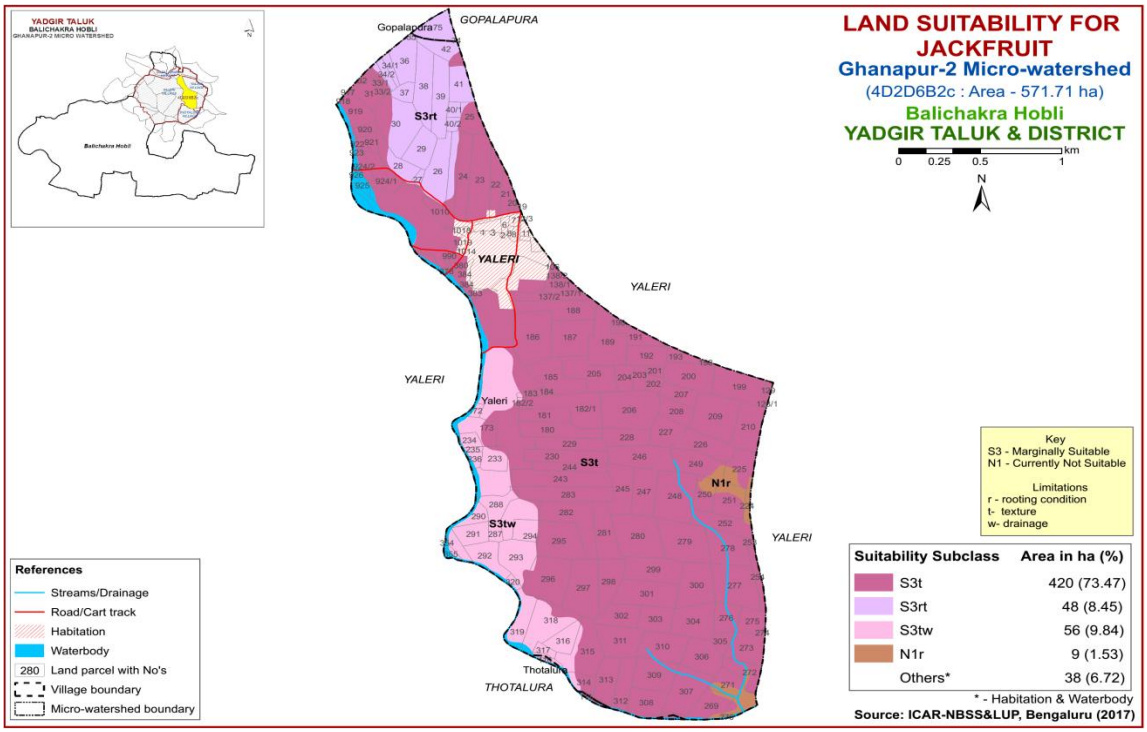


Fig. 7.20 Land Suitability map of Jackfruit

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing jackfruit in the microwatershed. Maximum area of about 524 ha (92%) is marginally suitable (Class S3) for growing jackfruit and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, drainage and texture. An area of about 9 ha (2%) is not suitable (Class N1) for growing jackfruit with severe limitation of rooting depth.

7.21 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 22) 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 are given in Figure 7.21.

No highly suitable (Class S1) lands are available for growing Jamun in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for growing Jamun and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 48 ha (8%) is marginally suitable (Class S3) for growing Jamun and are distributed in the northern part of the microwatershed. They have major limitations of rooting depth and calcareousness. An area of about 9 ha (2%) is not suitable (Class N1) for growing Jamun with severe limitation of rooting depth.

Table 7.22 Land 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

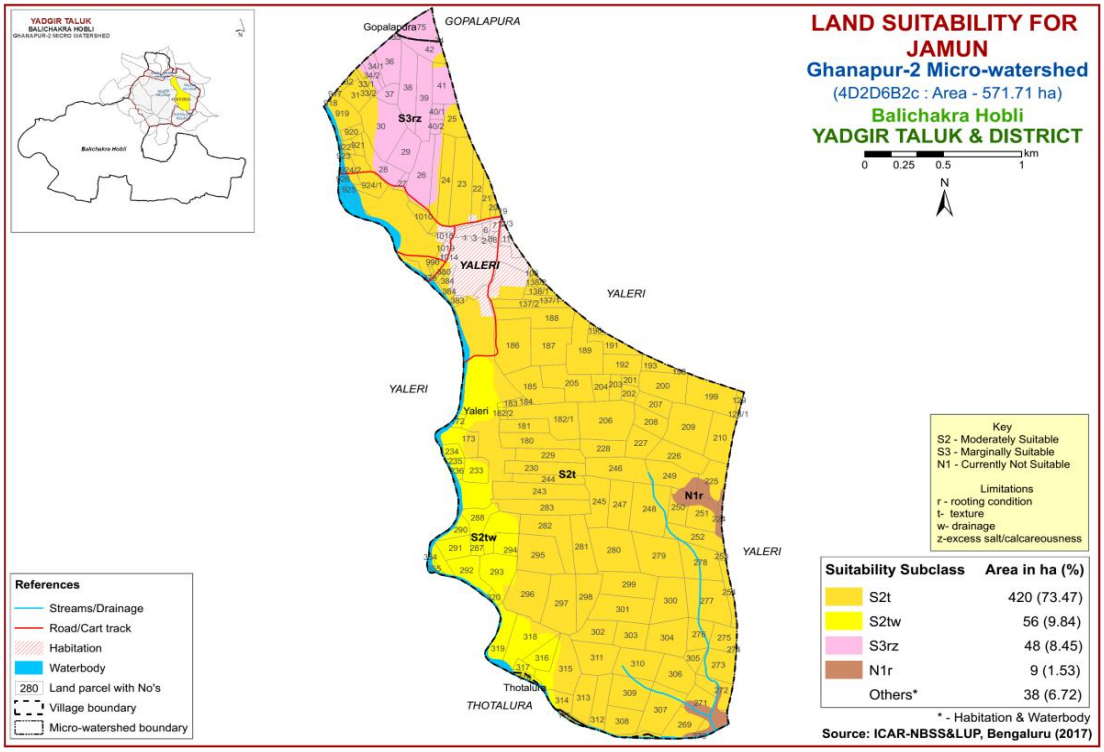


Fig. 7.21 Land Suitability map of Jamun

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

Custard apple is one of the most important fruit crop grown 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 geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.22.

No highly suitable (Class S1) lands are available for growing Custard apple. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing Custard apple and are distributed in all parts of the microwatershed. They have minor limitations of drainage, calcareousness and rooting depth. No marginally suitable lands (Class S3) are available for growing Custard apple. An area of about 9 ha (2%) is not suitable (Class N1) for growing Custard apple with severe limitation of rooting depth.

Table 7.23 Land 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	

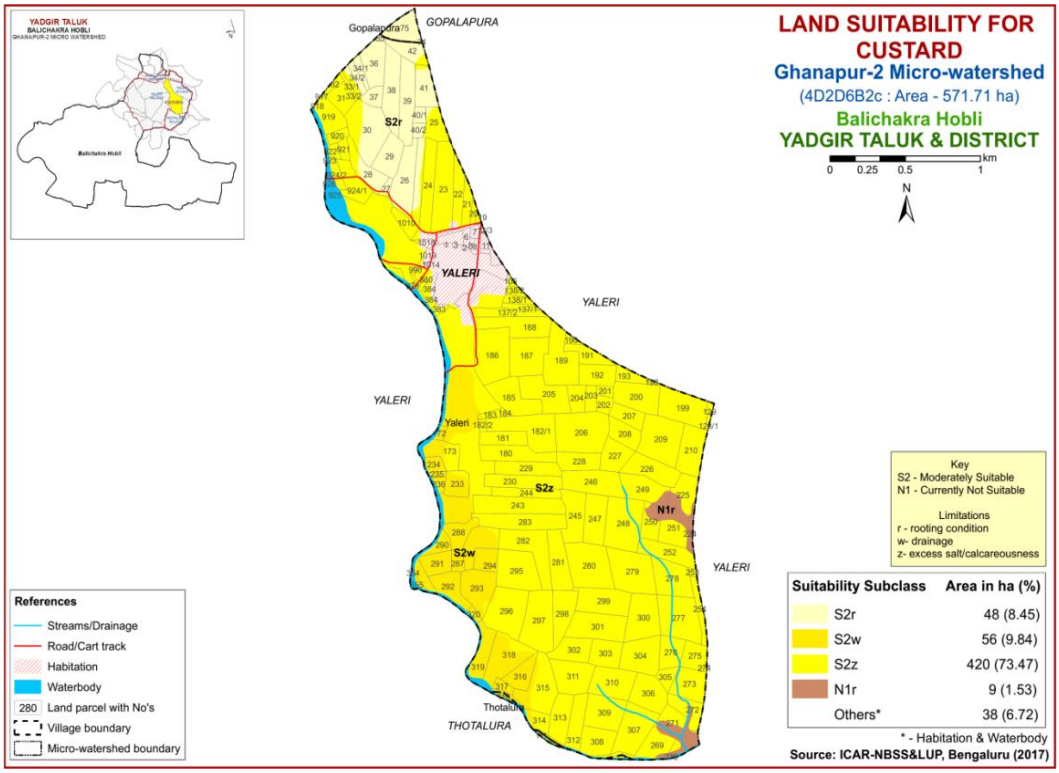


Fig. 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is the most important spice crop grown in almost all the districts of the state. The crop requirements for growing tamarind (Table 7.24) 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 geographical distribution of different suitability subclasses in the microwatershed is given in Fig. 7.23.

No highly suitable (Class S1) lands are available for growing Tamarind in the microwatershed. Maximum area of about 476 ha (83%) is moderately suitable (Class S2) for growing Tamarind and are distributed in all parts of the microwatershed with major limitations of texture and drainage. No marginally suitable (Class S3) lands are available for growing Tamarind. An area of about 57 ha (10%) is not suitable (Class N1) for growing Tamarind and are distributed in the northern and eastern part of the microwatershed with severe limitations of rooting depth and calcareousness.

Table 7.24 Land 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

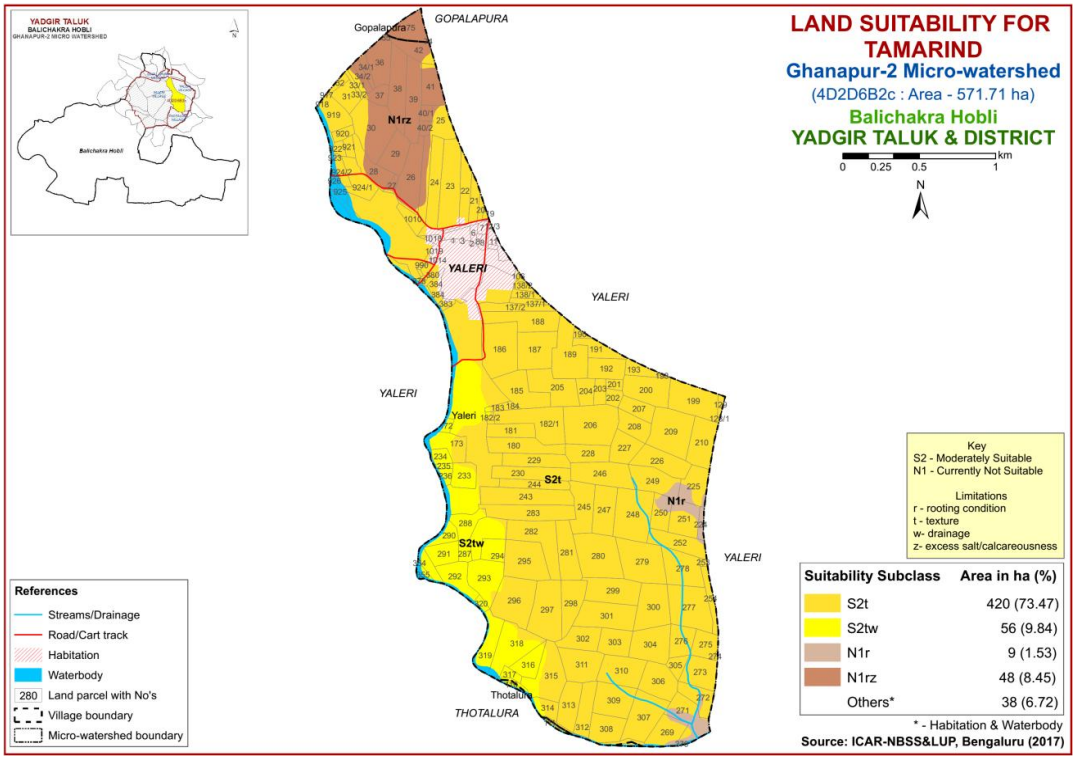


Fig. 7.23 Land Suitability map of Tamarind

7.24 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is an important leaf crop grown for rearing silkworms in about 1.6 lakh ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.25) 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 7.24.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mulberry in the microwatershed. Almost entire area of about 524 ha (92%) is marginally suitable (Class S3) for growing mulberry and are distributed in all parts of the microwatershed. They have major limitations of texture, drainage and rooting depth. An area of about 9 ha (2%) is not suitable (Class N1) for growing mulberry with severe limitation of rooting depth.

Table 7.25 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	Moderately 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

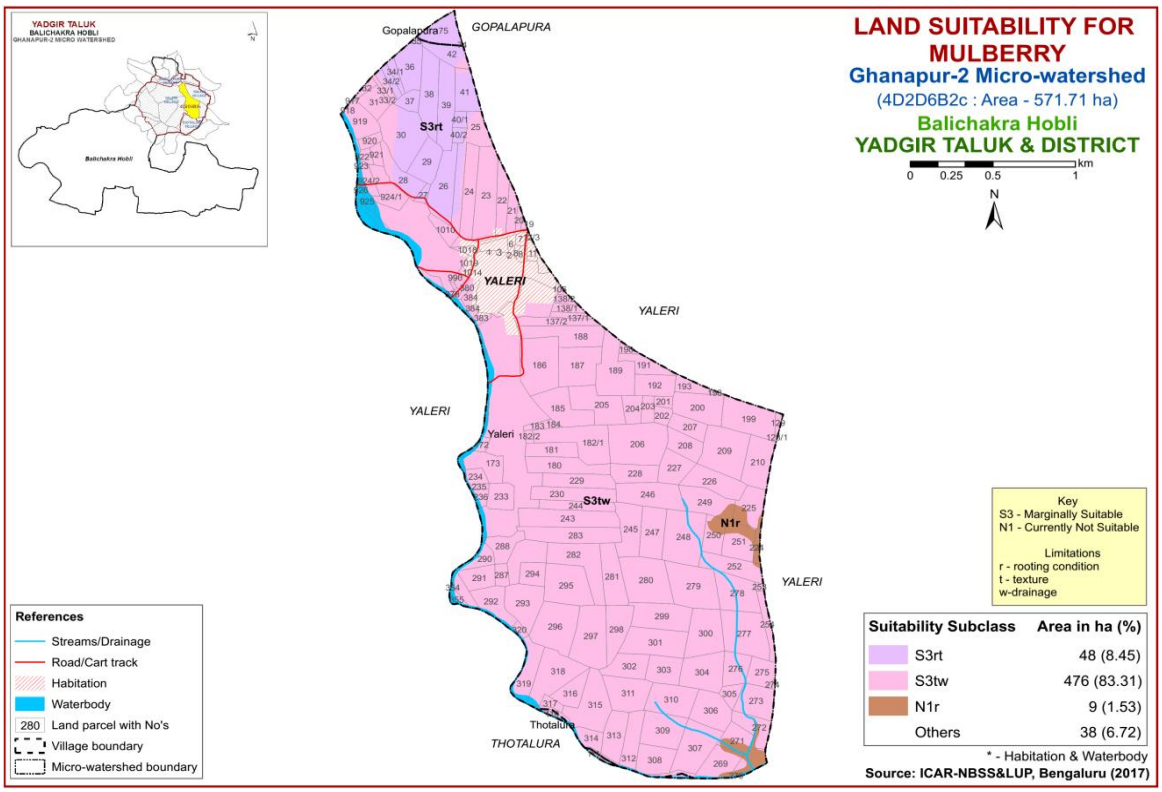


Fig 7.24 Land Suitability map of Mulberry

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 (Table 7.26) for growing marigold 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 are 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	-

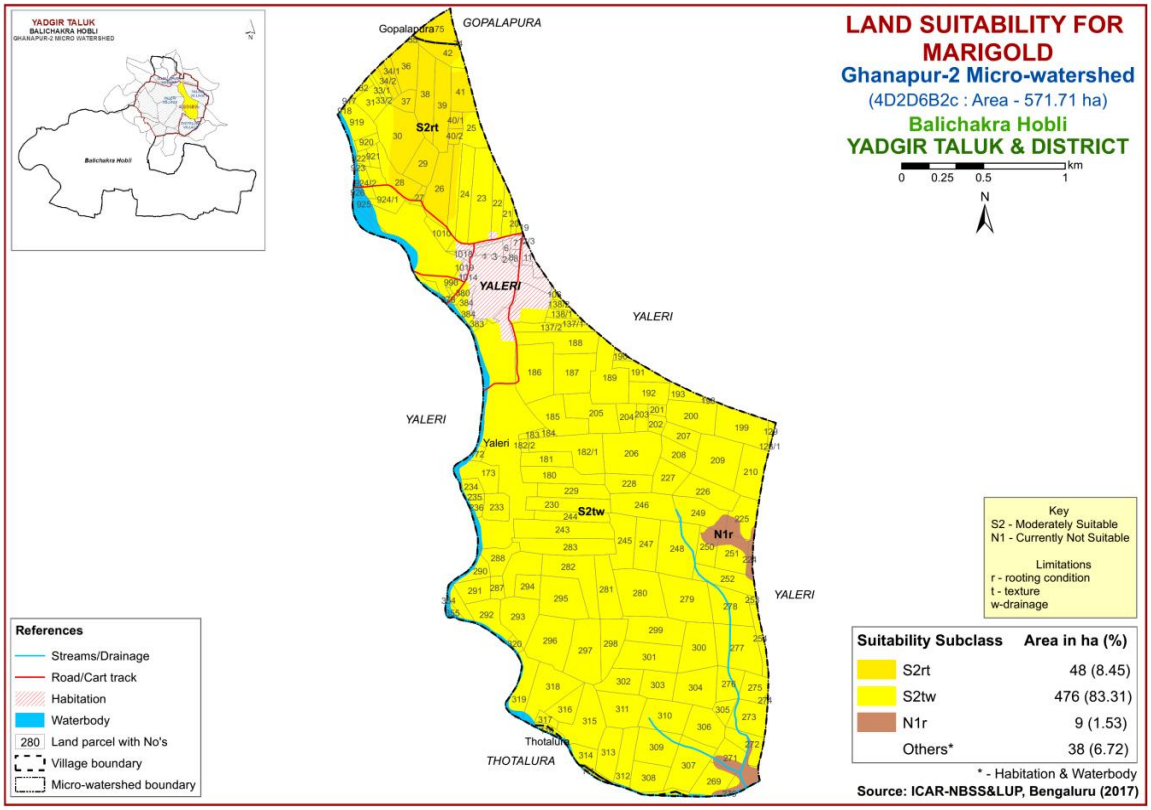


Fig. 7.25 Land Suitability map of Marigold

No highly suitable (Class S1) lands are available for growing Marigold in the microwatershed. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing Marigold and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage and rooting depth. No marginally suitable (Class S3) lands are available for growing Marigold. An area of about 9 ha (2%) is not suitable (Class N1) for growing Marigold with severe limitation of rooting depth.

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 (Table 7.27) for growing chrysanthemum 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 are given in Figure 7.26.

No highly suitable (Class S1) lands are available for growing Chrysanthemum in the microwatershed. Maximum area of about 524 ha (92%) is moderately suitable (Class S2) for growing Chrysanthemum and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage and rooting depth. No marginally suitable (Class S3) lands are available for growing Chrysanthemum. An area of about 9 ha (2%) is not suitable (Class N1) for growing Chrysanthemum with severe limitation of rooting depth.

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	

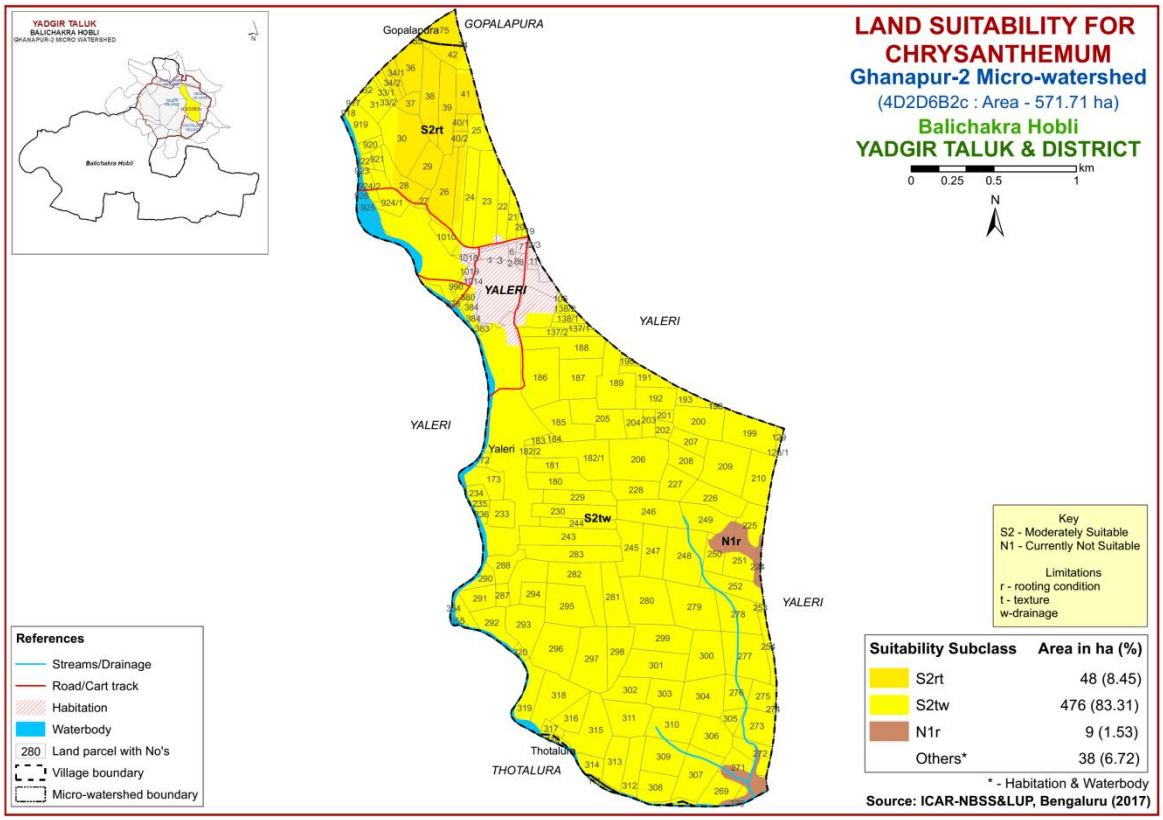


Fig. 7.26 Land Suitability map of Chrysanthemum

7.27 Land Management Units (LMUs)

The 8 soil map units identified in Ghanapur-2 microwatershed have been grouped into 3 Land Management Units (LMU) for the purpose of preparing a Proposed Crop Plan. Land Management Units are 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 Units map (Fig. 7.28) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The map units that have been grouped into 3 Land Management Units along with brief description of soil and site characteristics are given below. Land Management Units

LMU NO.	Soil map units	Soil and site characteristics
1	133. MDRiB2 138. HGNmB1 141. SGRcB2 142. SGRhB2 61. MDRmB2 95.HGNmB2	Very deep (>150 cm), black calcareous to non calcareous clay soils, 1-3% slope, slight to moderate erosion.
2	76.BLDmB2	Moderately shallow (50-75 cm), black calcareous clay soils, 1-3% slope, moderate erosion.
3	119.BDPiB3	Very shallow (<25 cm), black clay soils, 1-3% slope, severe erosion.

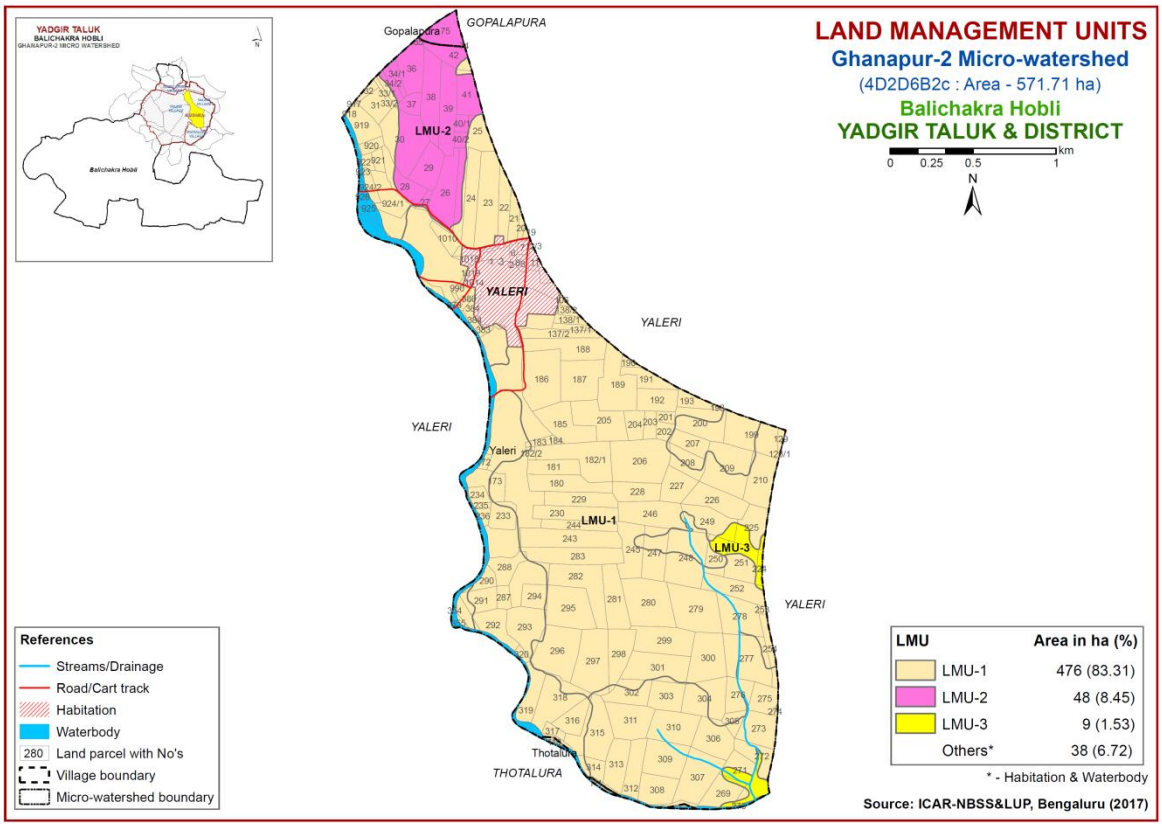


Fig. 7.27 Land Management Units Map- Ghanapur-2 Microwatershed

7.28 Proposed Crop Plan for Ghanapur-2 Microwatershed

After assessing the land suitability for the 26 crops, the proposed crop plan has been prepared for the 3 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 below in Table 7.28.

Table 7.28 Proposed Crop Plan for Ghanapur-2 Microwatershed

Proposed LMU	Soil Map Units	Survey Number	Soil and site characteristics	Field Crops	Horticulture Crops	Suitable Interventions
1	133. MDRiB2 138. HGNmB1 141. SGRcB2 142. SGRhB2 61. MDRmB2 95.HGNmB2	**Thotalura :**110,111 **Yaleri:**21,22,23,24,25,1010,1014,106,128/1,129,137/1,137/2,138/1,138/2,172,173,180,181,182/1,182/2,183,184,185,186,187,188,189,19,190,191,192,193,198,199,20,200,201,202,203,204,205,206,207,208,209,210,225,226,227,228,229,230,233,234,235,236,243,244,245,246,247,248,249,250,251,252,253,254,269,272,273,274,275,276,277,278,279,280,281,282,283,287,288,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,31,310,311,312,313,314,315,316,317,318,319,32,320,33/1,33/2,378,380,383,384,917,918,919,920,921,922,923,924/1,924/2,989,990	Very deep (>150 cm), black calcareous to non calcareous clay soils, 1-3% slope, slight to moderate erosion.	Sunflower, Sorghum, Soybean, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi, Tamarind, Jamun, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Bhendi, Cluster bean, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices
2	76.BLDmB2	**Gopalapura :**74,75 **Yaleri:**26,27,28,29,30,34/1,34/2,35,36,37,38,39,40/1,40/2,41,42	Moderately shallow (50-75 cm), black calcareous clay soils, 1-3% slope, moderate erosion.	Bengal gram, Sorghum, Soybean, Bajra, Safflower, Linseed	**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
3	119.BDPiB3	**Yaleri:**224,271	Very shallow (<25 cm), black clay soils, 1-3% slope, severe erosion.	-	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 unfavorable conditions occur

Characteristics of Ghanapur-2 Microwatershed

- The soil phases identified in the microwatershed belonged to the soil series of HGN 382 ha (67%), SGR 56 ha (10%), BLD 48 ha (8%), MDR 38 ha (7%) and BDP 9 ha (2%).
- As per land capability classification, entire area of the microwatershed falls under arable land category (Class II & IV). The major limitations identified in the arable lands were soil, erosion and drainage.
- On the basis of soil reaction, about 25 ha (4%) is slightly alkaline (pH 7.3-7.8), 392 ha (69%) is moderately alkaline (pH 7.8-8.4) and 117 ha (20%) is strongly alkaline (pH 8.4-9.0).

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 moderately alkaline soils)

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).

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Maximum area of about 262 ha is suffering from moderate erosion and 9 ha from severe erosion. These areas 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 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 can be adopted.
- **Gravelliness:** More gravel content is favorable 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 soil, erosion and drainage are the major constraints in Ghanapur-2 microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in 309 ha (54%), medium (0.5-0.75%) in about 173 ha (30%) and high (>0.75%) in 52 ha (9%). The areas that are low and medium in OC needs to be further improved by applying farm yard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops costs 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 482 ha area where OC is low (<0.5%) and medium (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**: Available Phosphorus is low (<23 kg/ha) in an area of 208 ha (36%), medium (23-57 kg/ha) in an area of 311 ha (54%) and high (>57 kg/ha) in an area of 15 ha (3%) of the microwatershed. For all the crops, 25% additional P needs to be applied where available P is low and medium.
- **Available Potassium:** Available potassium is low (<145 kg/ha) in an area of 5 ha (1%), medium (145-337 kg/ha) in maximum area of 318 ha (56%) of the microwatershed and an area of about 211 ha (37%) is high (>337 kg/ha) in available potassium. All the plots, where available potassium is low and medium, for all the crops, additional 25 % potassium may be applied.

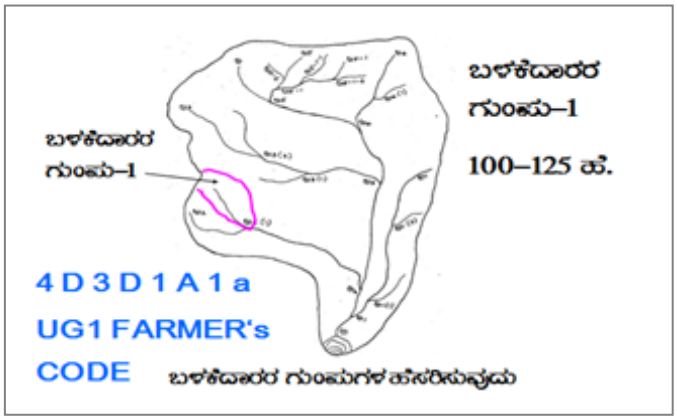
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops, it is low in 309 ha (54%), medium in 173 ha (30%) and high in 52 ha (9%). Low and medium areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Boron:** An area of 133 ha (23%) is low, 399 ha (70%) is medium and 2 ha (0.32%) is high. For areas that are low and medium, application of sodium borate @ 10 kg/ha as soil application or 0.2 % borax as foliar spray is recommended.
- **Available Iron:** An area of about 12 ha (2%) is deficient and 522 ha (91%) in the microwatershed is sufficient in available iron.
- **Available Manganese:** An entire area of about 534 ha (93%) in the microwatershed is sufficient in available manganese.
- **Available Copper:** An entire area of about 534 ha (93%) in the microwatershed is sufficient in available copper.
- **Available Zinc:** Almost entire area of about 504 ha (88%) of the microwatershed is deficient and about 29 ha (5%) is sufficient in available zinc content. Application of zinc sulphate @ 25 kg/ha is to be recommended for these areas**.**
- **Soil Alkalinity:** The microwatershed has 534 ha (94%) area with soils that are slightly to strongly alkaline. 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 Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable and also 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 the 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 Ghanapur-2 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
- Rainfall
- 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 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

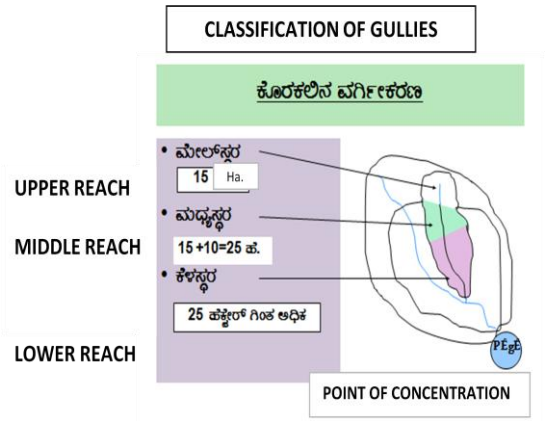
The treatment plan recommended for arable lands is briefly described below

9.1.1 Arable Land Treatment

A. BUNDING

Steps for Survey and Preparation of Treatment Plan	
• 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)

USER GROUP-1



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.

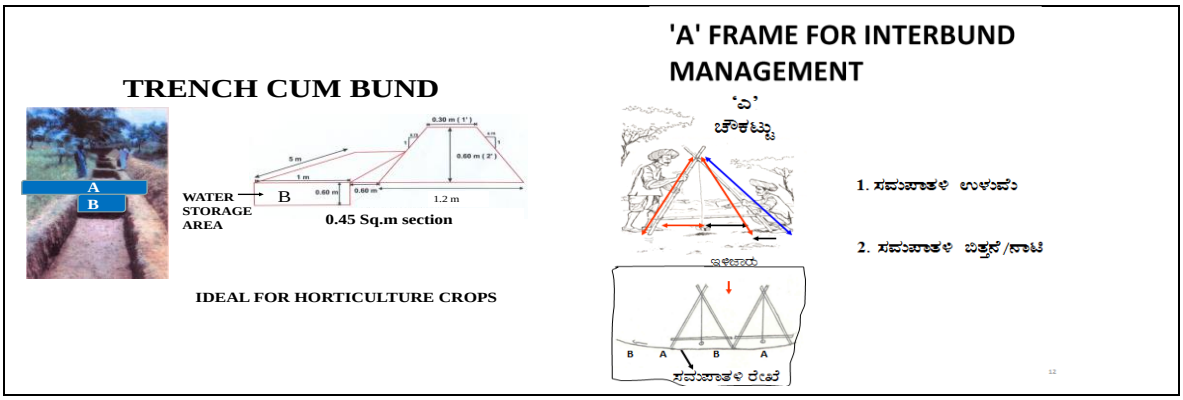
Recommended Bund Section

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 soils	
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

1. Existing waterways are marked on the cadastral map (1:7920 scale) and their dimensions are recorded.
2. Considering the contour plan of the MWS, additional waterways/ modernization of the existing ones can be thought of.
3. 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.
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 from 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.

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. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 525 ha (92%) needs Graded Bunding and 9 ha (2%) requires Trench cum Bunding.

The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

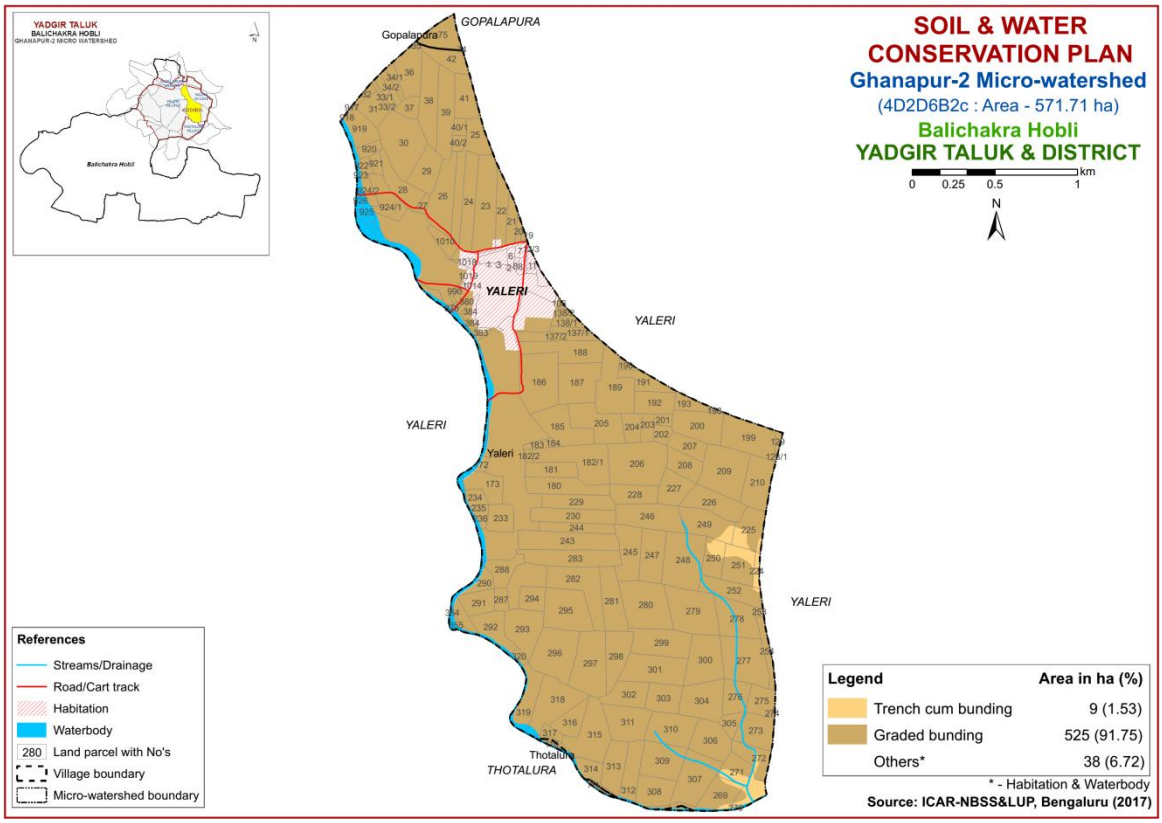


Fig. 9.1 Soil and Water Conservation Plan map of Ghanapur-2 Microwatershed

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 Nerale (*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

Ghanapur-2 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
Yaleri	1	0.05	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	2	0.09	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	3	0.11	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	6	0.49	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	7	0.47	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	8	0.57	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	11	1.07	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	12/3	0.05	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	19	0.2	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	20	0.48	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	21	1.62	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	22	2.92	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	23	7.46	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	24	4.66	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar (Ct+Jw)	Not Available	IIes	Graded bunding
Yaleri	25	5.71	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	26	5.72	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	27	0.63	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	28	3.5	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar (Ct+Jw)	Not Available	IIes	Graded bunding
Yaleri	29	3.71	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	30	7.97	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar+Redgram (Jw+Rg)	Not Available	IIes	Graded bunding
Yaleri	31	2.31	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	32	0.63	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	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
Yaleri	33/1	0.91	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	33/2	0.49	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	34/1	0.87	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	34/2	0.93	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	35	0.2	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	36	3.97	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	37	1.49	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	38	5.49	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	39	5.26	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	40/1	0.84	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	40/2	0.75	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	41	3.36	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	42	2.72	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	106	0.31	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	128/1	0	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	129	0.46	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	137/1	0.85	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	137/2	2.53	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	138/1	0.93	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	138/2	0.63	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	172	0.68	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIws	Graded bunding
Yaleri	173	3.32	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	180	4.53	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	181	2.85	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	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
Yaleri	182/1	7	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	182/2	0.41	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	183	0.64	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	184	0.28	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	185	5.35	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	186	7.77	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	187	5.88	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	188	5.42	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Sunflower+Redgram (Sf+Rg)	Not Available	IIes	Graded bunding
Yaleri	189	6.77	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	190	0.5	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Cotton+Redgram (Ct+Rg)	Not Available	IIes	Graded bunding
Yaleri	191	2.38	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	192	3.28	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	193	1.56	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	198	0.19	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	199	6.22	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	200	5.16	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	201	0.74	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	202	1.09	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	203	1.29	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	204	1.93	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	205	5.57	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	206	8.73	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	207	2.38	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	208	2.93	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	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
Yaleri	209	7.52	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	210	4.92	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	224	0.73	BDPiB3	LMU-3	Very shallow (<25 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	225	3.97	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	226	4.63	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	227	3.36	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	228	3.24	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	229	3.76	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	230	4.34	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	233	2.59	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Yaleri	234	1.16	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	235	0.41	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	236	0.86	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	243	6.52	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	244	2.65	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	245	4.58	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	246	5.84	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	247	4.56	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	248	7.81	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	249	4.81	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	250	2.78	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	251	4.12	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	252	4.08	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	253	0.25	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	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
Yaleri	254	1.73	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	269	3.8	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	270	0.12	Waterbody	Others	Others	Others	Others	Others	Others	Others	Others	Not Available	Others	Others
Yaleri	271	4.95	BDPiB3	LMU-3	Very shallow (<25 cm)	Sandy clay	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	272	2.96	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	273	4.18	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	274	0.18	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	275	2.62	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	276	3.03	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	277	7.26	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	278	5.33	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	279	7.49	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	280	7.8	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	281	4.68	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	282	6.57	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	283	5.81	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	287	1.14	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	288	2.64	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	290	1.78	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	291	2.68	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	292	3.75	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	293	5.16	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	294	2.19	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIws	Graded bunding
Yaleri	295	6.61	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	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
Yaleri	296	7.27	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	297	7.3	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	298	4.27	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	299	5.68	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	300	5.93	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	301	6.29	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	302	3.57	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	303	3.49	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	304	5.52	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	305	1.36	HGNmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	306	4.67	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	307	6.21	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	308	3.8	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	309	5.23	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	310	5.26	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	311	5.18	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	312	3.39	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	313	3.8	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	314	1.83	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	315	6.61	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	316	2.75	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Yaleri	317	0.78	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Yaleri	318	6.41	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	Graded bunding
Yaleri	319	3.94	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIws	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
Yaleri	320	0.61	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIws	Graded bunding
Yaleri	354	0.23	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Yaleri	355	0.57	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Yaleri	378	0.21	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	380	0.12	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	383	0.59	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	384	1.28	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	917	0.05	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	918	0.02	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Yaleri	919	3.49	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Jowar+Redgram (Ct+Jw+Rg)	Not Available	IIes	Graded bunding
Yaleri	920	0.98	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	921	0.84	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	922	0.67	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	923	0.15	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	924/1	3.41	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	924/2	1.19	MDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IIes	Graded bunding
Yaleri	925	0.74	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Yaleri	926	0.74	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Yaleri	989	0.1	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	990	0.15	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	1010	1.55	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIe	Graded bunding
Yaleri	1014	0.18	MDRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIe	Graded bunding
Yaleri	1018	0.59	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Yaleri	1019	0.45	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	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
Gopalapura	74	0.01	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Gopalapura	75	3.4	BLDmB2	LMU-2	Moderately shallow (50-75 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Thotalura	110	0.2	SGRcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIws	Graded bunding
Thotalura	111	0.09	HGNmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding

Appendix II

Ghanapur-2 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
Yaleri	1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	6	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	7	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	8	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	11	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	12/3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	19	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	20	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	21	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	22	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	23	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	24	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	25	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	26	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	27	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	28	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	29	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	30	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	31	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	32	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	33/1	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	33/2	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	34/1	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	34/2	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	35	Moderately alkaline	Non saline (<2	Low	Low	Medium (145 -	low	Low	Sufficient (>	Sufficient	Sufficient	Deficient

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
		(pH 7.8 – 8.4)	dsm)	(<0.5 %)	(< 23 kg/ha)	337 kg/ha)	(< 10 ppm)	(< 0.5 ppm)	4.5 ppm)	(> 1.0 ppm)	(>0.2 ppm)	(< 0.6 ppm)
Yaleri	36	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)
Yaleri	37	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	38	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	39	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	40/1	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	40/2	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)
Yaleri	41	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Hogh (> 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)
Yaleri	42	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)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	106	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	128/1	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)	low (< 10 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	129	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)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	137/1	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	137/2	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	138/1	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	138/2	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	low (< 10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	172	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	173	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	180	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	181	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	182/1	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)
Yaleri	182/2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	183	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)
Yaleri	184	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)
Yaleri	185	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)

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Yaleri	186	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	187	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)	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)
Yaleri	188	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	high (> 57 kg/ha)	High (> 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)
Yaleri	189	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	190	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Hogh (> 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)
Yaleri	191	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)	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)
Yaleri	192	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	193	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	198	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	199	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	200	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	201	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	202	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	203	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	204	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)
Yaleri	205	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)
Yaleri	206	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)
Yaleri	207	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)
Yaleri	208	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)
Yaleri	209	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	210	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	224	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)	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)
Yaleri	225	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	226	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	227	Moderately alkaline	Non saline (<2	Low	Medium	Medium (145 -	Medium	Medium	Sufficient (>	Sufficient	Sufficient	Deficient

Village	Survey No.	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
		(pH 7.8 – 8.4)	dsm)	(<0.5 %)	(23 - 57 kg/ha)	337 kg/ha)	(10 - 20 ppm)	(0.5 - 1.0 ppm)	4.5 ppm)	(> 1.0 ppm)	(>0.2 ppm)	(< 0.6 ppm)
Yaleri	228	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	229	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	230	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	233	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	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)
Yaleri	234	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 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)
Yaleri	235	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 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)
Yaleri	236	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 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)
Yaleri	243	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	244	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	245	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	246	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	247	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	248	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	249	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	250	Strongly alkaline (pH 8.4 – 9.0)	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)
Yaleri	251	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)	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)
Yaleri	252	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)	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)
Yaleri	253	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	254	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Sufficient (>0.2 ppm)
Yaleri	269	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Hogh (> 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)
Yaleri	270	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	271	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	272	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	273	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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
Yaleri	274	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)	Sufficient (>0.2 ppm)
Yaleri	275	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)	Sufficient (>0.2 ppm)
Yaleri	276	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)	Sufficient (>0.2 ppm)
Yaleri	277	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	low (< 10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Sufficient (>0.2 ppm)
Yaleri	278	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	279	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	280	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	281	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	282	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	283	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	287	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	288	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	290	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	291	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	Low (< 145 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)
Yaleri	292	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)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	293	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	294	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	295	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	296	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	297	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	298	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)
Yaleri	299	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	300	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)	Sufficient (>0.2 ppm)
Yaleri	301	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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
Yaleri	302	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)
Yaleri	303	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	304	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)	Sufficient (>0.2 ppm)
Yaleri	305	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Sufficient (>0.2 ppm)
Yaleri	306	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	307	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	308	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)
Yaleri	309	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)
Yaleri	310	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	311	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)
Yaleri	312	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)
Yaleri	313	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)
Yaleri	314	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)
Yaleri	315	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	316	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	317	Slightly alkaline (pH 7.3 – 7.8)	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)
Yaleri	318	Slightly alkaline (pH 7.3 – 7.8)	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)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	319	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)
Yaleri	320	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)
Yaleri	354	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	355	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	378	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Others	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	380	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	383	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	384	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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
Yaleri	917	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	918	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	919	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	920	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)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	921	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	922	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	923	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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
Yaleri	924/1	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	924/2	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	925	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	926	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	989	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	990	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	1010	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (<0.5 %)	Low (< 23 kg/ha)	High (> 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)
Yaleri	1014	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	High (> 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)
Yaleri	1018	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Yaleri	1019	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gopalapura	74	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)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Gopalapura	75	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)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (>0.2 ppm)	Deficient (< 0.6 ppm)
Thotalura	110	Slightly alkaline (pH 7.3 – 7.8)	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)
Thotalura	111	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)

Appendix III

Ghanapur-2 Microwatershed

Soil Suitability Information

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Cotton	Guava	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard Apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulbery
Yaleri	1	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
Yaleri	2	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
Yaleri	3	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
Yaleri	6	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
Yaleri	7	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
Yaleri	8	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
Yaleri	11	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
Yaleri	12/3	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
Yaleri	19	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	20	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	21	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	22	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	23	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	24	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	25	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	26	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	27	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	28	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	29	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	30	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	31	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	32	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	33/1	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	33/2	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	34/1	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	34/2	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	35	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	36	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	37	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	38	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	39	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	40/1	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	40/2	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	41	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	42	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Yaleri	106	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	128/1	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	129	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	137/	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Cotton	Guava	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard Apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulbery
	1																										
Yaleri	137/2	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	138/1	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	138/2	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	172	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	173	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	180	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	181	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	182/1	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	182/2	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	183	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	184	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	185	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	186	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	187	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	188	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	189	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	190	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	191	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	192	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	193	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	198	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	199	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	200	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	201	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	202	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	203	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	204	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	205	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	206	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	207	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	208	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	209	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	210	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	224	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
Yaleri	225	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	226	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	227	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	228	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	229	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	230	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	233	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	234	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Cotton	Guava	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard Apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulbery
Yaleri	235	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	236	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	243	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	244	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	245	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	246	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	247	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	248	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	249	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	250	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	251	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	252	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	253	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	254	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	269	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	270	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
Yaleri	271	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
Yaleri	272	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	273	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	274	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	275	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	276	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	277	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	278	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	279	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	280	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	281	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	282	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	283	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	287	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	288	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	290	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	291	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	292	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	293	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	294	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	295	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	296	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	297	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	298	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	299	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	300	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	301	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Cotton	Guava	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard Apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulbery
Yaleri	302	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	303	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	304	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	305	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	306	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	307	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	308	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	309	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	310	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	311	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	312	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	313	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	314	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	315	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Yaleri	316	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	317	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	318	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	319	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	320	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Yaleri	354	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
Yaleri	355	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
Yaleri	378	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	380	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	383	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	384	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	917	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	918	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	919	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	920	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	921	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	922	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	923	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	924/1	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	924/2	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	925	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
Yaleri	926	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
Yaleri	989	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	990	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	1010	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	1014	S3tz	S3tw	S3t	S2zw	S2z	S3t	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Yaleri	1018	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
Yaleri	1019	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
Gopalapura	74	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt

Village	Survey No.	Mango	Maize	Sapota	Sorgham	Cotton	Guava	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard Apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulbery
Gopalapura	75	N1rz	S3tz	S3rt	S2rz	S2rw	S3rt	N1rz	S3rz	S2rw	S3rw	S3rw	S2r	S3rt	S2r	N1tz	S3rz	S3rz	S3tw	S2tw	S3tw	S2rt	S2rt	S3rz	S2rt	S3rz	S3rt
Thotalura	110	S3tw	S3tw	S3tw	S2w	S1	S3tw	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Thotalura	111	S3t	S3tw	S3t	S2wz	S2wz	S3t	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data on households sampled for socio economic survey indicated that 35 farmers were sampled in Ghanapur-2 micro-watershed among them 7 (20 %) were landless, 5 (14.29 %) were marginal farmers, 15 (42.86 %) were small farmers, 6 (17.14 %) were semi medium farmers and 2 (5.71%) were medium farmers.*
- *The data indicated that there were 77 (55 %) men and 63 (45 %) women among the sampled households. The average family size of landless farmers' was 5.5, marginal farmers' was 4.9, small farmers' was 5.8, semi medium farmers' was 6.2 and medium farmers' was 9.*
- *The data indicated that, 14 (10 %) people were in 0-15 years of age, 67 (47.86 %) were in 16-35 years of age, 49 (35 %) were in 36-60 years of age and 10 (7.14 %) were above 61 years of age.*
- *The results indicated that Ghanapur-2 had 17.14 per cent illiterates, 18.57 per cent of them had primary school, 5.71 per cent of them had middle school, 50 per cent of them had high school education, 2.86 per cent of them had PUC and 1.43 per cent of them had degree education.*
- *The results indicate that, 74.29 per cent of household heads were practicing agriculture, 20 per cent of the household heads were agricultural labourers and 5.71 cent of the household heads were General Labour.*
- *The results indicate that agriculture was the major occupation for 32.86 per cent of the household members, 37.86 per cent were agricultural labourers, 2.14 per cent were in general labour, 0.71 per cent were Household industry, 3.57 per cent were private service and Trade & Business , 6.43 per cent were students, housewives and children.*
- *The results show that, 0.71 per cent of the population in the micro watershed has participated in Raitha Sangha.*
- *The results indicate that 100 per cent of the households possess katcha house.*
- *The results show that 91.43 per cent of the households possess TV, 2.86 per cent of the households possess DVD/VCD Player, 14.29 per cent of the households possess motor cycle and 71.43 per cent of the households possess mobile phones.*
- *The results show that the average value of television was Rs. 8,953, DVD/VCD Player was Rs. 2,000, motor cycle was Rs. 44,000 and mobile phone was Rs. 2,824.*
- *About 2.86 per cent each of the households possess bullock cart, Plough, Sprinkler and Harvester.*
- *The results show that the average value of bullock cart was Rs. 13,000, plough was Rs. 5,000, sprinkler was Rs. 500 and the average value of Harvester was Rs. 400.*

- *The results indicate that, 8.57 per cent of the households possess bullocks, 2.86 per cent of the households possess local cow and Sheep and 8.57 per cent of the households possess Buffalo.*
- *The results indicate that, average own labour men available in the micro watershed was 1.71, average own labour (women) available was 1.43, average hired labour (men) available was 5.89 and average hired labour (women) available was 4.91.*
- *The results indicate that, 85.71 per cent of the households opined that the hired labour was adequate.*
- *The results indicate that, households of the Ghanapur-2 micro-watershed possess 33.99 ha (79.24 %) of dry land and 8.90 ha (20.76 %) of irrigated land. Marginal farmers possess 3.89 ha (100 %) of dry land. Small farmers possess 21.05 ha (100 %) of dry land. Semi medium farmers possess 4.05 ha (41.67 %) of dry land and 5.67 ha (58.33 %) of irrigated land. Medium farmers possess 5 ha (60.71 %) and 3.24 ha (39.29 %) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 567,647.06 and the average value of irrigated land was Rs. 437,863.64. In case of marginal famers, the average land value was Rs. 720,416.67 for dry land. In case of small famers, the average land value was Rs. 574,529.02 for dry land. In case of semi medium famers, the average land value was Rs. 889,200 for dry land and Rs. 564,571.43 for irrigated land. In case of medium farmers, the average land value was Rs. 159,870.55 for dry land and Rs. 216,125 for irrigated land.*
- *The results indicate that, there were 3 functioning and de-functioning bore wells in the micro watershed.*
- *The results indicate that, there were 1 functioning and de-functioning open wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 8.57 per cent of the farmers and open well was the irrigation source in the micro water shed for 2.86 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 4.01 meters and the depth of open well was found to be 1.83 meters.*
- *The results indicate that, small and semi medium farmers had an irrigated area of 1.21 ha and 2.83 ha respectively.*
- *The results indicate that, farmers have grown cotton (8.18 ha), groundnut (3.32 ha), red gram (28.06 ha) and sorghum (2.02 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, groundnut and cotton. Semi medium farmers have grown cotton, sorghum and groundnut. Medium farmers have grown red gram.*
- *The results indicate that, the cropping intensity in Ghanapur-2 micro-watershed was found to be 97.17 per cent.*

- *The results indicate that, 94.29 per cent of the households have bank account and 91.43 per cent of the households have savings.*
- *The results indicate that, 94.29 per cent of the households have availed credit from different sources.*
- *The results indicate that, 30.30 per cent of the households have borrowed from commercial bank and 3.03 per cent of the households have borrowed from moneylender traders.*
- *The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 15,909.09.*
- *The results indicate that, 90.91 per cent of the households borrowed from institutional sources for the purpose of agricultural production and 9.09 per cent for Healthcare.*
- *The results indicate that, 100 per cent of the households borrowed from private sources for the purpose of agricultural production.*
- *The results indicated that 100 per cent of the households not paid their loan borrowed from institutional sources.*
- *The results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.*
- *The results indicate that, 81.82 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations and 9.09 per cent opined that the loan amount borrowed from easy accessibility of credit.*
- *The results indicate that, around 100 per cent opined that the loan amount was adequate to fulfil the requirement.*
- *The results indicate that, the total cost of cultivation for Cotton was Rs. 31117.88. The gross income realized by the farmers was Rs. 52002.32. The net income from Cotton cultivation was Rs. 20884.44. Thus the benefit cost ratio was found to be 1: 1.67.*
- *The results indicate that, the total cost of cultivation for groundnut was Rs. 42675.97. The gross income realized by the farmers was Rs. 47273.06. The net income from groundnut cultivation was Rs. 4597.09. Thus the benefit cost ratio was found to be 1: 1.11.*
- *The results indicate that, the total cost of cultivation for Red gram was Rs. 30982.58. The gross income realized by the farmers was Rs. 71422.49. The net income from Red gram cultivation was Rs. 40439.90. Thus the benefit cost ratio was found to be 1: 2.31.*
- *The results indicate that, the total cost of cultivation for Sorghum was Rs. 15222.38. The gross income realized by the farmers was Rs. 19760. The net income from Sorghum cultivation was Rs. 4537.62. Thus the benefit cost ratio was found to be 1: 1.3.*

- *The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that dry fodder was inadequate and 14.29 per cent of the households opined that green fodder was adequate*
- *The results indicate that the annual gross income was Rs. 36,714.29 for landless farmers, for marginal farmers it was Rs. 149,200, for small farmers it was Rs. 128,200, semi medium farmers it was Rs. 144,500 and medium farmers it was Rs. 180,000.*
- *The results indicate that the average annual expenditure is Rs. 8,570. For landless households it was Rs. 10,000, for marginal farmers it was Rs. 9,640, for small farmers it was Rs. 3,327.78, for semi medium farmers it was Rs. 7,388.89 and medium farmers it was Rs. 43,750.*
- *The results indicate that, sampled households have grown 11 mango tree in their field and 2 mango trees in backyard.*
- *The results indicate that, households have planted 24 neem and 2 tamarind trees in their field and also 4 neem and 1 tamarind trees in their backyard.*
- *The results indicated that, households have an average investment capacity of Rs. 8,885.77 for land development and households have an average investment capacity of Rs. 714.29 for Subsidiary enterprises.*
- *The results indicated that government subsidy was the source of additional investment for 2.86 per cent for land development and subsidiary enterprises. Own funds was the source of additional investment for 2.86 per cent for land development. Soft loan was the source of additional investment for 65.71per cent for land development and 2.86 per cent for subsidiary enterprises.*
- *The results indicated that, cotton was sold to the extent of 100 per cent, groundnut was sold to the extent of 77.78 per cent, Redgram was sold to the extent of 88.86 per cent and sorghum to the extent of 25 per cent.*
- *The results indicated that, about 82.86 per cent of the farmers sold their produce to regulated markets.*
- *The results indicated that, 82.86 per cent of the households have used tractor as a mode of transportation.*
- *The results indicated that, 45.71 per cent of the households have experienced soil and water erosion problems in the farm.*
- *The results indicated that, 45.71 per cent have shown interest in soil test.*
- *The results indicated that, 5.71 per cent have adopted Summer Ploughing and mulching, 2.86 per cent have adopted Dead Furrow and 2.86 per cent have adopted Combination of deep and shallow root crops.*
- *The results indicated that, 97.14 per cent of the households used firewood as a source of fuel.*

- *The results indicated that, piped supply was the major source of drinking water for 91.43 per cent of the households in the micro watershed and bore well was the source of drinking water for 2.86 per cent of the households in the micro watershed.*
- *The results indicated that, Electricity was the major source of light for 97.14 per cent of the households in micro watershed.*
- *The results indicated that, 25.71 per cent of the households possess sanitary toilet facility.*
- *The results indicated that, 97.14 per cent of the sampled households possessed BPL cards.*
- *The results indicated that, 97.14 per cent of the households participated in NREGA programme.*
- *The results indicated that, cereals were adequate for 82.86 per cent of the households, pulses were adequate for 74.29 per cent of the households, oilseed were adequate for 68.57 per cent, vegetables were adequate for 65.71 per cent, fruits were adequate for 48.57 per cent, milk were adequate for 60 per cent and meat were adequate for 14.29 per cent, Egg and meat were adequate for 57.14 per cent.*
- *The results indicated that, cereals were inadequate for 5.71 per cent of the households, pulses were inadequate for 11.43 per cent of the households, oilseeds were inadequate for 14.29 per cent, vegetables were inadequate for 17.14 per cent, fruits were inadequate for 34.29 per cent, milk were inadequate for 22.86 per cent, egg were inadequate for 31.43 per cent and meat were inadequate for 28.57 per cent of the households.*
- *The results indicated that, lower fertility status of the was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (11.43 %), frequent incidence of pest and diseases (71.43 %), Inadequacy of irrigation water (80 %), high rate of interest on credit (82.86 %), low price for the agricultural commodities (80 %), inadequacy extension service (68.57 %), high cost of fertilizer and plant protection chemicals (77.14 %), lack of marketing facilities in the area (74.29 %) and Lack of transport for safe transport of the Agril produce to the market (5.71 %).*

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

Yadgir 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.

Yadgir 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 Yadgir 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

Ghanapur-2 micro-watershed in Gopalapur sub-watershed (Yadgir taluk and district) is located in between $16^0$44.33.373'' to $16^0$41'56.581'' North latitudes and 77^0 20'43.345'' to $77^0$19'19.978'' East longitudes, covering an area of about 571.43 ha, bounded by Yaleri, Gopalapura and Thotalura 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 Ghanapur-2 micro-watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Ghanapur-2 micro-watershed among them 7 (20 %) were landless, 5 (14.29 %) were marginal farmers, 15 (42.86 %) were small farmers, 6 (17.14 %) were semi medium farmers and 2 (5.71%) were medium farmers.

Table 1: Households sampled for socio economic survey in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	7	20	5	14.29	15	42.86	6	17.14	2	5.71	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Ghanapur-2 micro-watershed is presented in Table 2. The data indicated that there were 77 (55 %) men and 63 (45 %) women among the sampled households. The average family size of landless farmers' was 5.5, marginal farmers' was 4.9, small farmers' was 5.8, semi medium farmers' was 6.2 and medium farmers' was 9.

Table 2: Population characteristics of Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Men	12	60	10	50	37	56.92	11	42.31	7	77.78	77	55
2	Women	8	40	10	50	28	43.08	15	57.69	2	22.22	63	45
Total		20	100	20	100	65	100	26	100	9	100	140	100
Average		2.85		4		4.33		4.33		4.5		4	

Age wise classification of population: The age wise classification of household members in Ghanapur-2 micro-watershed is presented in Table 3. The data indicated that, 14 (10 %) people were in 0-15 years of age, 67 (47.86 %) were in 16-35 years of age, 49 (35 %) were in 36-60 years of age and 10 (7.14 %) were above 61 years of age.

Table 3: Age wise classification of household members in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (20)		MF (20)		SF (65)		SMF (26)		MDF (9)		All (140)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	3	15	3	15	3	4.62	5	19.23	0	0	14	10
2	16-35 years of age	12	60	10	50	37	56.92	4	15.38	4	44.44	67	47.86
3	36-60 years of age	4	20	6	30	21	32.31	14	53.85	4	44.44	49	35
4	> 61 years	1	5	1	5	4	6.15	3	11.54	1	11.11	10	7.14
Total		20	100	20	100	65	100	26	100	9	100	140	100

Education level of household members: Education level of household members in Ghanapur-2 micro-watershed is presented in Table 4. The results indicated that

Ghanapur-2 had 17.14 per cent illiterates, 18.57 per cent of them had primary school, 5.71 per cent of them had middle school, 50 per cent of them had high school education, 2.86 per cent of them had PUC and 1.43 per cent of them had degree education.

Table 4. Education level of household members in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (20)		MF (20)		SF (65)		SMF (26)		MDF (9)		All (140)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	7	35	3	15	7	10.77	7	26.92	0	0	24	17.14
2	Primary School	5	25	8	40	4	6.15	8	30.77	1	11.11	26	18.57
3	Middle School	0	0	0	0	6	9.23	2	7.69	0	0	8	5.71
4	High School	7	35	8	40	40	61.54	7	26.92	8	88.89	70	50
5	PUC	0	0	1	5	3	4.62	0	0	0	0	4	2.86
6	Degree	0	0	0	0	2	3.08	0	0	0	0	2	1.43
7	Others	1	5	0	0	3	4.62	2	7.69	0	0	6	4.29
Total		20	100	20	100	65	100	26	100	9	100	140	100

Occupation of household heads: The data regarding the occupation of the household heads in Ghanapur-2 micro-watershed is presented in Table 5. The results indicate that, 74.29 per cent of household heads were practicing agriculture, 20 per cent of the household heads were agricultural labourers and 5.71 cent of the household heads were General Labour.

Table 5: Occupation of household heads in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	14.29	5	100	12	80	6	100	2	100	26	74.29
2	Agricultural Labour	4	57.14	0	0	3	20	0	0	0	0	7	20
3	General Labour	2	28.57	0	0	0	0	0	0	0	0	2	5.71
Total		7	100	5	100	15	100	6	100	2	100	35	100

Table 6: Occupation of family members in Ghanapur-2 micro-watershed

Sl. No.	Particulars	LL (20)		MF (20)		SF (65)		SMF (26)		MDF (9)		All (140)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	5	11	55	24	36.92	7	26.92	3	33.33	46	32.86
2	Agricultural Labour	12	60	5	25	20	30.77	12	46.15	4	44.44	53	37.86
3	General Labour	2	10	0	0	1	1.54	0	0	0	0	3	2.14
4	Household industry	0	0	0	0	1	1.54	0	0	0	0	1	0.71
5	Private Service	0	0	0	0	5	7.69	0	0	0	0	5	3.57
6	Trade & Business	1	5	0	0	2	3.08	0	0	2	22.22	5	3.57
7	Student	3	15	2	10	3	4.62	1	3.85	0	0	9	6.43
8	Housewife	0	0	0	0	6	9.23	3	11.54	0	0	9	6.43
9	Children	1	5	2	10	3	4.62	3	11.54	0	0	9	6.43
Total		20	100	20	100	65	100	26	100	9	100	140	100

Occupation of the household members: The data regarding the occupation of the household members in Ghanapur-2 micro-watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 32.86 per cent of the household members, 37.86 per cent were agricultural labourers, 2.14 per cent were in general labour, 0.71 per cent were Household industry, 3.57 per cent were private service and Trade & Business , 6.43 per cent were students, housewives and children.

Institutional participation of the household members: The data regarding the institutional participation of the household members in Ghanapur-2 micro-watershed is presented in Table 7. The results show that, 0.71 per cent of the population in the micro watershed has participated in Raitha Sangha.

Table 7. Institutional Participation of household members in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (20)		MF (20)		SF (65)		SMF (26)		MDF (9)		All (140)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Raitha Sangha	0	0	1	5	0	0	0	0	0	0	1	0.71
2	No Participation	20	100	19	95	65	100	26	100	9	100	139	99.29
Total		20	100	20	100	65	100	26	100	9	100	140	100

Type of house owned: The data regarding the type of house owned by the households in Ghanapur-2 micro-watershed is presented in Table 8. The results indicate that 100 per cent of the households possess katcha house.

Table 8. Type of house owned by households in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Katcha	7	100	5	100	15	100	6	100	2	100	35	100
Total		7	100	5	100	15	100	6	100	2	100	35	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Ghanapur-2 micro-watershed is presented in Table 9. The results show that 91.43 per cent of the households possess TV, 2.86 per cent of the households possess DVD/VCD Player, 14.29 per cent of the households possess motor cycle and 71.43 per cent of the households possess mobile phones.

Table 9. Durable Assets owned by households in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Television	5	71.43	4	80	16	106.67	5	83.33	2	100	32	91.43
2	DVD/VCD Player	0	0	1	20	0	0	0	0	0	0	1	2.86
3	Motor Cycle	1	14.29	1	20	2	13.33	0	0	1	50	5	14.29
4	Mobile Phone	3	42.86	4	80	13	86.67	4	66.67	1	50	25	71.43

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Ghanapur-2 micro-watershed is presented in Table 10. The

results show that the average value of television was Rs. 8,953, DVD/VCD Player was Rs. 2,000, motor cycle was Rs. 44,000 and mobile phone was Rs. 2,824.

Table 10. Average value of durable assets owned by households in Ghanapur-2 micro-watershed

Average value (Rs.)

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Television	18,000	7,750	6,718	8,400	8,000	8,953
2	DVD/VCD Player	0	2,000	0	0	0	2,000
3	Motor Cycle	40,000	25,000	47,500	0	60,000	44,000
4	Mobile Phone	2,666	2,083	2,813	4,425	1,500	2,824

Farm Implements owned: The data regarding the farm implements owned by the households in Ghanapur-2 micro-watershed is presented in Table 11. About 2.86 per cent each of the households possess bullock cart, Plough, Sprinkler and Harvester.

Table 11. Farm Implements owned by households in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	0	0	1	6.67	0	0	0	0	1	2.86
2	Plough	0	0	0	0	1	6.67	0	0	0	0	1	2.86
3	Sprinkler	0	0	0	0	0	0	1	16.67	0	0	1	2.86
4	Harvester	0	0	0	0	0	0	1	16.67	0	0	1	2.86
5	Blank	1	14.29	0	0	1	6.67	0	0	0	0	2	5.71

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Ghanapur-2 micro-watershed is presented in Table 12. The results show that the average value of bullock cart was Rs. 13,000, plough was Rs. 5,000, sprinkler was Rs. 500 and the average value of Harvester was Rs. 400.

Table 12. Average value of farm implements owned by households in Ghanapur-2 micro-watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Bullock Cart	0	0	13,000	0	0	13,000
2	Plough	0	0	5,000	0	0	5,000
3	Sprinkler	0	0	0	500	0	500
4	Harvester	0	0	0	400	0	400

Table 13. Livestock possession by households in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	1	20	2	13.33	0	0	0	0	3	8.57
2	Local cow	0	0	0	0	1	6.67	0	0	0	0	1	2.86
3	Buffalo	0	0	2	40	0	0	0	0	1	50	3	8.57
4	Sheep	0	0	0	0	1	6.67	0	0	0	0	1	2.86
5	blank	1	14.29	0	0	1	6.67	0	0	0	0	2	5.71

Livestock possession by the households: The data regarding the Livestock possession by the households in Ghanapur-2 micro-watershed is presented in Table 13. The results indicate that, 8.57 per cent of the households possess bullocks, 2.86 per cent of the households possess local cow and Sheep and 8.57 per cent of the households possess Buffalo.

Average Labour availability: The data regarding the average labour availability in Ghanapur-2 micro-watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.71, average own labour (women) available was 1.43, average hired labour (men) available was 5.89 and average hired labour (women) available was 4.91.

In case of marginal farmers, average own labour men available was 2, average own labour (women) was 1.60, average hired labour (men) was 6.80 and average hired labour (women) available was 5.80. In case of small farmers, average own labour men available was 1.93, average own labour (women) was 1.80, average hired labour (men) was 7.40 and average hired labour (women) available was 5.87. In case of semi medium farmers, average own labour men available was 2, average own labour (women) was 1.67, average hired labour (men) was 7.67 and average hired labour (women) available was 6.17. In case of medium farmers, average own labour men available and average own labour (women) was 1.50, average hired labour (men) was 1.50 and average hired labour (women) available was 3.

Table 14. Average Labour availability in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		N	N	N	N	N	N
1	Hired labour Female	1.71	5.80	5.87	6.17	3	4.91
2	Own Labour Female	0.29	1.60	1.80	1.67	1.50	1.43
3	Own labour Male	0.86	2	1.93	2	1.50	1.71
4	Hired labour Male	1.71	6.80	7.40	7.67	1.50	5.89

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Ghanapur-2 micro-watershed is presented in Table 15. The results indicate that, 85.71 per cent of the households opined that the hired labour was adequate.

Table 15. Adequacy of Hired Labour in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	2	28.57	5	100	15	100	6	100	2	100	30	85.71

Distribution of land (ha): The data regarding the distribution of land (ha) in Ghanapur-2 micro-watershed is presented in Table 16. The results indicate that, households of the Ghanapur-2 micro-watershed possess 33.99 ha (79.24 %) of dry land and 8.90 ha (20.76 %) of irrigated land. Marginal farmers possess 3.89 ha (100 %) of dry land. Small farmers

possess 21.05 ha (100 %) of dry land. Semi medium farmers possess 4.05 ha (41.67 %) of dry land and 5.67 ha (58.33 %) of irrigated land. Medium farmers possess 5 ha (60.71 %) and 3.24 ha (39.29 %) of irrigated land.

Table 16. Distribution of land (Ha) in Ghanapur-2 micro-watershed

Sl.No.	Particulars	MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	3.89	100	21.05	100	4.05	41.67	5	60.71	33.99	79.24
2	Irrigated	0	0	0	0	5.67	58.33	3.24	39.29	8.90	20.76
Total		3.89	100	21.05	100	9.71	100	8.24	100	42.89	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Ghanapur-2 micro-watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 567,647.06 and the average value of irrigated land was Rs. 437,863.64. In case of marginal famers, the average land value was Rs. 720,416.67 for dry land. In case of small famers, the average land value was Rs. 574,529.02 for dry land. In case of semi medium famers, the average land value was Rs. 889,200 for dry land and Rs. 564,571.43 for irrigated land. In case of medium farmers, the average land value was Rs. 159,870.55 for dry land and Rs. 216,125 for irrigated land.

Table 17. Average land value (Rs./ha) in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		N	N	N	N	N	N
1	Dry	0	720,416.67	574,529.02	889,200	159,870.55	567,647.06
2	Irrigated	0	0	0	564,571.43	216,125	437,863.64

Status of bore wells: The data regarding the status of bore wells in Ghanapur-2 micro-watershed is presented in Table 18. The results indicate that, there were 3 functioning and de-functioning bore wells in the micro watershed.

Table 18. Status of bore wells in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		N	N	N	N	N	N
1	De-functioning	0	0	1	1	1	3
2	Functioning	0	0	1	1	1	3

Status of open wells: The data regarding the status of open wells in Ghanapur-2 micro-watershed is presented in Table 19. The results indicate that, there were 1 functioning and de-functioning open wells in the micro watershed.

Table 19. Status of open wells in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		N	N	N	N	N	N
1	De-functioning	0	0	0	1	0	1
2	Functioning	0	0	0	1	0	1

Source of irrigation: The data regarding the source of irrigation in Ghanapur-2 micro-watershed is presented in Table 20. The results indicate that, bore well was the major irrigation source in the micro water shed for 8.57 per cent of the farmers and open well was the irrigation source in the micro water shed for 2.86 per cent of the farmers.

Table 20. Source of irrigation in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	0	0	1	6.67	1	16.67	1	50	3	8.57
2	Open Well	0	0	0	0	0	0	1	16.67	0	0	1	2.86

Depth of water (Avg in meters): The data regarding the depth of water in Ghanapur-2 micro-watershed is presented in Table 21. The results indicate that, the depth of bore well was found to be 4.01 meters and the depth of open well was found to be 1.83 meters.

Table 21. Depth of water (Avg in meters) in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		N	N	N	N	N	N
1	Bore Well	0	0	2.44	6.10	33.53	4.01
2	Open Well	0	0	0	10.67	0	1.83

Irrigated Area (ha): The data regarding the irrigated area (ha) in Ghanapur-2 micro-watershed is presented in Table 22. The results indicate that, small and semi medium farmers had an irrigated area of 1.21 ha and 2.83 ha respectively.

Table 22. Irrigated Area (ha) in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Kharif	0	0	1.21	2.83	0	4.05

Cropping pattern: The data regarding the cropping pattern in Ghanapur-2 micro-watershed is presented in Table 23. The results indicate that, farmers have grown cotton (8.18 ha), groundnut (3.32 ha), red gram (28.06 ha) and sorghum (2.02 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, groundnut and cotton. Semi medium farmers have grown cotton, sorghum and groundnut. Medium farmers have grown red gram.

Table 23. Cropping pattern in Ghanapur-2 micro-watershed (Area in ha)

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Kharif - Red gram (togari)	0	2.67	17.14	0	8.24	28.06
2	Kharif - Cotton	0	1.21	1.3	5.67	0	8.18
3	Kharif - Groundnut	0	0	2.51	0.81	0	3.32
4	Kharif - Sorghum	0	0	0	2.02	0	2.02
Total		0	3.89	20.95	8.5	8.24	41.58

Cropping intensity: The data regarding the cropping intensity in Ghanapur-2 micro-watershed is presented in Table 24. The results indicate that, the cropping intensity in Ghanapur-2 micro-watershed was found to be 97.17 per cent.

Table 24. Cropping intensity (%) in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Cropping Intensity	0	100	100.02	87.50	100	97.17

Possession of Bank account and savings: The data regarding the possession of bank account and saving in Ghanapur-2 micro-watershed is presented in Table 25. The results indicate that, 94.29 per cent of the households have bank account and 91.43 per cent of the households have savings.

Table 25. Possession of bank account and savings in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Account	6	85.71	5	100	15	100	5	83.33	2	100	33	94.29
2	Savings	6	85.71	5	100	14	93.33	5	83.33	2	100	32	91.43

Borrowing status: The data regarding the borrowing status in Ghanapur-2 micro-watershed is presented in Table 26. The results indicate that, 94.29 per cent of the households have availed credit from different sources.

Table 26. Borrowing status in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	6	85.71	5	100	15	100	5	83.33	2	100	33	94.29

Source of credit availed by households: The data regarding the source of credit availed by households in Ghanapur-2 micro-watershed is presented in Table 27. The results indicate that, 30.30 per cent of the households have borrowed from commercial bank and 3.03 per cent of the households have borrowed from moneylender traders.

Table 27. Source of credit availed by households in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (6)		MF (5)		SF (15)		SMF (5)		MDF (2)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Commercial Bank	1	16.67	2	40	4	26.67	2	40	1	50	10	30.30
2	Money Lender	0	0	0	0	0	0	1	20	0	0	1	3.03

Avg. Credit amount: The data regarding the avg. Credit amount in Ghanapur-2 micro-watershed is presented in Table 28. The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 15,909.09.

Table 28. Avg. credit amount by household in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (6)	MF (5)	SF (15)	SMF (5)	MDF (2)	All (33)
		N	N	N	N	N	N
1	Average Credit	5,000	22,000	11,000	24,000	50,000	15,909.09

Purpose of credit borrowed - Institutional Credit: The data regarding the purpose of credit borrowed - Institutional Credit in Ghanapur-2 micro-watershed is presented in Table 29. The results indicate that, 90.91 per cent of the households borrowed from institutional sources for the purpose of agricultural production and 9.09 per cent for Healthcare.

Table 29. Purpose of credit borrowed - Institutional Credit by household in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (1)		MF (3)		SF (4)		SMF (2)		MDF (1)		All (11)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture production	0	0	3	100	4	100	2	100	1	100	10	90.91
2	Healthcare	1	100	0	0	0	0	0	0	0	0	1	9.09

Purpose of credit borrowed - Private Credit: The data regarding the purpose of credit borrowed - private Credit in Ghanapur-2 micro-watershed is presented in Table 30. The results indicate that, 100 per cent of the households borrowed from private sources for the purpose of agricultural production.

Table 30. Purpose of credit borrowed - Private Credit in Ghanapur-2 micro-watershed

Sl.No.	Particulars	SMF (1)		All (1)	
		N	%	N	%
1	Agriculture production	1	100	1	100.0

Repayment status of households – Institutional: The data regarding the repayment status of credit borrowed from institutional sources by households in Ghanapur-2 micro watershed is presented in Table 31. The results indicated that 100 per cent of the households not paid their loan borrowed from institutional sources.

Table 31. Repayment status of households – Institutional Credit in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (1)		MF (3)		SF (4)		SMF (2)		MDF (1)		All (11)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Un paid	1	100	3	100	4	100	2	100	1	100	11	100

Repayment status of households – Private: The data regarding the repayment status of credit borrowed from private sources by households in Ghanapur-2 micro watershed is

presented in Table 32. The results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.

Table 32. Repayment status of households – private Credit in Ghanapur-2 micro-watershed

Sl.No.	Particulars	SMF (1)		All (1)	
		N	%	N	%
1	Un paid	1	100	1	100

Opinion on institutional sources of credit: The data regarding the opinion on institutional sources of credit in Ghanapur-2 micro watershed is presented in Table 33. The results indicate that, 81.82 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations and 9.09 per cent opined that the loan amount borrowed from easy accessibility of credit.

Table 33. Opinion on institutional sources of credit in Ghanapur-2 micro watershed

Sl.No.	Particulars	LL (1)		MF (3)		SF (4)		SMF (2)		MDF (1)		All (11)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Helped to perform timely agricultural operations	0	0	2	66.67	4	100	2	100	1	100	9	81.82
2	Easy accessibility of credit	0	0	1	33.33	0	0	0	0	0	0	1	9.09
3	None	1	100	0	0	0	0	0	0	0	0	1	9.09

Opinion on non-institutional sources of credit: The data regarding the opinion on non-institutional sources of credit in Ghanapur-2 micro watershed is presented in Table 34. The results indicate that, around 100 per cent opined that the loan amount was adequate to fulfil the requirement.

Table 34. Opinion on non- institutional sources of credit in Ghanapur-2 micro watershed

Sl.No.	Particulars	SMF (1)		All (1)	
		N	%	N	%
1	Loan amount was adequate to fulfil the requirement	1	100	1	100

Cost of cultivation of Cotton: The data regarding the cost of cultivation of Cotton in Ghanapur-2 micro-watershed is presented in Table 35. The results indicate that, the total cost of cultivation for Cotton was Rs. 31117.88. The gross income realized by the farmers was Rs. 52002.32. The net income from Cotton cultivation was Rs. 20884.44. Thus the benefit cost ratio was found to be 1: 1.67.

Table 35. Cost of Cultivation of Cotton in Ghanapur-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	28.02	6341.50	20.38
2	Bullock		Pairs/day	0.53	423.43	1.36
3	Tractor		Hours	0	0	0
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	6.23	3599.14	11.57
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	2.42	2819.92	9.06
8	Fertilizer + micronutrients		Quintal	5.62	3991.70	12.83
9	Pesticides (PPC)		Kgs / liters	2.26	2243.58	7.21
10	Irrigation		Number	0	0	0
11	Repairs			0	214.29	0.69
12	Msc. Charges (Marketing costs etc)			0	628.57	2.02
13	Depreciation charges			0	7.41	0.02
14	Land revenue and Taxes			0	0	0
II	**Cost B1**					
16	Interest on working capital				1530.52	4.92
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				21800.06	70.06
III	**Cost B2**					
18	Rental Value of Land				0	0
19	**Cost B2 = (Cost B1 + Rental value)**				21800.06	70.06
IV	**Cost C1**					
20	Family Human Labour			27.91	6388.92	20.53
21	**Cost C1 = (Cost B2 + Family Labour)**				28188.98	90.59
V	**Cost C2**					
22	Risk Premium				100	0.32
23	**Cost C2 = (Cost C1 + Risk Premium)**				28288.98	90.91
VI	**Cost C3**					
24	Managerial Cost				2828.90	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				31117.88	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		11.56	52002.32	
		b) Main Crop Sales Price (Rs.)			4500	
b.	Gross Income (Rs.)				52002.32	
c.	Net Income (Rs.)				20884.44	
d.	Cost per Quintal (Rs./q.)				2692.77	
e.	Benefit Cost Ratio (BC Ratio)				1:1.67	

Cost of cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Ghanapur-2 micro-watershed is presented in Table 36. The results indicate that, the total cost of cultivation for groundnut was Rs. 42675.97. The gross income realized by the farmers was Rs. 47273.06. The net income from groundnut cultivation was Rs. 4597.09. Thus the benefit cost ratio was found to be 1: 1.11.

Table 36. Cost of Cultivation of groundnut in Ghanapur-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	40.69	9137.11	21.41
2	Bullock		Pairs/day	0	0	0
3	Tractor		Hours	0.55	439.11	1.03
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	25.21	9818.25	23.01
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	2.32	3126.09	7.33
8	Fertilizer + micronutrients		Quintal	5.21	4185.28	9.81
9	Pesticides (PPC)		Kgs/liters	2.14	2435.69	5.71
10	Irrigation		Number	0	0	0
11	Repairs			0	300	0.70
12	Msc. Charges (Marketing costs etc)			0	533.33	1.25
13	Depreciation charges			0	0	0
14	Land revenue and Taxes			0	0	0
II	**Cost B1**					
16	Interest on working capital				2359.84	5.53
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				32334.71	75.77
III	**Cost B2**					
18	Rental Value of Land				0	0
19	**Cost B2 = (Cost B1 + Rental value)**				32334.71	75.77
IV	**Cost C1**					
20	Family Human Labour			26.07	6361.62	14.91
21	**Cost C1 = (Cost B2 + Family Labour)**				38696.33	90.67
V	**Cost C2**					
22	Risk Premium				100	0.23
23	**Cost C2 = (Cost C1 + Risk Premium)**				38796.33	90.91
VI	**Cost C3**					
24	Managerial Cost				3879.63	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				42675.97	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		13.38	47273.06	
		b) Main Crop Sales Price (Rs.)			3533.33	
b.	Gross Income (Rs.)				47273.06	
c.	Net Income (Rs.)				4597.09	
d.	Cost per Quintal (Rs./q.)				3189.73	
e.	Benefit Cost Ratio (BC Ratio)				1:1.11	

Cost of cultivation of Red gram: The data regarding the cost of cultivation of Red gram in Ghanapur-2 micro-watershed is presented in Table 37. The results indicate that, the total cost of cultivation for Red gram was Rs. 30982.58. The gross income realized by the farmers was Rs. 71422.49. The net income from Red gram cultivation was Rs. 40439.90. Thus the benefit cost ratio was found to be 1: 2.31.

Table 37. Cost of Cultivation of Red gram in Ghanapur-2 micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	31.99	8167.46	26.36
2	Bullock	Pairs/day	0.09	79.91	0.26
3	Tractor	Hours	0.07	56.42	0.18
4	Machinery	Hours	0.10	0	0
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	11.96	1668.08	5.38
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	3.39	4253.38	13.73
8	Fertilizer + micronutrients	Quintal	3.76	2835.88	9.15
9	Pesticides (PPC)	Kgs /liters	2.22	2509.93	8.10
10	Irrigation	Number	0	0	0
11	Repairs		0	288.24	0.93
12	Msc. Charges (Marketing costs etc)		0	488.24	1.58
13	Depreciation charges		0	97.09	0.31
14	Land revenue and Taxes		0	0	0
II	**Cost B1**				
16	Interest on working capital			1363.44	4.40
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			21808.07	70.39
III	**Cost B2**				
18	Rental Value of Land			23.53	0.08
19	**Cost B2 = (Cost B1 + Rental value)**			21831.60	70.46
IV	**Cost C1**				
20	Family Human Labour		22.71	6239.68	20.14
21	**Cost C1 = (Cost B2 + Family Labour)**			28071.28	90.60
V	**Cost C2**				
22	Risk Premium			94.71	0.31
23	**Cost C2 = (Cost C1 + Risk Premium)**			28165.99	90.91
VI	**Cost C3**				
24	Managerial Cost			2816.60	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			30982.58	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	17.50	71422.49	
		b) Main Crop Sales Price (Rs.)		4082.35	
b.	Gross Income (Rs.)			71422.49	
c.	Net Income (Rs.)			40439.90	
d.	Cost per Quintal (Rs./q.)			1770.90	
e.	Benefit Cost Ratio (BC Ratio)			1:2.31	

Cost of Cultivation of Sorghum: The data regarding the cost of cultivation of Sorghum in Ghanapur-2 micro-watershed is presented in Table 38. The results indicate that, the total cost of cultivation for Sorghum was Rs. 15222.38. The gross income realized by the farmers was Rs. 19760. The net income from Sorghum cultivation was Rs. 4537.62. Thus the benefit cost ratio was found to be 1: 1.3.

Table 38. Cost of Cultivation of Sorghum in Ghanapur-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	32.60	7410	48.68
2	Bullock		Pairs/day	0	0	0
3	Tractor		Hours	0	0	0
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.35	1235	8.11
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	2.96	2549.04	16.75
9	Pesticides (PPC)		Kgs / liters	0	0	0
10	Irrigation		Number	0	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	0	0
14	Land revenue and Taxes			0	0	0
II	**Cost B1**					
16	Interest on working capital				466.08	3.06
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				11660.12	76.60
III	**Cost B2**					
18	Rental Value of Land				300	1.97
19	**Cost B2 = (Cost B1 + Rental value)**				11960.12	78.57
IV	**Cost C1**					
20	Family Human Labour			7.90	1778.40	11.68
21	**Cost C1 = (Cost B2 + Family Labour)**				13738.52	90.25
V	**Cost C2**					
22	Risk Premium				100	0.66
23	**Cost C2 = (Cost C1 + Risk Premium)**				13838.52	90.91
VI	**Cost C3**					
24	Managerial Cost				1383.85	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				15222.38	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		9.88	19760	
		b) Main Crop Sales Price (Rs.)			2000	
b.	Gross Income (Rs.)				19760	
c.	Net Income (Rs.)				4537.62	
d.	Cost per Quintal (Rs./q.)				1540.73	
e.	Benefit Cost Ratio (BC Ratio)				1:1.3	

Adequacy of fodder: The data regarding the adequacy of fodder in Ghanapur-2 micro-watershed is presented in Table 39. The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that dry fodder was inadequate and 14.29 per cent of the households opined that green fodder was adequate

Table 39. Adequacy of fodder in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	3	60	7	46.67	1	16.67	2	100	13	37.14
2	Inadequate-Dry Fodder	0	0	0	0	0	0	1	16.67	0	0	1	2.86
3	Adequate-Green Fodder	0	0	0	0	2	13.33	1	16.67	2	100	5	14.29

Annual gross income: The data regarding the annual gross income in Ghanapur-2 micro-watershed is presented in Table 40. The results indicate that the annual gross income was Rs. 36,714.29 for landless farmers, for marginal farmers it was Rs. 149,200, for small farmers it was Rs. 128,200, semi medium farmers it was Rs. 144,500 and medium farmers it was Rs. 180,000.

Table 40. Annual gross income in Ghanapur-2 micro-watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Business	11,428.57	0	0	0	0	2,285.71
2	Wage	25,285.71	51,200	34,400	67,166.67	60,000	42,057.14
3	Agriculture	0	98,000	93,800	77,333.33	120,000	74,314.29
Income(Rs.)		36,714.29	149,200	128,200	144,500	180,000	118,657.14

Average annual expenditure: The data regarding the average annual expenditure in Ghanapur-2 micro-watershed is presented in Table 41. The results indicate that the average annual expenditure is Rs. 8,570. For landless households it was Rs. 10,000, for marginal farmers it was Rs. 9,640, for small farmers it was Rs. 3,327.78, for semi medium farmers it was Rs. 7,388.89 and medium farmers it was Rs. 43,750.

Table 41. Average annual expenditure in Ghanapur-2 micro-watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
1	Business	50,000	0	0	0	0	1,428.57
2	Wage	20,000	21,400	17,583.33	18,000	42,500	16,885.71
3	Agriculture	0	26,800	32,333.33	26,333.33	45,000	24,771.43
Total		70,000	48,200	49,916.67	44,333.33	87,500	299,950
Average		10,000	9,640	3,327.78	7,388.89	43,750	8,570

Horticulture species grown: The data regarding horticulture species grown in Ghanapur-2 micro-watershed is presented in Table 42. The results indicate that, sampled households have grown 11 mango tree in their field and 2 mango trees in backyard.

Table 42. Horticulture species grown in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Mango	0	0	0	0	7	1	0	0	4	1	11	2

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

Forest species grown: The data regarding forest species grown in Ghanapur-2 micro-watershed is presented in Table 43. The results indicate that, households have planted 24 neem and 2 tamarind trees in their field and also 4 neem and 1 tamarind trees in their backyard.

Table 43: Forest species grown in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Neem	0	0	8	2	12	1	0	0	4	1	24	4
2	Tamarind	0	0	0	0	0	0	0	0	2	1	2	1

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

Average Additional investment capacity: The data regarding average additional investment capacity in Ghanapur-2 micro-watershed is presented in Table 44. The results indicated that, households have an average investment capacity of Rs. 8,885.77 for land development and households have an average investment capacity of Rs. 714.29 for Subsidiary enterprises.

Table 44: Source of funds for additional investment capacity in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)	MF (5)	SF (15)	SMF (6)	MDF (2)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	0	11,800	12,200.07	9,500	6,000.50	8,885.77
2	Subsidiary enterprises	3,571.43	0	0	0	0	714.29

Source of additional investment: The data regarding source of funds for additional investment in Ghanapur-2 micro-watershed is presented in Table 45. The results indicated that government subsidy was the source of additional investment for 2.86 per cent for land development and subsidiary enterprises. Own funds was the source of additional investment for 2.86 per cent for land development. Soft loan was the source of additional investment for 65.71per cent for land development and 2.86 per cent for subsidiary enterprises.

Table 45: Source of funds for additional investment capacity in Ghanapur-2 micro – watershed

Sl.No	Item	Land development		Subsidiary enterprises	
		N	%	N	%
1	Government subsidy	1	2.86	1	2.86
2	Own funds	1	2.86	0	0.0
3	Soft loan	23	65.71	1	2.86

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Ghanapur-2 micro-watershed is presented in Table 46. The results indicated that, cotton was sold to the extent of 100 per cent, groundnut was sold to the extent of 77.78 per cent, Redgram was sold to the extent of 88.86 per cent and sorghum to the extent of 25 per cent.

Table 46. Marketing of the agricultural produce in Ghanapur-2 micro-watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	94	0	94	100	3937.5
2	Groundnut	45	10	35	77.78	3533.33
3	Redgram	449	50	399	88.86	4082.35
4	Sorghum	20	15	5	25	2000.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Ghanapur-2 micro-watershed is presented in Table 47. The results indicated that, about 82.86 per cent of the farmers sold their produce to regulated markets.

Table 47. Marketing Channels used for sale of agricultural produce in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Regulated Market	0	0	5	100	15	100	7	116.67	2	100	29	82.86

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Ghanapur-2 micro-watershed is presented in Table 48. The results indicated that, 82.86 per cent of the households have used tractor as a mode of transportation.

Table 48. Mode of transport of agricultural produce in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Tractor	0	0	5	100	15	100	7	116.67	2	100	29	82.86

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Ghanapur-2 micro-watershed is presented in Table 49. The results indicated that, 45.71 per cent of the households have experienced soil and water erosion problems in the farm.

Table 49. Incidence of soil and water erosion problems in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	0	0	2	40	7	46.67	5	83.33	2	100	16	45.71

Interest shown towards soil testing: The data regarding Interest shown towards soil testing in Ghanapur-2 micro-watershed is presented in Table 50. The results indicated that, 45.71 per cent have shown interest in soil test.

Table 50. Interest shown towards soil testing in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0	2	40	7	46.67	5	83.33	2	100	16	45.71

Soil and water conservation practices and structures adopted: The data regarding incidence of soil and water conservation practices in Balachakra-1 micro-watershed is presented in Table 51. The results indicated that, 5.71 per cent have adopted Summer Ploughing and mulching, 2.86 per cent have adopted Dead Furrow and 2.86 per cent have adopted Combination of deep and shallow root crops.

Table 51. Soil and water conservation practices and structures adopted in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Summer Ploughing	0	0	0	0	1	6.67	0	0	1	50	2	5.71
2	Dead Furrow	0	0	0	0	1	6.67	0	0	0	0	1	2.86
3	Mulching	0	0	0	0	1	6.67	0	0	1	50	2	5.71
4	Combination of deep and shallow root crops	0	0	0	0	1	6.67	0	0	0	0	1	2.86

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Ghanapur-2 micro-watershed is presented in Table 52. The results indicated that, 97.14 per cent of the households used firewood as a source of fuel.

Table 52. Usage pattern of fuel for domestic use in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	6	85.71	5	100	15	100	6	100	2	100	34	97.14

Source of drinking water: The data regarding source of drinking water in Ghanapur-2 micro-watershed is presented in Table 53. The results indicated that, piped supply was the major source of drinking water for 91.43 per cent of the households in the micro

watershed and bore well was the source of drinking water for 2.86 per cent of the households in the micro watershed.

Table 53. Source of drinking water in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	6	85.71	5	100	14	93.33	5	83.33	2	100	32	91.43
2	Bore Well	0	0	0	0	0	0	1	16.67	0	0	1	2.86

Source of light: The data regarding source of light in Ghanapur-2 micro-watershed is presented in Table 54. The results indicated that, Electricity was the major source of light for 97.14 per cent of the households in micro watershed.

Table 54. Source of light in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	6	85.71	5	100	15	100	6	100	2	100	34	97.14

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facilit**y** in Ghanapur-2 micro-watershed is presented in Table 55. The results indicated that, 25.71 per cent of the households possess sanitary toilet facility.

Table 55. Existence of Sanitary toilet facility in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	2	28.57	2	40	2	13.33	1	16.67	2	100	9	25.71

Possession of PDS card: The data regarding possession of PDS card in Ghanapur-2 micro-watershed is presented in Table 56. The results indicated that, 97.14 per cent of the sampled households possessed BPL cards.

Table 56. Possession of PDS card in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	6	85.71	5	100	15	100	6	100	2	100	34	97.14

Participation in NREGA program: The data regarding participation in NREGA programme in Ghanapur-2 micro-watershed is presented in Table 57. The results indicated that, 97.14 per cent of the households participated in NREGA programme.

Table 57. Participation in NREGA programme in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	6	85.71	5	100	15	100	6	100	2	100	34	97.14

Adequacy of food items: The data regarding adequacy of food items in Ghanapur-2 micro-watershed is presented in Table 58. The results indicated that, cereals were adequate for 82.86 per cent of the households, pulses were adequate for 74.29 per cent of the households, oilseed were adequate for 68.57 per cent, vegetables were adequate for 65.71 per cent, fruits were adequate for 48.57 per cent, milk were adequate for 60 per cent and meat were adequate for 14.29 per cent, Egg and meat were adequate for 57.14 per cent.

Table 58. Adequacy of food items in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	0	0	5	100	15	100	6	100	3	150	29	82.86
2	Pulses	0	0	5	100	15	100	5	83.33	1	50	26	74.29
3	Oilseed	0	0	5	100	13	86.67	4	66.67	2	100	24	68.57
4	Vegetables	0	0	5	100	10	66.67	6	100	2	100	23	65.71
5	Fruits	0	0	2	40	9	60	5	83.33	1	50	17	48.57
6	Milk	0	0	5	100	11	73.33	4	66.67	1	50	21	60
7	Egg	0	0	4	80	9	60	6	100	1	50	20	57.14
8	Meat	0	0	4	80	10	66.67	5	83.33	1	50	20	57.14

Response on Inadequacy of food items: The data regarding inadequacy of food items in Ghanapur-2 micro-watershed is presented in Table 59. The results indicated that, cereals were inadequate for 5.71 per cent of the households, pulses were inadequate for 11.43 per cent of the households, oilseeds were inadequate for 14.29 per cent, vegetables were inadequate for 17.14 per cent, fruits were inadequate for 34.29 per cent, milk were inadequate for 22.86 per cent, egg were inadequate for 31.43 per cent and meat were inadequate for 28.57 per cent of the households.

Table 59. Response on Inadequacy of food items in Ghanapur-2 micro-watershed

Sl.No.	Particulars	LL (7)		MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	2	28.57	0	0	0	0	0	0	0	0	2	5.71
2	Pulses	2	28.57	0	0	0	0	1	16.67	1	50	4	11.43
3	Oilseed	2	28.57	0	0	1	6.67	2	33.33	0	0	5	14.29
4	Vegetables	2	28.57	0	0	4	26.67	0	0	0	0	6	17.14
5	Fruits	2	28.57	3	60	5	33.33	1	16.67	1	50	12	34.29
6	Milk	3	42.86	0	0	3	20	1	16.67	1	50	8	22.86
7	Egg	3	42.86	1	20	6	40	0	0	1	50	11	31.43
8	Meat	3	42.86	1	20	4	26.67	1	16.67	1	50	10	28.57

Farming constraints: The data regarding farming constraints experienced by households in Ghanapur-2 micro-watershed is presented in Table 60. The results indicated that, lower fertility status of the was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (11.43 %), frequent incidence of pest and diseases (71.43 %), Inadequacy of irrigation water (80 %), high rate of interest on credit (82.86

%), low price for the agricultural commodities (80 %), inadequacy extension service (68.57 %), high cost of fertilizer and plant protection chemicals (77.14 %), lack of marketing facilities in the area (74.29 %) and Lack of transport for safe transport of the Agril produce to the market (5.71 %).

Table 60. Farming constraints Experienced in Ghanapur-2 micro-watershed

Sl. No.	Particulars	MF (5)		SF (15)		SMF (6)		MDF (2)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	5	100	15	100	6	100	2	100	28	80
2	Wild animal menace on farm field	1	20	3	20	0	0	0	0	4	11.43
3	Frequent incidence of pest and diseases	5	100	13	86.67	5	83.33	2	100	25	71.43
4	Inadequacy of irrigation water	5	100	15	100	6	100	2	100	28	80
5	High cost of Fertilizers and plant protection chemicals	4	80	15	100	6	100	2	100	27	77.14
6	High rate of interest on credit	5	100	16	106.67	6	100	2	100	29	82.86
7	Low price for the agricultural commodities	5	100	15	100	6	100	2	100	28	80
8	Lack of marketing facilities in the area	5	100	13	86.67	6	100	2	100	26	74.29
9	Inadequate extension services	4	80	12	80	6	100	2	100	24	68.57
10	Lack of transport for safe transport of the Agril produce to the market.	0	0	2	13.33	0	0	0	0	2	5.71

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 data on households sampled for socio economic survey indicated that 35 farmers were sampled in Ghanapur-2 micro-watershed among them 7 (20 %) were landless, 5 (14.29 %) were marginal farmers, 15 (42.86 %) were small farmers, 6 (17.14 %) were semi medium farmers and 2 (5.71%) were medium farmers.

The data indicated that there were 77 (55 %) men and 63 (45 %) women among the sampled households. The average family size of landless farmers' was 5.5, marginal farmers' was 4.9, small farmers' was 5.8, semi medium farmers' was 6.2 and medium farmers' was 9.

The data indicated that, 14 (10 %) people were in 0-15 years of age, 67 (47.86 %) were in 16-35 years of age, 49 (35 %) were in 36-60 years of age and 10 (7.14 %) were above 61 years of age.

The results indicated that Ghanapur-2 had 17.14 per cent illiterates, 18.57 per cent of them had primary school, 5.71 per cent of them had middle school, 50 per cent of them had high school education, 2.86 per cent of them had PUC and 1.43 per cent of them had degree education.

The results indicate that, 74.29 per cent of household heads were practicing agriculture, 20 per cent of the household heads were agricultural labourers and 5.71 cent of the household heads were General Labour.

The results indicate that agriculture was the major occupation for 32.86 per cent of the household members, 37.86 per cent were agricultural labourers, 2.14 per cent were in general labour, 0.71 per cent were Household industry, 3.57 per cent were private service and Trade & Business , 6.43 per cent were students, housewives and children.

The results show that, 0.71 per cent of the population in the micro watershed has participated in Raitha Sangha. The results indicate that 100 per cent of the households possess katcha house. The results show that 91.43 per cent of the households possess TV, 2.86 per cent of the households possess DVD/VCD Player, 14.29 per cent of the

households possess motor cycle and 71.43 per cent of the households possess mobile phones.

The results show that the average value of television was Rs. 8,953, DVD/VCD Player was Rs. 2,000, motor cycle was Rs. 44,000 and mobile phone was Rs. 2,824. About 2.86 per cent each of the households possess bullock cart, Plough, Sprinkler and Harvester.

The results show that the average value of bullock cart was Rs. 13,000, plough was Rs. 5,000, sprinkler was Rs. 500 and the average value of Harvester was Rs. 400. The results indicate that, 8.57 per cent of the households possess bullocks, 2.86 per cent of the households possess local cow and Sheep and 8.57 per cent of the households possess Buffalo.

The results indicate that, average own labour men available in the micro watershed was 1.71, average own labour (women) available was 1.43, average hired labour (men) available was 5.89 and average hired labour (women) available was 4.91.

The results indicate that, 85.71 per cent of the households opined that the hired labour was adequate. The results indicate that, households of the Ghanapur-2 micro-watershed possess 33.99 ha (79.24 %) of dry land and 8.90 ha (20.76 %) of irrigated land. Marginal farmers possess 3.89 ha (100 %) of dry land. Small farmers possess 21.05 ha (100 %) of dry land. Semi medium farmers possess 4.05 ha (41.67 %) of dry land and 5.67 ha (58.33 %) of irrigated land. Medium farmers possess 5 ha (60.71 %) and 3.24 ha (39.29 %) of irrigated land.

The results indicate that, the average value of dry land was Rs. 567,647.06 and the average value of irrigated land was Rs. 437,863.64. In case of marginal famers, the average land value was Rs. 720,416.67 for dry land. In case of small famers, the average land value was Rs. 574,529.02 for dry land. In case of semi medium famers, the average land value was Rs. 889,200 for dry land and Rs. 564,571.43 for irrigated land. In case of medium farmers, the average land value was Rs. 159,870.55 for dry land and Rs. 216,125 for irrigated land.

The results indicate that, there were 3 functioning and de-functioning bore wells in the micro watershed.The results indicate that, there were 1 functioning and de-functioning open wells in the micro watershed.

The results indicate that, bore well was the major irrigation source in the micro water shed for 8.57 per cent of the farmers and open well was the irrigation source in the micro water shed for 2.86 per cent of the farmers.

The results indicate that, the depth of bore well was found to be 4.01 meters and the depth of open well was found to be 1.83 meters. The results indicate that, small and semi medium farmers had an irrigated area of 1.21 ha and 2.83 ha respectively.

The results indicate that, farmers have grown cotton (8.18 ha), groundnut (3.32 ha), red gram (28.06 ha) and sorghum (2.02 ha). Marginal farmers have grown red gram and cotton. Small farmers have grown red gram, groundnut and cotton. Semi medium farmers have grown cotton, sorghum and groundnut. Medium farmers have grown red gram.

The results indicate that, the cropping intensity in Ghanapur-2 micro-watershed was found to be 97.17 per cent. The results indicate that, 94.29 per cent of the households have bank account and 91.43 per cent of the households have savings.

The results indicate that, 94.29 per cent of the households have availed credit from different sources. The results indicate that, 30.30 per cent of the households have borrowed from commercial bank and 3.03 per cent of the households have borrowed from moneylender traders.

The results indicate that, the average credit amount borrowed by households in micro-watershed was Rs, 15,909.09. The results indicate that, 90.91 per cent of the households borrowed from institutional sources for the purpose of agricultural production and 9.09 per cent for Healthcare. The results indicate that, 100 per cent of the households borrowed from private sources for the purpose of agricultural production.

The results indicated that 100 per cent of the households not paid their loan borrowed from institutional sources. The results indicated that 100 per cent of the households did not repay their loan borrowed from private sources.

The results indicate that, 81.82 per cent opined that the loan amount borrowed from helped to perform timely agricultural operations and 9.09 per cent opined that the loan amount borrowed from easy accessibility of credit.

The results indicate that, around 100 per cent opined that the loan amount was adequate to fulfil the requirement. The results indicate that, the total cost of cultivation for Cotton was Rs. 31117.88. The gross income realized by the farmers was Rs. 52002.32. The net income from Cotton cultivation was Rs. 20884.44. Thus the benefit cost ratio was found to be 1: 1.67.

The results indicate that, the total cost of cultivation for groundnut was Rs. 42675.97. The gross income realized by the farmers was Rs. 47273.06. The net income from groundnut cultivation was Rs. 4597.09. Thus the benefit cost ratio was found to be 1: 1.11. The results indicate that, the total cost of cultivation for Red gram was Rs.

30982.58. The gross income realized by the farmers was Rs. 71422.49. The net income from Red gram cultivation was Rs. 40439.90. Thus the benefit cost ratio was found to be 1: 2.31.

The results indicate that, the total cost of cultivation for Sorghum was Rs. 15222.38. The gross income realized by the farmers was Rs. 19760. The net income from Sorghum cultivation was Rs. 4537.62. Thus the benefit cost ratio was found to be 1: 1.3. The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and 2.86 per cent of the households opined that dry fodder was inadequate and 14.29 per cent of the households opined that green fodder was adequate

The results indicate that the annual gross income was Rs. 36,714.29 for landless farmers, for marginal farmers it was Rs. 149,200, for small farmers it was Rs. 128,200, semi medium farmers it was Rs. 144,500 and medium farmers it was Rs. 180,000. The results indicate that the average annual expenditure is Rs. 8,570. For landless households it was Rs. 10,000, for marginal farmers it was Rs. 9,640, for small farmers it was Rs. 3,327.78, for semi medium farmers it was Rs. 7,388.89 and medium farmers it was Rs. 43,750.

The results indicate that, sampled households have grown 11 mango tree in their field and 2 mango trees in backyard. The results indicate that, households have planted 24 neem and 2 tamarind trees in their field and also 4 neem and 1 tamarind trees in their backyard.

The results indicated that, households have an average investment capacity of Rs. 8,885.77 for land development and households have an average investment capacity of Rs. 714.29 for Subsidiary enterprises.

The results indicated that government subsidy was the source of additional investment for 2.86 per cent for land development and subsidiary enterprises. Own funds was the source of additional investment for 2.86 per cent for land development. Soft loan was the source of additional investment for 65.71per cent for land development and 2.86 per cent for subsidiary enterprises.

The results indicated that, cotton was sold to the extent of 100 per cent, groundnut was sold to the extent of 77.78 per cent, Redgram was sold to the extent of 88.86 per cent and sorghum to the extent of 25 per cent. The results indicated that, about 82.86 per cent of the farmers sold their produce to regulated markets.

The results indicated that, 82.86 per cent of the households have used tractor as a mode of transportation. The results indicated that, 45.71 per cent of the households have experienced soil and water erosion problems in the farm. The results indicated that, 45.71 per cent have shown interest in soil test.

The results indicated that, 5.71 per cent have adopted Summer Ploughing and mulching, 2.86 per cent have adopted Dead Furrow and 2.86 per cent have adopted Combination of deep and shallow root crops. The results indicated that, 97.14 per cent of the households used firewood as a source of fuel.

The results indicated that, piped supply was the major source of drinking water for 91.43 per cent of the households in the micro watershed and bore well was the source of drinking water for 2.86 per cent of the households in the micro watershed. The results indicated that, Electricity was the major source of light for 97.14 per cent of the households in micro watershed.

The results indicated that, 25.71 per cent of the households possess sanitary toilet facility. The results indicated that, 97.14 per cent of the sampled households possessed BPL cards. The results indicated that, 97.14 per cent of the households participated in NREGA programme.

The results indicated that, cereals were adequate for 82.86 per cent of the households, pulses were adequate for 74.29 per cent of the households, oilseed were adequate for 68.57 per cent, vegetables were adequate for 65.71 per cent, fruits were adequate for 48.57 per cent, milk were adequate for 60 per cent and meat were adequate for 14.29 per cent, Egg and meat were adequate for 57.14 per cent.

The results indicated that, cereals were inadequate for 5.71 per cent of the households, pulses were inadequate for 11.43 per cent of the households, oilseeds were inadequate for 14.29 per cent, vegetables were inadequate for 17.14 per cent, fruits were inadequate for 34.29 per cent, milk were inadequate for 22.86 per cent, egg were inadequate for 31.43 per cent and meat were inadequate for 28.57 per cent of the households.

The results indicated that, lower fertility status of the was the constraint experienced by 80 per cent of the households, wild animal menace on farm field (11.43 %), frequent incidence of pest and diseases (71.43 %), Inadequacy of irrigation water (80 %), high rate of interest on credit (82.86 %), low price for the agricultural commodities (80 %), inadequacy extension service (68.57 %), high cost of fertilizer and plant protection chemicals (77.14 %), lack of marketing facilities in the area (74.29 %) and Lack of transport for safe transport of the Agril produce to the market (5.71 %).