

**“FERTILITY EVALUATION IN BLACK SOILS OF SAKTI
BLOCK IN JANJGIR-CHAMPA DISTRICT OF
CHATTISGARH”**

M.Sc. (Ag.) THESIS

By
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CHEMISTRY
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INDIRA GANDHI KRISHI VISHWAVIDYALAYA
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BLOCK IN JANJGIR-CHAMPA DISTRICT OF CHATTISGARH”**

Thesis

Submitted to the

Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.)

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ASHISH SONI

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CERTIFICATE –I

This is to certify that the thesis entitled “**FERTILITY EVALUATION IN BLACK SOILS OF SAKTI BLOCK IN JANJGIR-CHAMPA DISTRICT OF CHATTISGARH**” submitted in partial fulfillment of the requirements for the degree of “**MASTER OF SCIENCE IN AGRICULTURE**” of the Indira Gandhi Krishi Vishwavidyalaya, Raipur, is a record of the bonafide research work carried out by **ASHISH SONI** under my guidance and supervision. The subject of the thesis has been approved by Student’s Advisory Committee and the Director of Instructions.

No part of the thesis has been submitted for any other degree or diploma (certificate awarded etc.) or has been published/published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been only acknowledged by him.

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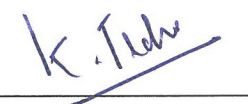
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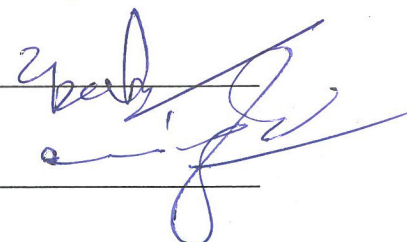
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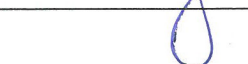
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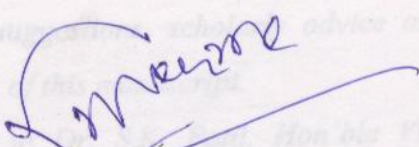
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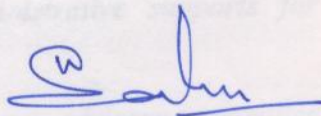

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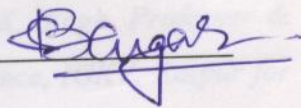
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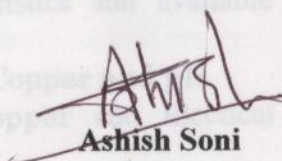
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LIST OF ABBREVIATIONS

ABBRAVIATIONS	DESCRIPTIONS
@	At the rate of
Al	Aluminum
B	Boron
CG	Chhattisgarh
Cu	Copper
Ca	Calcium
Ca ²⁺	Calcium ion
cm	Centimeter
°C	Degree Celsius
d Sm ⁻¹	Desi Siemens per meter
DTPA	Diethyl triamine penta acetic acid
<i>et al.</i>	and co-worker/and others
<i>etc</i>	Etcetera
EC	Electrical conductivity
Fe	Iron
Fig.	Figure
H ⁺	Hydrogen-ion
ha ⁻¹	Per hectare
<i>i.e.</i>	That is
g	Gram
kg	Kilogram
K	Potassium
Min.	Minutes
mg.	Milligram
Mg ²⁺	Magnesium ion
mm.	Millimeter
Mn	Manganese
N	Nitrogen
nm	Nanometer
OC	Organic Carbon

ABBRAVIATIONS	DESCRIPTIONS
pH	Logarithm of the reciprocal of the H ⁺ ion activity
ppm	Parts per million
P	Phosphorus
%	Per cent
S. No.	Serial number
Km ⁻²	Kilometer Square
viz	That is to say / in other words
Zn	Zinc

Introduction

CHAPTER-I

INTRODUCTION

India contributes to 16 percent of the population and 2 percent of the land surface of the world. Its population is growing at the rate of 15 million every year while size of an average farm holding shrinking. In order to provide adequate food and fiber for over one billion people, the Indian agriculture is to be revolutionized from subsistent farming to intensive one by increasing cropping intensity, adopting high yielding varieties, use of more fertilizers and irrigation etc. All these will increase the agricultural production tremendously and will also increase demand of nutrients from soil reserves.

Macronutrients (N, P, and K) and Micronutrients (Fe, Mn, Zn, and Cu) are important soil elements that control its fertility. Soil fertility is one of the important factors controlling yield of the crops. Soil characterization in relation to evaluation of fertility status of the soils of an area or region is an important aspect in context of sustainable agriculture production. Because of imbalanced and inadequate fertilizer use coupled with low efficiency of other crop inputs, the response (production) efficiency of chemical fertilizer nutrients has declined tremendously under intensive agriculture in recent years. The results of numerous field experiments in different parts of India have, therefore indicated “fertilizer-induced un-sustainability of crop productivity”. Variation in nutrient supply is a natural phenomena and some of them may be sufficient where others deficient. The stagnation in crop productivity can not be boosted without judicious use of macro and micronutrient fertilizers to overcome existing deficiencies/imbances.

Soil test-based fertility management is an effective tool for increasing productivity of agricultural soils that have high degree of spatial variability resulting

from the combined effects of physical, chemical or biological processes (Goovaerts, 1998). However, major constraints is hinderance in wide scale adoption of soil testing in most developing countries. In India, these include the prevalence of small holding systems of farming as well as lack of infrastructural facilities for extensive soil testing (Sen *et al.* 2008).

The advent of information technology have provided tools like Global Positioning System (GPS), Geographical Information System (GIS), which help in collecting a systematic set of geo-referenced samples and generating the spatial data about the distribution of nutrients (Sharma, 2004). The maps generated through remote sensing helps in delineating the homogenous units to decide the sampling size and thereby saving a lot of time. This will also helps to monitor the changes in micronutrients status over a period of time as sampling sites can be revisited with help of GPS which is otherwise difficult in the random sampling.

The variability in fertility caused by application of fertilizers in individual farms is one factor that is difficult to account. However, it is possible to measure the natural variation in soil fertility by considering the factors which influence it. Slope, topography and soil types can account for most of the natural variation in fertility. It will be of great significance if Soil Test Crop Response based recommendation can be provided even on this basis. More site specific recommendations can still be provided on the basis of field soil testing to farmers who are applying very high doses of fertilizer and who show interest on testing their soils. The soil testing results indicate nothing about the potential of soil to produce or amount of nutrients to be added to achieve a desired yield (Melsted and Peck, 1973). The interpretation of test results is carried out by correlating data obtained by analysis of soil samples with known field crop response.

Chhattisgarh state is carved out of the erstwhile Madhya Pradesh. It lies between 17°46' to 24°8' N latitude and 80°15' to 84°24' E longitude. The State measures 640 Km from North to South and 336 km from East to West with a total area of 1,35,194 Km². The total geographical area of the State is 1,36,034.3 Km². The state shares its boundaries with the 6 Indian states i.e. Madhya Pradesh on the northwest, Uttar Pradesh on the north, Jharkhand on the north-east, Orissa on the south-east, Andhra Pradesh on the south and Maharashtra on the south-west. Chhattisgarh State has four major soils type i.e. *Entisols*, *Inceptisols*, *Alfisols*, *Vertisols* in whole area and only *Mollisols* at Manpat area of Ambikapur. Almost all soils are deficient in nitrogen and phosphorus and medium to high in potassium. Zinc deficiency is commonly observed in *Alfisols* and *Vertisols* of this region.

The District Janjgir- Champa is situated in the center of the of Chhattisgarh and so it is considered as the *Heart of Chhattisgarh*. The Janjgir-Champa district is a major producer of food grains in the state of Chhattisgarh. The Hasdeobango, project has been considered as life supporting canal for the District Janjgir-Champa. Under this project 75% area of the District will be covered for irrigation. The District head quarter of Janjgir-Champa is in Janjgir, which is situated on national highway no. 200. Janjgir, is 65 Km away from Bilaspur and 175 Km from state capital Raipur through road route.

Janjgir-Champa district covers an area of 446674 ha and it is situated in central part of Chhattisgarh state lying between 82°3' to 82°2'E longitude and 21°6' to 22°4'N latitude and 294.4 m high from mean sea level. The normal rainfall is 1478.0 mm and average rainfall 1157.1mm. The average maximum and minimum temperatures are 49°C and 08° C. Out of the total geographical area, the net sown area is 3,23,599 ha and forest area is 79,439 ha. Total cropped area during *kharif* is 2,59,215 ha and during *rabi* is 6,43,84 ha. Total irrigated area is 215128 ha. The

district is surrounded by the Raigarh District on the east and in the north Korba and Bilaspur district. Paddy, Kodo, Arhar, Wheat, Lakhdi (Tiwara) are the main crops of the District. The District is divided into 10 tahsil and 9 developmental blocks. The tahsils are Janjgir-Champa, Akaltara, Baloda, Nawagarh, Champa, Pamgarh, Sakti, Jaijaipur, Malkharoda and Dabhara. The development blocks of Janjgir - Champa district are Nawagarh, Baloda, Akaltara, Pamgarh, Bamhinidih, Sakti, Jaijaipur, Malkharoda, and Dabhara. The total villages in the District are 915 including 2 forest villages. Sakti block is located in the Janjgir – Champa district in Chhattisgarh. The geographical location of Sakti is $22^{\circ} 1'N$ latitude and $82^{\circ} 58' E$ longitudes. Average altitude is 236m. Systematic survey will be carried out for evaluation the soil fertility status of Sakti block of Janjgir-Champa district, a surface (0-15) cm. depth soil samples will be collected from village sites following the standard procedure of soil sample collection.

In view of these, it may be worthwhile to evaluate the GPS based soil fertility status in *black soils* of Sakti block, under Janjgir-Champa district of Chhattisgarh with the following objectives:

- 1 To classify the pH, EC, and organic carbon content of the samples of the study area.
- 2 To estimate the available nutrient status (N, P, K) in soil samples taken from *black soils* group of Sakti block.
- 3 To assess the level of micronutrients (Fe, Zn, Mn, Cu) in *black soils* of study area.
- 4 To study the relationship among the different nutrient with pH, EC and Organic carbon in the sampled soil.

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

In this chapter an attempt has been made to present review of research work done in the country on the status of available major and micro nutrients and its relationship with physico- chemical properties.

2.1 Physico- chemical properties of soil

2.2 Status of available macronutrients in soil

2.2.1 Status of available macronutrients and its relationship with soil physico-chemical properties

2.3 Status of available micronutrients in soil

2.3.1 Status of available micronutrients and its relationship with soil physico-chemical properties

2.1 Physico- chemical properties of soil

2.1.1 pH

Jena *et al.* (2008) showed that the majority (78.57%) of the soil sites were mild acidic in nature. The pH ranged from 4.63 to 7.52 with the mean value of 5.9 in deltaic alluvium (Ustipsamment) in coastal Orissa.

Ved *et al.* (2008) found that pH of the study area varied from 7.25 to 8.26 with an average of 7.79 respectively in the Bajaj sugar mill Bhasana, Muzaffarnagar district, and Uttar Pradesh.

Singh *et al.* (2009) reported that the surface and subsurface soils were normal to slightly alkaline with pH ranging between 7.1 to 8.6 in the soils of district Ghazipur, Uttar Pradesh.

Kumar *et al.* (2009)) reported that soils of Dumka series were characterized by low pH ranging from 3.80 to 6.40 and the Lachimpur series showed wide variation in pH (4.60 to 7.70) in soils of Santhal Paraganas region of Jharkhand.

Vaisnow (2010) observed that the pH of *Vertisols* of Dhamtari block varied from 4.7 to 8.2.

Shukla (2011) found that the pH of the soils varied from 4.5 to 8.1 (mean-6.12) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.1.2 Electrical conductivity (EC)

Ved *et al.* (2008) found that EC of the study area varied from 0.14 to 0.54 dS m⁻¹ with an average of 0.32 dS m⁻¹, respectively in the Bajaj sugar mill Bhasana, Muzaffarnagar district, and Uttar Pradesh. The EC in the soil profiles of different soil series ranged from 0.09 to 0.40 dS m⁻¹ in various soil types (*Entisols* and *Inceptisols*) lower Shiwaliks of Solan district in north – west Himalayas

Rajeswar *et al.* (2009) reported that the EC values varied from 0.10 to 0.32 dS m⁻¹ in the soils of Garikapadu of Krishna district of Andhra-Pradesh.

Singh *et al.* (2009) reported that electrical conductivity varied between 0.10 and 0.38 dS m⁻¹ in the soils of district Ghazipur, Uttar-Pradesh.

Bali *et al.* (2010) reported that the EC of soil solution ranged from 0.14 to 1.37 dS m⁻¹ with a mean value of 0.46 dS m⁻¹ in the state of Punjab.

Vaisnow (2010) observed that the Electrical conductivity of soil water suspension ranged from 0.01 to 0.89 dS m⁻¹ of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the Electrical Conductivity of soil-water suspension ranged from 0.05 to 0.86 dS m⁻¹ (mean- 0.13 dS m⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.1.3 Organic Carbon

Meena *et al.* (2006) observed that the organic carbon content was low (< 0.50 %) in 63% soil samples, medium (0.50 to 0.75 %) in 21 % and high (>0.75 %) in 16 % soil samples in light texture soils of Tonk District of Rajasthan.

Lathwal (2006) organized Soil testing campaigns during 2005 and 2006 to assess the soil fertility status in district Kurukshetra, Haryana, India. Two blocks with different cropping patterns were selected: rice-potato-sunflower and rice-wheat-sugarcane in Shahbad block and rice-wheat in Thanesar block. One hundred forty-four and 104 soil samples were collected from the village Dangali (Shahbad block) and Adhon (Thanesar block) showed that the organic carbon status of village Dangali (Shahbad block) ranged between 0.05 to 0.80% and Adhon (Thanesar block) 0.05 to 0.50%.

Sharma and Chaudhary (2007) found that the organic carbon content ranged from 1.5 to 15.9 g kg⁻¹ showed a considerable variation with depth in different soil type (*Entisols*, *Alfisols* and *Inceptisols*), lower Shiwaliks of Solan district in north – west Himalayas.

Sharma *et al.* (2008) reported that the organic carbon in black soils ranged between 0.16to 0.97% with an average value of 0.61%. Considering the soils having <0.4 as low , 0.4 -0.75 % as medium and > 0.75 % as high in organic carbon status , the distribution of soil samples under these categories was 6.8 ,73.5 and 19.7%, respectively. Thus, the majority of the soils of Amritsar district are medium in their Organic carbon status.

Kumar *et al.* (2009) reported that soils of Dumka series were characterized by organic carbon ranging from 2.53 to 7.80 g kg⁻¹. The results showed that 77% soils were rated as low, 18% as medium and 5% as high in the organic carbon status and the Lachimpur series of organic carbon ranging from 3.80 to 9.50 g kg⁻¹ and the percentage of soils low, medium and high in organic carbon status was 13, 66 and 21, respectively in soils of Santhal Paraganas region of Jharkhand.

Bali *et al.* (2010) characterized the soils of Punjab and presented the data agro-eco-sub region wise. The descriptive statistics on soil characteristics indicated that the available organic carbon ranged from 0.0 to 1.55 %.

Vaisnow (2010) observed that the organic carbon content of *Vertisols* of Dhamtari block in C.G. varied from 0.15 to 0.91 %.

Shukla (2011) found that the variation in organic carbon of the soils varied from 0.09 to 1.1 per cent (mean-0.57%). in *Inceptisol*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.2 STATUS OF MACRONUTRIENT IN SOILS

2.2.1 Available Nitrogen status in soils:

Ashok *et al.* (2006) conducted a survey for comprehensive study of soil nutrient status was carried out in Auraiya district of Uttar Pradesh, India, to investigate the cause of wheat decline in the southern part of Uttar Pradesh. A total of 168 soil samples were collected from seven blocks representing important soil groups in wheat growing areas of Auraiya district reported that most of the soil was low in nitrogen.

Bajpai *et al.* (2006) conducted a long term permanent plot field experiment at the Raipur inceptisol of chhatishgarh and reported that the initial fertility status of nitrogen is 234 kg ha⁻¹.

Kumar *et al.* (2009) observed that an available nitrogen content of Dumka and Lachimpur series varied from 125 to 310 kg ha⁻¹ with a mean of 216 kg ha⁻¹ and 210 to 545 kg ha⁻¹ with a mean of 401 kg ha⁻¹ in soils of Santhal Paraganas region of Jharkhand. About 40 to 50 % soil samples in light texture soils of Dumka series were rated as low in available nitrogen.

Rajeswar *et al.* (2009) reported that the available nitrogen content in all the pedons were low ranging from 133 to 188 kg ha⁻¹ throughout the depth. However, available nitrogen content was found to be high in surface horizons and distribution of available macronutrients decreased regularly with soil depth in soils of Garikapadu in Krishna district of Andhra Pradesh.

Gogoi *et al.* (2010) conducted a long term permanent integrated nutrient management (INM) experiment at Instructional-cum-Research farm of Assam Agriculture University (AAU), Jorhat, and reported that the available nitrogen content is 270 kg ha⁻¹.

Vaisnow (2010) observed that the status of available nitrogen of soils ranged from 100.35 to 451.58 kg ha⁻¹ with an average of 219.48 kg ha⁻¹. Nearly, 75 percent soils samples in the present study are classified in low fertility class and 25 percent in medium fertility class of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the status of available nitrogen ranged from 100 to 550 kg ha⁻¹ (mean- 325 kg ha⁻¹) and concluded that soils were found to be low nitrogen status. In *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.2.2 Available Phosphorus status in soils:

Lathwal (2006) reported that Ingenral, available phosphorus ranged from low to medium, but high values of available P were also found in some part of the area. About 45% soil samples tested low, 40% medium and 15% soil samples tested high in available phosphorus content. The data indicates that majority of the soil samples from Dangali (Shahbad block) were low in available phosphorus content in the district Kurukshetra (Haryana).

Ved *et al.* (2008) conducted a soil survey of Bajaj sugar mill Bhasana, Muzaffarnagar district, Uttar Pradesh, India during the year 2004-05. Six hundred soil samples were collected from 22 circles of sugar factory zone and analysed for the current status of the available macronutrients and other parameters and found that available nutrient index value of the zone for available phosphorus was found 1.20 and showing the deficiency.

Bali *et al.* (2010) characterized the soils of Punjab and presented the data agro-eco-sub region wise. The descriptive statistics on soil characteristics indicated that the available phosphorus ranged from 1.12 to 238 kg ha⁻¹ with mean value of 42.77 kg ha⁻¹.

Gogoi *et al.* (2010) conducted a long term permanent integrated nutrient management (INM) experiment at Instructional-cum-Research farm of Assam Agriculture University (AAU), Jorhat and reported that the available Phosphorus content is 12.1 kg ha⁻¹.

Vaisnow (2010) observed that the status of available phosphorus varied from 0.35 to 51.96 kg ha⁻¹ with a mean value of 8.13 kg ha⁻¹. Nearly 81.40 percent soil samples in *Vertisols* are classified as low fertility class and 15.50 percent in medium fertility class and 3.10 percent in high fertility class of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the status of available phosphorus in soils ranged from 1.61 to 26.14 kg ha⁻¹ (mean- 13.87 kg ha⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.2.3 Available Potassium status in soils:

Meena *et al.* (2006) reported that status of available potassium (K₂O) in the soils ranged from 105 to 1059 kg ha⁻¹ with an average of 377 kg ha⁻¹.

Kumar *et al.* (2009) observed that the content of available potassium in soils of Dumka series varied from 111 to 145 kg ha⁻¹ with a mean value of 124 kg ha⁻¹ and in Lachimpur series from 110 to 188 kg ha⁻¹ with a mean of 134 kg ha⁻¹. The available potassium in both the series was medium in status in soils of Santhal Paraganas region of Jharkhand.

Nirawar *et al.* (2009) observed that the content of available potassium in soils of Takalgaon varied from 208 to 213 kg ha⁻¹ with a mean value of 211 kg ha⁻¹ and in Andori village varied from 353 to 655 kg ha⁻¹ with a mean of 551 kg ha⁻¹ in soils of Ahmedpur tahsil of Latur district.

Bali *et al.* (2010) reported that the available potassium ranged from 33.6 to 1192 kg ha⁻¹ (mean=280.57 kg ha⁻¹) in soils of Punjab state.

Gogoi *et al.* (2010) conducted a long term permanent integrated nutrient management (INM) experiment at Instructional-cum-Research farm of Assam Agriculture University Jorhat. and reported that the available Potassium content was 116.7 kg ha⁻¹.

Vaisnow (2010) observed that the status of available potassium varied from 23.52 to 566.05 kg ha⁻¹ with a mean value of 262.11 kg ha⁻¹. Nearly, 1.75 per cent soil

samples in the study area were observed under low fertility class, 81.38 per cent soil samples as in medium fertility class and 16.87 per cent soil samples as in high fertility class of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available potassium content generally medium to high and only 7.4 per cent soil samples tested low in available potassium. It ranged from 90 to 656 kg ha⁻¹ (mean- 275 kg ha⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3 RELATIONSHIP BETWEEN SOIL CHARACTERISTICS AND AVAILABLE MACRONUTRIENTS:

2.3.1 Relationship between Available Nitrogen and pH:

Meena *et al.* (2006) reported that available N was negatively correlated ($r = -0.292^{**}$) with pH. This might be due to increased rate of denitrification at lower pH values (Tisdale, 1997).

Sharma *et al.* (2008) reported that available nitrogen was positive and non-significant correlation ($r = 0.105$) with pH, in soils of Amritsar district (Punjab).

Kumar *et al.* (2009) showed that the negative and non-significant relationship ($r = -0.03$ and $r = -0.019$) between available nitrogen content and pH in soils of Dumka and Lachimpur series in Santhal Paraganas Region of Jharkhand.

Wagmare *et al.* (2009) reported that the available nitrogen was positive and significant correlation with pH in soils of Aussha tahsil of Latur district.

Vaisnow (2010) observed that the positive correlations were observed between soil pH and available nitrogen of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available N showed significant positive correlation with pH ($r = 0.135^*$), ($r = 0.256^*$) and ($r = 0.139^*$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.2 Relationship between Available Nitrogen and Electrical Conductivity:

Sharma *et al.* (2008) showed that the positive and non significant correlation ($r = 0.131$) between available nitrogen and electrical conductivity in soils of Amritsar district of Punjab.

Vaisnow (2010) observed that the electrical conductivity showed positive and non significant correlation with available nitrogen of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh. Jatav (2010) reported that the significant and positive correlations of soil EC with available N of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh.

Shukla (2011) found that the available N showed positive and non significant correlation with EC ($r = 0.054$), ($r = 0.040$) and significant positive correlations ($r = 0.186^{**}$) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.3 Relationship between Available Nitrogen and Organic Carbon:

Sharma *et al.* (2008) reported that available nitrogen was positively and significantly correlated with organic carbon ($r = 0.436^*$) and available potassium showed a significant and positive relationship with EC ($r = 0.584^*$) and organic carbon ($r = 0.351^*$) in soils of Amritsar district.

Kumar *et al.* (2009) showed that relationship between available nitrogen content was a highly significant and positive correlation with organic carbon ($r = 0.838^{**}$) in Lachimpur series in soils of Santhal Paraganas region of Jharkhand.

Vaisnow (2010) observed that organic carbon of the soils exercised significant and positive relationship with available nitrogen in *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available N showed significant positive correlation with OC ($r = 0.893^{**}$), ($r = 0.115^{*}$) and ($r = 0.140^{**}$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.4 Relationship between Available Phosphorus and pH:

Meena *et al.* (2006) reported that available phosphorus was significant and negatively correlated with pH ($r = -0.575^{**}$) because at higher pH, calcium can precipitate with phosphorus as Ca- phosphate and reduce phosphorus availability in light texture soils of Tonk district of Rajasthan.

Kumar *et al.* (2009) showed that relationship between available phosphorus content was a non-significant, negative and positively correlated with pH ($r = -0.003$ and $r = 0.001$) in Dumka and Lachimpur series, respectively in soils of Santhal Paraganas Region of Jharkhand.

Shukla (2011) found that the available P showed positive and non significant correlation with pH ($r = 0.021$), ($r = 0.040$) and significant negative correlations ($r = -0.096^{*}$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.5 Relationship between Available Phosphorus and Electrical Conductivity:

Sharma *et al.* (2008) showed that the positive and non significant correlation ($r = 0.148$) between available phosphorus and electrical conductivity in soils of Amritsar district of Punjab.

Shukla (2011) found that the available P showed positive and non significant correlation with EC ($r = 0.014$), ($r = 0.024$) and ($r = 0.031$) in representing the

Inceptisols, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.6 Relationship between Available Phosphorus and Organic Carbon:

Meena *et al.* (2006) reported that a significant positive correlation ($r = 0.797^{**}$) was observed between organic carbon and available phosphorous. This relationship might be due to the presence of more than 50 % of phosphorus in organic forms and after the decomposition of organic matter as humus is formed which forms complex with Al and Fe that a protective cover for phosphorus fixation adsorption / phosphate fixation (Tisdale *et al.* ,1997).

Shukla (2011) found that the available P showed non-significant positive correlation with OC ($r = 0.071$), ($r = 0.081$) and ($r = 0.061$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.7 Relationship between Available Potassium and pH:

Kumar *et al.* (2009) showed that relationship between available potassium content was a non-significant and negative correlation with pH ($r = -0.027$ and $r = -0.124$) in Dumka ,the soil color varied from yellowish red to dark red and the soil color varied from sandy loam to sandy clay loam Lachimpur series the soil in soils of Santhal Paraganas Region of Jharkhand.

Singh *et al.* (2009) showed that relationship between available potassium content was a significant and positive correlation with pH ($r = 0.321$) in soils of Gajipur District of Uttar Pradesh.

Vaisnow (2010) observed that the non-significant and negative correlations were observed between soil pH and available K of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available K showed significant positive correlation ($r = 0.090^*$), ($r = 0.113^*$) and non-significant positive correlation ($r = 0.009$) with pH in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.8 Relationship between Available Potassium and Electrical Conductivity:

Yadav and Meena (2009) showed that relationship between available potassium content was a significant and positive correlation with electrical conductivity in light texture soils of Degana soils series of Rajasthan.

Shukla (2011) found that the available K showed non-significant positive correlation ($r = 0.024$), ($r = 0.015$) and ($r = 0.030$) with EC in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.9 Relationship between Available Potassium and Organic Carbon:

Sharma *et al.* (2006) reported that a significant positive correlation of available potassium was observed with organic carbon ($r = 0.466^*$) in soils of Kargil district of cold arid region of Ladakh.

Wagmare *et al.* (2009) showed that the available potassium was positive and significant correlation with organic carbon in soils of Ausha tahsil of Latur district.

Vaisnow (2010) observed that the negative and non-significant relationship was observed between organic carbon and available potassium of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available K showed positive and significant correlation with OC ($r = 0.937^{**}$), ($r = 0.124$) and non-significant positive correlations ($r = 0.081$) in *Inceptisols*, *Vertisols* and *Alfisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.3.10 Relationship between Organic Carbon and Electrical Conductivity:

Sharma *et al.* (2008) showed that the positive and non significant correlation between organic carbon and electrical conductivity in soils of Amritsar district of Punjab.

Shukla (2011) found that the OC showed non-significant positive correlation ($r = 0.048$), significant positive correlation ($r = 0.958^{**}$) and non-significant negative correlation ($r = -0.030$) with EC in representing the *Inceptisols*, *Vertisols* and *Alfisols* orders of Pamgarh block in Janjgir-Champa district (C.G.)

2.4 STATUS OF AVAILABLE MICRONUTRIENT IN SOILS:

2.4.1 Available Copper status in soils:

Dwiwedi *et al.* (2005) conducted field research laboratory, Leh during the year 1998-2001, surface soil samples was collected each from in Leh (96) and Kargil (50) from five cultivated fields, in Ladakh region and found that in Leh soils the DTPA extractable Cu ranged from 0.43 to 3.52 mg kg⁻¹ and 0.51 to 3.41 mg kg⁻¹ in Kargil district of Jammu and Kashmir.

Nazif *et al.* (2006) reported that the AB-DTPA extractable copper ranged from 0.59-4.38 mg kg⁻¹. AB-DTPA extractable copper was found high in all sites. The micronutrient status of soils of district Bhimber (Azad Jammu and Kashmir) was made at 30 different locations.

Talukdar *et al.* (2009) investigated the DTPA extractable cationic micronutrient relationship with some important soil physico-chemical properties in two agro- ecosystems of Golaghat district of Assam. Considering the critical limits of soil micronutrients, all the soil associations were adequately supplied with DTPA - extractable micronutrients.

Bassirani *et al* (2011) observed that The DTPA-extractable Zn in all the profiles and horizons varied from in different profiles the amount of Cu extracted by DTPA solution ranged from 0.10 to 2.10 mg kg⁻¹ with the corresponding mean values of 0.819.

Vaisnow (2010) observed that the status of available copper varied from 0.22 to 6.52 mg kg⁻¹ with a mean value of 2.45 mg kg⁻¹ of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the DTPA-extractable copper content ranged from 0.14 to 10.33 mg kg⁻¹ (mean- 2.85 mg kg⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.4.2 Available Zinc status in soils:

Kher and Khajuria (2005) observed that the range of zinc, 0.46 ppm to 1.0 ppm, with the mean values 0.73 ppm in the Kandi belt of Jammu region.

Andrabi and Shah (2010) studied the micronutrient status in relation to physico-chemical properties in the soils of three different agro-climatic zones of Jammu and Kashmir at 12 different locations, (four samples from each zone). The results revealed that by and large there is a decrease in micronutrient content with depth. Available zinc status in all the soil profiles was in deficient range.

Bali *et al.* (2010) studied the GIS-aided thematic maps and indicated that 10% of the total geographical area of Punjab was affected by the zinc deficiency based on critical limit and result showed that the DTPA- zinc ranged from 0.07 to 3.06 kg⁻¹ with mean value of 1.10 mg kg⁻¹.

Vaisnow (2010) observed that the status of available zinc varied from 0.04 to 3.66 mg kg⁻¹ with a mean value of 0.82 mg kg⁻¹. About 49.03 per cent soil samples were found to be deficient and 50.97 per cent soil samples were found to be sufficient

in available content of zinc in *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Bassirani *et al* (2011) observed that The DTPA-extractable Zn in all the profiles and horizons varied from 0.12 to 0.94 ppm with a mean value of 0.27 ppm.

Shukla (2011) found that the status of available zinc in soils ranged from 0.02 to 5.8 mg kg⁻¹ (mean- 0.72 mg kg⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.4.3 Available Iron status in soils:

Sharma and Chaudhary (2007) reported that available zinc in the studied profiles varied from 0.31 to 4.7 mg kg⁻¹ in lower Shiwaliks of Solan district in north – west Himalayas.

Yadav and Meena (2009) reported that available iron in soil samples of Degana soil series of Rajasthan varied from 0.20 to 18.73 mg kg⁻¹.

Rajeswar *et al.* (2009) reported that the DTPA – extractable iron content varied from 0.4 to 40.2 mg kg⁻¹ soil. All the surface soils were sufficient in available iron content. Vertical distribution of iron exhibited little variation with depth in soils of Garikapadu in Krishna district of Andhra Pradesh.

Bassirani *et al* (2011) observed that The DTPA-extractable Zn in all the profiles and horizons varied from in different profiles the amount of Cu extracted by DTPA solution ranged from 0.51 to 10.8 with the corresponding mean values of 2.98.

Vaisnow (2010) observed that the status of available iron varied from 6.36 to 97.02 mg kg⁻¹ with a mean value of 38.61 mg kg⁻¹ of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the DTPA-extractable copper content ranges from 3.2 to 50.90 mg kg⁻¹ (mean- 23.34 mg kg⁻¹) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.4.4 Available Manganese Status in soils:-

Sharma and Chaudhary (2007) reported that available manganese in the studied profiles varied from 2.7 to 56.7 mg kg⁻¹, respectively. All the soils had amounts of available manganese in lower Shiwaliks of Solan district in north - west Himalayas. Considering 1.0 mg kg⁻¹ for manganese as critical limits suggested by Lindsay and Norvell (1978).

Singh *et al.* (2009) reported that the DTPA-Extractable manganese content in the soils varied between 3.2 to 8.5 mg kg⁻¹ in surface and subsurface soils. Sixteen percent of the samples contained DTPA- manganese between 3.3 and 4.0 mg kg⁻¹ and 84% had more than 4 mg kg⁻¹ DTPA- manganese micronutrients in the soils of district Ghazipur, Uttar Pradesh.

Kumar *et al.* (2009) observed that an available manganese content of Dumka and Lachimpur series varied from 26.20 to 180.00 mg kg⁻¹ with a mean of 94.44 mg kg⁻¹ and 15.60 to 189.00 mg kg⁻¹ with a mean of 95.99 mg kg⁻¹, respectively in soils of Santhal Paraganas region of Jharkhand.

Rajeswar *et al.* (2009) reported that the available DTPA -Extractable manganese content in these soils varied from 2.6 to 19.7 mg kg⁻¹. It was high in the surface horizons and gradually decreased with depth of soil. Vertical distribution of available manganese micronutrient was also observed in soils of Garikapadu of Krishna district of Andhra Pradesh.

Vaisnow (2010) observed that the status of available manganese varied from 3.66 to 95.00 mg kg⁻¹ with a mean value of 21.99 mg kg⁻¹ in *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the status of available zinc in soils ranged from 4.2 to 62.12 (mean- 30.2) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5 RELATIONSHIP BETWEEN SOIL CHARACTERISTICS AND AVAILABLE MICRONUTRIENTS:

2.5.1 Relationship between Available Copper and pH:

Meena *et al.* (2006) reported that a significant negative correlation ($r = -0.195^{**}$) was observed between soil pH and available copper in Tonk district of Rajasthan.

Jena *et al.* (2008) observed that available copper was negatively correlated with pH and positively with organic carbon.

Rajeshwar *et al.* (2009) reported that positive and non significant correlation ($r = 0.134$) of available copper with in Soils of Garikapadu of Krishna District of Andhra Pradesh.

Vaisnow (2010) observed that the available copper showed positive and non significant correlation with pH of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available Cu showed non-significant negative correlation with pH ($r = -0.009$), ($r = -0.24$) and ($r = -0.074$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.2 Relationship between Available Copper and Electrical Conductivity:

Maji *et al.* (1993) reported that a positive and significant correlation existed between DTPA-extractable copper and electrical conductivity in soils of Sunderbans, West Bangal.

Shukla (2011) found that the available Cu showed non-significant negative correlation with EC ($r = -0.026$), ($r = -0.004$) and ($r = -0.059$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.3 Relationship between Available Copper and Organic Carbon:

Meena *et al.* (2006) reported that available copper were positively correlated ($r=0.268^{**}$) with organic carbon content.

Kumar *et al.* (2009) showed that positive significant correlation of available copper with organic carbon ($r = 0.526^{**}$) in Lachimpur series, whereas no such relationship was found in Dumka series in soils of Santhal Paraganas region of Jharkhand

Shukla (2011) found that the available Cu showed non-significant negative correlation with OC ($r = -0.040$), ($r = -0.004$) and ($r = -0.010$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.4 Relationship between Available Zinc and pH

Jena *et al.* (2008) showed that Zn was correlated negatively with pH and positively correlated with organic carbon. There was antagonistic effect of available zinc with copper in deltaic alluvium (Ustipsamment) in coastal Orissa.

Ajay *et al.* (2009) reported that the significantly negative correlation ($r = -0.38$) between available zinc and pH in soils of south- western plain zone of Uttar Pradesh.

Vaisnow (2010) observed that the available zinc showed negative and non significant correlation with pH of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available Zn showed negative and non significant correlation with pH ($r = -0.039$), ($r = -0.054$) and ($r = -0.077$) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.5 Relationship between Available Zinc and Electrical Conductivity

Shukla (2011) found that the available Zn showed negative and non significant correlation with EC ($r = -0.005$), ($r = -0.006$) and ($r = -0.006$) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.6 Relationship between Available Zinc and Organic Carbon:

Nazif *et al.* (2006) reported that the correlation coefficient (r) obtained between zinc and organic matter was (0.623). It was concluded that zinc was positive significant correlated with organic matter in the micronutrient status of soils of district Bhimber (Azad Jammu and Kashmir) was made at 30 different locations. The positive correlation may be due to the formation of organic complexes between organic matters.

Vaisnow (2010) observed that the available zinc showed negative and non significant correlation with organic carbon of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available Zn showed non-significant negative correlation with OC ($r = -0.004$), ($r = -0.039$) and ($r = -0.005$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.) respectively.

2.5.7 Relationship between Available Iron and pH:

Verma *et al.* (2007) reported that the negative and significant correlation between available iron with pH ($r = -0.822^*$) in the soils of semi-arid region of Punjab.

Jena *et al.* (2008) studied soil samples from intensive rice-groundnut growing area of deltaic alluvium (Ustipsamment) in coastal Orissa, India, were analyzed for available S, Zn, Cu, Fe, Mn and B and some important soil properties such as textural

class, pH, EC, and organic carbon. Results showed that iron, were negatively correlated with pH in deltaic alluvium (Ustipsamment) in coastal Orissa.

Andrabi and Shah (2010) reported that DTPA extractable iron gave negative significant correlation with soil pH in three different agro-climatic zones of Jammu and Kashmir.

Vaisnow (2010) observed that the available iron showed negative and non significant correlation with pH of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the significant negative correlation was observed between available Fe ($r = -0.095^{**}$) and negative and non significant correlation ($r = -0.054$), ($r = -0.077$) with pH in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.8 Relationship between Available Iron and Electrical Conductivity:

Sharma and Chaudhary (2007) reported that in multiple regression studies of available iron showed significant and positive regression coefficient with EC ($b_7 = 70.366^{**}$) profiles of different series representing in lower Shiwaliks of Solan district in north – west Himalayas.

Shukla (2011) found that the available Fe showed non-significant negative correlation with EC ($r = -0.043$), ($r = -0.11$) and ($r = -0.007$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5. 9 Relationship between Available Iron and organic carbon:

Meena *et al.* (2006) reported that available iron were positively correlated ($r = 0.226^{**}$) with organic carbon content in light texture soils of Tonk district of Rajasthan.

Shukla (2011) found that the available Fe showed non-significant negative correlation with OC ($r = -0.021$), ($r = -0.025$) and ($r = -0.040$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.10 Relationship between Available Manganese and pH

Nazif *et al.*, (2006) reported that the correlation value (r) between manganese and Soil pH was $r = -0.392$. Manganese had negative significant correlation with soil pH in the micronutrient status of soils of district Bhimber (Azad Jammu and Kashmir) was made at 30 different locations. It showed that as pH increases availability of manganese decreases.

Kumar *et al.* (2009) showed that negative significant correlation of available manganese with ($r = -0.374^{**}$) in Lachimpur series, whereas no such relationship was found in Dumka series in soils of Santhal Paraganas region of Jharkhand.

Andrabi and Shah (2010) reported that DTPA extractable manganese gave negative significant correlation with soil pH in soils of three different agro-climatic zones of Jammu and Kashmir.

Vaisnow (2010) observed that the available manganese showed negative and significant correlation with pH of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh.

Shukla (2011) found that the available Mn showed non-significant negative correlation ($r = -0.018$) and significant negative correlation ($r = -0.065^{*}$), ($r = -0.089^{*}$) with pH in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.11 Relationship between Available Manganese and Electrical Conductivity

Murthy and Shrivastava (1994) found a low degree correlation between DTPA extractable manganese and electrical conductivity in acidic soil of Majera form of Uttar Pradesh.

Shukla (2011) found that the available Mn showed non-significant negative correlation with EC ($r = -0.023$), ($r = -0.025$) and ($r = -0.048$) in *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

2.5.12 Relationship between Available Manganese and Organic Carbon:

Nazif *et al.* (2006) reported that the correlation result (r) between manganese and organic carbon was 0.246. The result was positive non-significant in the micronutrient status of soils of district Bhimber (Azad Jammu and Kashmir).

Kumar *et al.* (2009) showed that negative significant correlation of available manganese with organic carbon ($r = -0.289^{**}$) in Lachimpur series, whereas no such relationship was found in Dumka series in soils of Santhal Paraganas region of Jharkhand.

Shukla (2011) found that the available Mn showed non-significant negative correlation ($r = -0.023$), ($r = -0.040$) and non-significant positive correlation ($r = -0.048$) with OC in *Inceptisols*, *Vertisols* and *Alfisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

Materials and Methods

CHAPTER – III

MATERIALS AND METHODS

This chapter deals with the materials used and methods employed during the course of the investigation to evaluate the soil fertility status of Sakti block of Janjgir-Champa district of Chhattisgarh. In each village, mainly two types of soil are presented namely *Alfisols* and *Vertisols*. The information on the experimental area and other details are presented in the following sections.

3.1 Location and climate

Sakti is a prominent block in Janjgir-Champa district in the state of Chhattisgarh, India. Sakti is located at Janjgir district lying between 22° 1' N latitude and 82° 58' E longitudes with an altitude of 236m above the mean sea level. The region generally experiences hot, sub humid climate, having average rainfall of 1157.1 mm, with erratic pattern of distribution, mostly concentrated in the month of June to September, with very little amount from October to February. The hottest and coolest months are May and December, respectively. The maximum temperature during the summer may exceed even 46°C and the minimum temperature often falls below 8°C during winter season. Location and land use and other agricultural characteristics of the study area be seen in Fig.-3.1 and table 3.1.

3.2 Soil characteristics

For evaluation of the soil fertility status of Sakti block, a systematic survey was carried out. Surface (0-15 cm depth) soil samples were collected from 108 Village of block Sakti using GPS (Global Positioning System) marked. The sampling points have been taken from the cadastral map of 108 villages by locating in such a way that from each 10 hectare area may represent one grid based soil sample.

3.3 Systematic or Grid Sampling

Sampling points were determined prior to sampling with the help of GPS across a field for a soil type under study. Samples were taken at fixed intervals systematically across a grid from each of 10 ha area. Within each of such sample points, five samples were randomly taken for further analysis, to represent the 10 hectares area or grid selected under the soil.

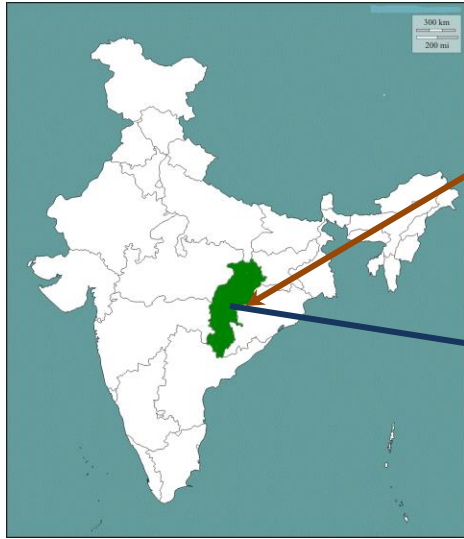
3.4 Table work

Land System Maps published by Chhattisgarh InfoTech and Biotech Promotion Society (CHIPS) and Indian Satellites Research Services (ISRO) in 2004-05 at the scale of 1: 4000 have been used as the cadastral maps for conducting the field survey works. Prior to the actual fieldwork, tentative sampling sites were fixed on the cadastral maps. These sampling sites were set and distributed in such a way that all the agriculturally important land system units are proportionately represented.

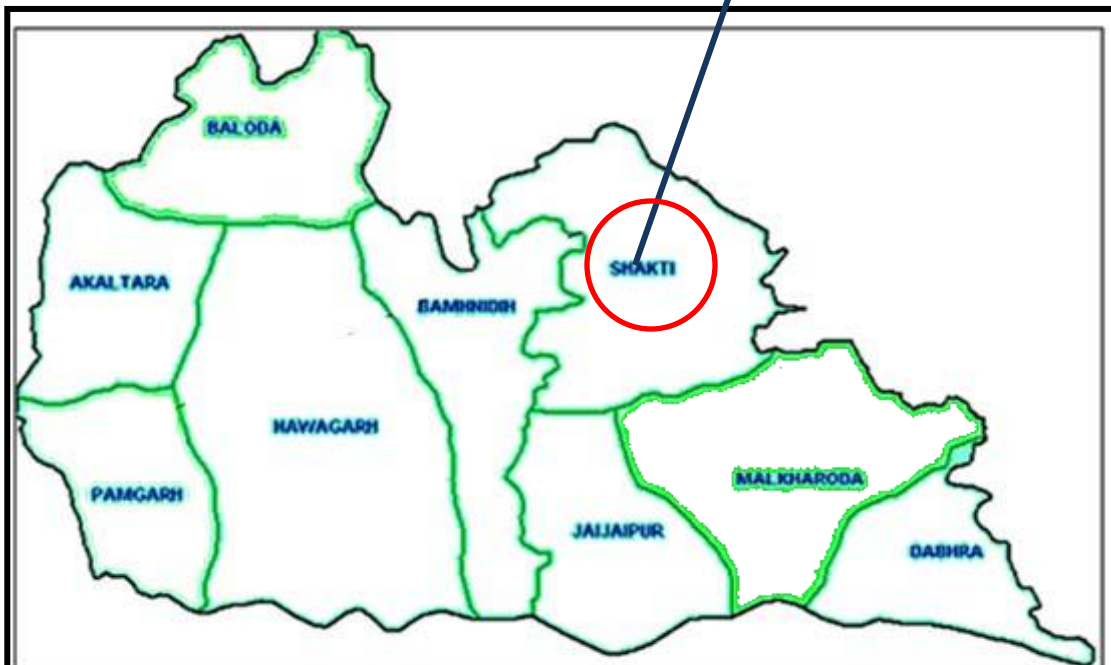
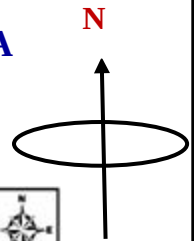
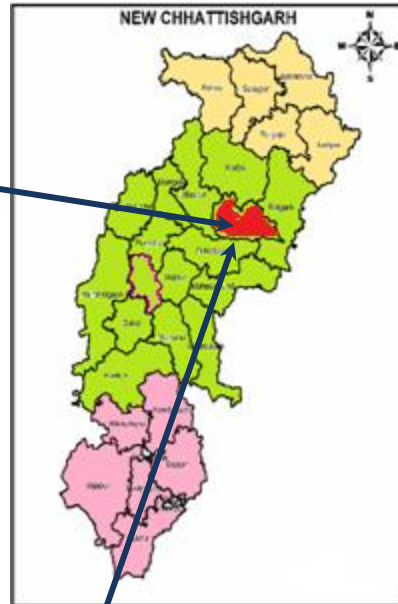
3.5 Fieldwork

Soil sampling points were determined according to the steps explained at Para 3.2 above for each village cadastral map. Generally in each village, four types of soil were found. The area was surveyed in each village and sampling was done considering one soil sample representing each of 10 hectare area. After sampling, the points were marked by GPS with Latitude, Longitude and Altitude. The soil samples were collected from 15 cm depth with the help of spade as per standard soil sampling techniques.

LOCATION OF STUDY AREA IN INDIA



CHHATTISGARH IN INDIA



Development Blocks of Janjgir Champa District

Fig. 3.1 Location Map of the Study Area

Table 3.1: Land use and other agricultural characteristics of the study area in Janjgir-Champa district and its share in the State (2012)

S. N.	Agricultural parameters	Area, ha	% Share
1	Geographical area (GA)	446674	3.2 %of state
2	Forest area	89204	20 % of GA
3	Land not available for cultivation – Non agricultural uses	37578	8.41% of GA
4	Land that can be brought under cultivation (a) Immediately without any investment (b) With some improvement (C) With some investment Total	3509 3224 4033 10766	2.41% of GA
5	Pasture land	37849	8.47% of GA
6	Total cultivated land	11187	2.50% of GA
7	Net cropped area (NCA)	260076	58.2% of GA
8	Double cropped area	70448	15.77% of GA
9	Total cropped area	330524	73.99% of GA
10	Intensity of cropping		127.1 %
11	Cultural waste land	10766	4.1% of NCA
12	Cultivated land	11187	4.3% of NCA
13	Barren land	2349	0.9% of NCA
14	Pasture /grazing land	37849	14.6% of NCA

Laboratory work:

Soil samples collected from the study area were dried and crushed with the help of wooden rod and passed through 2 mm sieve and then used for the determination of soil pH, organic matter, macronutrients and micronutrients content by adopting standard laboratory method.

3.6 Soil parameters

The soil of experimental site was analyzed for the physico-chemical properties like pH, Electrical conductivity, Organic carbon and available nutrient (N, P, K, Fe, Cu, Zn and Mn), content.

3.7 Methods of analysis**3.7.1 Determination of soil pH in soil:**

The pH was determined by glass electrode pH meter in soil water suspension (1: 2.5) (Piper, 1950).

a. Principle:

The electrode potential developed due to H ions is measured by pH meter using two half cells namely reference electrode and glass electrode. The electrode potential is directly related to the H ions concentration of the medium. The ratio of soil: water has to be specified while expressing the pH value of the suspension. The commonly employed ratio is 1: 2 or 1: 2.5 (soil: water). Addition of more amount of water to soil i.e. dilution causes a slight increase in the pH value observed. Addition of neutral salts such as KCl, CaCl₂ etc. to soil suspension decreases the pH values.

b. Materials required:

- 100 ml beaker with glass rod
- pH meter

- Balance
- Wash bottle
- Measuring cylinder (100ml capacity)
- Standard buffer solution of pH 4, 7.0 and 9.2.

c. Procedure:

- Weight 20 g of soil into a clean 100 ml beaker.
- Add 50 ml of distilled water.
- Stir the suspension intermittently for 30 minutes or continuously for 10 minutes.
- Record the pH using pH meter.

d. Standardization of pH meter:

- Switch on the instrument 15-20 minutes prior to estimation to warm up.
- Adjust the temperature control knob to room temperature.
- Dip the electrode in standard buffer solution of pH 4.0 and set the buffer control knob.
- Remove the electrode wash with a jet of distilled water and dip the electrode in pH 7.0 or pH 9.2 standard buffer solutions and calibrate the instrument.
- When the calibration is satisfactory take out electrode and rinse with distilled water and inserts the electrode into soil suspension and record the pH.

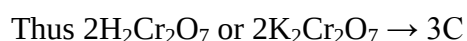
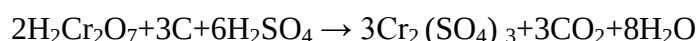
3.7.2 Determination of organic carbon (OC) in soil:

a. Principle:

Soil organic matter (SOM) is the seat of nitrogen in soils. Its determination is often carried out as an index of nitrogen availability. Two major methods are generally followed:

- (i) The titration method (Walkley & Black, 1934) and
- (ii) The colorimetric method.

In both the methods, organic matter is oxidized with chromic acid (potassium dichromate + H₂SO₄). In the titration method, the unconsumed potassium dichromate is back titrated against ferrous sulphate or ferrous ammonium sulphate (Redox titration). Carbon in the sample is oxidized as follows:



In the colorimetric method, the intensity of chromic acid obtained due to its reduction is measured calorimetrically. This intensity is directly proportional to the amount of organic carbon present in the soil.

Walkley and Black's, (1934) rapid titration method as described by Jackson, (1967), which was followed for Organic C determination is described below.

b. Reagent:

- 1N potassium dichromate (49.04 g of AR grade K₂Cr₂O₇ per liter of solution).
- 0.5 N (proxy) ferrous ammonium sulphate (196 g of hydrated crystalline salt per liter containing 20 ml of conc. H₂SO₄)
- Diphenylamine indicator ; Dissolve 0.5 g Diphenyl amine in a mixture of 20 ml of water and 100 ml of conc. H₂SO₄ .
- Concentrated sulphuric acid (sp. gr. 1.84)
- Ortho-phosphoric acid (85%) (chemically pure)

c. Procedure:

The soil is ground and passed through 2 mm sieve. Place 1 g. soil at the bottom of dry 500 ml conical flask and add 10 ml of 1N $K_2Cr_2O_7$ and swirl a little. The flask is kept on asbestos sheet. Then add 20 ml of concentrated H_2SO_4 and swirl again two or three times. The flask is allowed to stand for 30 minutes preferably in darkness. Add 200 ml of distilled water, 10 ml of Ortho-phosphoric acid and titrate the contents with ferrous ammonium sulphate solution till the color changes from blue-violet to green. Simultaneously, a blank is run without soil. If more than 7 ml of dichromate solution is consumed, the determination must be repeated with a smaller quantity (0.25-0.50 g.) of soil.

d. Calculation:

$$\text{Organic Carbon (\% in Soil)} = 10 (B-S)/B \times 0.003 \times 100/\text{wt of sample (g)}$$

Where B & S stand for the titrate value (ml) of blank and sample respectively.

(Where: B- Blank, S-Sample)

3.7.3 Determination of electrical conductivity (EC) in soil:

The soluble salts in soils are determined by electrical conductivity method. Solution offers some resistance to passage of electric current through them, depending upon the salt content. Higher the salt content, lower is the resistance to flow of salt concentration. EC which is reciprocal of resistance, thus, increases with increases in salt concentration as described by Black, (1965)

According to ohm's law - Conductivity is inversely proportional to resistance. The EC of soil water extract is generally measured in smaller units such as milliohms/cm (mmhos/cm or microhms/cm at $25^{\circ}C$). The international unit (SI) of expression Siemens/m(S/m) and smaller SI unit is deci Siemen/m (dS/m). One dS/m = one mmhos/cm, which is in turn equal to 640 ppm or 0.064% of salts.

a. **Materials required:**

- 100 ml beaker with glass rod
- EC bridge
- Balance and weight box
- Measuring cylinder
- 50 ml beaker
- Squeeze bottle

b. **Procedure:**

- Weight 20 g. soil into clean 100 ml beaker.
- Add 50 ml of distilled water.
- Stir the suspension intermittently for 30 minutes and allow the suspension to settle for about one hour.
- Measure the EC in the supernatant solution using EC Bridge. If supernatant solution is not obtained/ clears, filter the suspension using ordinary filter paper and measure the EC infiltrate or leachate.
- The soil suspension prepared of pH measurement after setting down of solid particles, the E.C. was measured from supernatant solution.

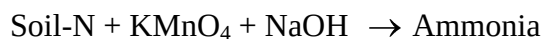
3.7.4 Estimation of available Nitrogen:

Principle: - A known weight of the soil is mixed with excess of alkaline KMnO_4 solution, a mild oxidizing agent in an alkaline medium, and distilled. The nascent oxygen, liberated by KMnO_4 , in the presence of NaOH , oxidizes the organic matter present in the soil and the ammonia released is distilled and absorbed in a known volume of standard acid and the excess of which is titrated with standard alkali using methyl red as the indicator. This method is the quickest of all the other methods

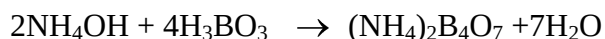
for the estimation of available nitrogen in soil and has been found to work well in Indian soils.

a. **Reaction:**

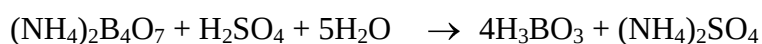
In distilled flask-



Absorbed in Boric acid-



Titration in Ammonium borate and Standard sulphuric acid/sulphamic acid.



b. **Reagents:**

- 0.32% KMnO_4 (potassium permanganate) solution: Dissolve 3.2 g KMnO_4 in distilled water, make up to 1 liter in volumetric flask and mix well.
- 2.5% NaOH (Sodium hydroxide) solution: Dissolve 25 g NaOH flakes in distilled water make up to 1 liter in volumetric flask and mix well.
- Liquid paraffin (Extra pure).
- N/50 sulphuric acid.
- Mixed indicator solution: Dissolve 0.07 gm methyl red with 0.1 gm bromocresol green in 100 ml of ethanol.
- Boric acid-indicator solution: Dissolve 20 g of pure boric acid (H_3BO_3) in about 700 ml of hot water. Transfer the cooled solution to a 1 liter volumetric flask containing 200 ml of ethanol and 20 ml of mixed indicator solution. After mixing the contents of the flask, add approximately 0.05 N NaOH cautiously until the color is reddish purple. Then dilute the solution to volume with water and mix it thoroughly.

c. **Procedure:**

- Take 5g soil in a dry tube then add 30 ml of 0.32% KMnO_4 solution and 25 ml of 2.5% NaOH solution moist the soil.
- In the distillation (receiving) end, keeps a 250 ml conical flask containing 10 ml boric acid.
- Start the distillation by using the automatic distillation unit for 9-12 minutes (nearly 100 ml distillate to be collected)
- Pinkish color turns to light green by the absorption of ammonia in conical flask.
- Titrate the distillate with 0.02N sulfamic acid.
- End point: green color changes to pinkish color (initial color). And note the burette reading.
- The tube of distillation end must be dipped into boric acid solution.

d. **Calculation:**

$$\text{Mineralizable N kg/ha} = (R-B) \times 125.44$$

Where R = Volume of 0.02N sulfamic acid required in titration for soil.

B = Volume of 0.02 N sulfamic acid required in titration for blank.

3.7.5 Estimation of available Phosphorous:

For determining soil available Phosphorous in soils, two methods are commonly used in India. The Olsen's method (Olsen *et al.*, 1954) is used for neutral-alkaline soils while the Bray and Kurtz P1 method is used for acid soils.

1. **Olsen's (NaHCO_3) methods:**

Sodium bicarbonate (NaHCO_3) solution extracts some exchangeable or surface- absorbed Al-P, Fe-P, Ca-P and other phosphates.

a. **Reagents:**

- i. Sodium bicarbonate (Olsen's reagents) solutions 0.5 M NaHCO_3 , pH 8.5:
Dissolve 42 g NaHCO_3 , in water and make up to one liter, Mix thoroughly.
Adjust the pH 8.5, store in glass or polythene bottle.
- ii. Reagent A: Dissolve 12 g. ammonium molybdate $(\text{NH}_4)_6\text{MO}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$, in 250 ml of distilled water. Dissolve 0.2908 g. antimony potassium tartarate (K (SbO) $\text{C}_4\text{H}_4\text{O}_6 \cdot 1/2 \text{H}_2\text{O}$) in 100 ml of distilled water. Add these two solutions to 1000 ml of 2.5 M (5N) H_2SO_4 , mix thoroughly and make to 2000 ml. store in Pyrex glass bottle in a dark and cool place.
- iii. Reagent B: Dissolve 0.528 g ascorbic acid ($\text{C}_6\text{H}_8\text{O}_6$) in 100 ml reagent A and mix. These do not keep for more than 24 hrs at room temperature. Prepare daily as required.
- iv. Sulphuric acid 5N: Dilute 140 ml of conc. H_2SO_4 to 1 lit.
- v. Standard stock Phosphorous solution: Dissolve exactly 0.2195 g. potassium dihydrogen orthophosphate (KH_2PO_4) A.R. grade (dried in oven at 60°C for 1 hrs and cooled in desiccators) in half a liter of distilled water. Add 25 ml of 7 N H_2SO_4 (approx.) and make to one lit with distilled water. This gives 100 ppm phosphorous standard stock solution. From this, a 2 ppm solution is made by diluting it 50 times.

b. **Standard curve:**

To prepare the standard curve, 1, 2, 3, 4, 5 and 10 ml of 2 ppm phosphorous standard stock solution are taken in 25 ml volumetric flasks. To these 5 ml of the extracting solution is added. When Olsen's extractant is used, acidify 5 ml aliquot with 2.5M H_2SO_4 . Add distilled water to make the volume to 20 ml and then add 4 ml of reagent B. Make the volume with distilled water and mix. Prepare a blank with

NaHCO₃ solution, distilled water and 4 ml of reagent B. After waiting for 10 minutes, read the intensity of the blue color in a photoelectric colorimeter using 730-840 nm filters or on Ultra-violet spectrophotometer at 882 nm.

c. **Procedure:**

- Weigh 2.5 g 2 mm air-dry soil (0.1 gm accuracy) into a 250 ml Erlenmeyer flask.
- Add a 0.5 g (Half tea spoon) of Darco G-60 or equivalent grade phosphorous-free activated charcoal.
- Then add 50 ml of Olsen's reagents (Sodium bicarbonate) and shake on the reciprocating shaker for 30 minutes (180 + oscillations/min).
- Similarly run a blank without soil.
- Filter through Whatman no. 40 or 42 filter paper into a clean and dry beaker. Shake the flask immediately before pouring suspension into funnel.
- Place a 5 ml aliquot of the extract in a 25 ml volumetric flask and add 0.5 ml H₂SO₄ with 5 N H₂SO₄, then after waiting 10-15 minutes, add 4 ml of reagent B. After waiting for 10 min, read the intensity of blue color on a spectrophotometer or colorimeter as described for standard curve above.

d. **Calculation:**

$$\text{Available P (kg/ha)} = \frac{R \times \text{volume of extract}}{\text{Volume of aliquot}} \times \frac{2.24 \times 10^6}{\text{Weight (gm) of soil} \times 10^6}$$

Where R = R in the aliquot (obtained from standard curve)

$$\frac{R \times 50 \times 2.24}{5 \times 2.5} = R \times 8.96$$

3.7.6 Estimation of available Potassium:

The term available potassium (K) conventionally refers to exchangeable + water soluble potassium. The potassium is estimated by using a flame-photometer.

Extractant are used as neutral normal ammonium acetate. Described by Jackson, (1967)

a. Reagents and Standard curve:

1. Ammonium acetate (1N) pH 7.0: Dissolve 77g ammonium acetate ($\text{CH}_3\text{COONH}_4$) in 100 ml of distilled water. Mix thoroughly and dilute it and adjust pH to 7.0 by the addition of more of 3N ammonium hydroxide (NH_4OH) or 3N acetic acid (CH_3COOH) and make up volume to one lit. Store in pyrex or polypropylene bottle.
2. Potassium chloride standard solution: make a stock solution of 1000 ppm potassium by dissolving 1.908 g of A.R grade potassium chloride (dried at 60°C for one hrs) in distilled water and diluting up to one liter. Prepare 100 ppm standard by diluting 100 ml of 1000 ppm stock solution to one liter with the extracting solution.
3. Standard curve: Pipette 0, 20, 40, 60, 80 and 100 ml of 100 ppm standard solution into 100 ml volumetric flasks and bring the volume to mark with extracting solution. The solutions contain 0, 20, 40, 60, 80 and 100 ppm potassium respectively.

b. Procedure:

- Place 5 g soil in a 150 ml Erlenmeyer flask
- Pour in 25 ml of neutral normal ammonium acetate (pH 7.0) in each flask.
- Shake on a reciprocating shaker (180 + Oscillations/min) for 5 minutes and immediately filter through whatman No.1 filter papers.
- Mix the solution and determine potassium in the extract in the flame photometer using potassium filter after necessary setting and calibration of the instrument (Use 0 and 20 ppm working potassium concentrations)

- Read similarly the different concentration of potassium in the flame photometer and obtain the standard curve by plotting the reading against the different concentrations of potassium.

c. Calculation:

$$\text{Available potassium (kg/ha)} = \frac{R \times \text{volume of extract} \times 2.24 \times 10^6}{\text{Weight of soil taken} \times 10^6}$$

$$\begin{aligned} \text{Where } R &= \text{ppm of K in the extract (obtained from standard curve)} \\ &= \text{ppm K} \times 11.2 \end{aligned}$$

3.7.7 Determination of available Zn, Cu, Mn and Fe:

Since 1965 numerous studies have conducted to find a suitable extract for the simultaneous extraction of available Zn, Cu, Mn and Fe in soils. Lindsay and Novell, (1978) developed a method using DTPA (Diethyl Triamine Penta Acetic Acid) which was found useful for separating soils into deficient and non deficient categories for Zn, Cu, Mn, and Fe by using atomic absorption spectrophotometer. This method has been adopted in all the laboratories engaged in the analysis of available Zn, Cu, Mn and Fe in soil in India.

a. Principle:

Chelating agents offer great promise for readily-available micronutrient cations in soils. These agents combine with free metal ions in solution to form soluble complexes. DTPA offers a most favorable combination of stability constants for the simultaneous complexation of Zn, Cu, Mn, and Fe.

To avoid excessive dissolution of CaCO_3 can release occluded micronutrients (not available for plants), the extractant is buffered in a slightly alkaline pH range and in part by including soluble Ca^{2+} triethanolamine (TEA) is used as buffer because it burns cleanly during atomization and has a $\text{pK}_a = 7.8$. At the selected pH of 7.3, there fourth of TEA is protonated and is present as HTEA. When the extractant is added to the soil, additional Ca^{2+} and some Mg^{2+} enter the solution, largely because

the protonated TEA exchanges with Ca^{2+} and Mg^{2+} from soil exchange sites. This raises the concentration of ionic Ca^{2+} by two to three folds and adds in suppressing the dissolution of CaCO_3 in calcareous soils with a 2:1 solution to soil ratio. The capacity of DTPA to complex each of the micronutrient is 10 times its atomic weight and ranges from 550 to 650 ppm depending on the micronutrient cation. Thus DTPA is present in excess of the micronutrient metal cation that is normally solublized during an extraction. This excess reduces the possibility that the extraction of one micronutrient might significantly affect the amount of other micronutrient extracted.

b. **Reagent and standard:**

The following reagents are needed:

- DTPA= 0.005M (formula weight 393.35)
- $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ = 0.01M solution
- TEA = 0.1M solution.

c. **Apparatus:**

The following apparatus are needed:

- Conical flask
- Volumetric flask
- Mechanical shaker
- Pipette
- Filter paper
- Atomic absorption spectrophotometer
- Small Pyrex funnel etc.

d. **Extracting solution:**

To prepare 1 liter of DTPA extracting solution, dissolve 13.1 ml reagent grade TEA, 1.967 g. DTPA (AR grade) and 1.47 g of CaCl_2 in 100 ml of double glass

distilled water. Allow sometime for the DTPA to dissolve and dilute to approximately 900 ml. adjust the pH to 7.3 with 1: 1 HCl while stirring and dilute to 1 liter. Addition of approximately 4 ml of 1N HCl will bring the pH of the solution to 7.3. This solution is stable for several months.

e. **Standard solution:**

i) **Zinc standard solution:**

Dissolve 0.439 g AR grade $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ in 200 ml of glass distilled water in beaker. Add 5 ml of 1:5 H_2SO_4 . Transfer to a liter measuring flask and make volume to the mark to have a standard solution of 100 $\mu\text{g Zn/ml}$ (100 ppm) Transfer 10 ml of this standard solution to 100 ml volumetric flask and dilute to the mark with DTPA extracting solution to have a stock solution of 10 $\mu\text{g Zn/ml}$ (10 ppm). For preparing working standards, transfer 1, 2, 4 and 5 ml of stock solution (10 $\mu\text{g Zn/ml}$) to a series of clean 100 ml volumetric flask and dilute each to the mark with DTPA extracting solution.

Volume of stock Zn solution taken	:	0	1	2	4	6 ml
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Concentration of Zn in solution	:	0	0.1	0.2	0.4	0.6 $\mu\text{g /ml}$ (ppm)
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ii) **Iron standard solution:**

Dissolve 0.702 g of AR grade ammonium ferrous sulphate $(\text{NH}_4)_2\text{SO}_4\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$ in 300 ml deionizer or double glass distilled water in a beaker. Add 5 ml of 1:5 H_2SO_4 . Transfer to a 1 liter measuring flask and make volume to the mark. This is a standard solution of 100 $\mu\text{g Fe/ml}$ (100 ppm). To prepare working standards, transfer 1, 2, 4 and 6 ml of stock solution and dilute each to the mark with DTPA extracting solution.

Volume of stock Fe solution taken	:	0	1	2	4	6 ml
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Concentration of Fe in solution	:	0	1	2	4	6 $\mu\text{g/ml}$ (ppm)
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iii) Manganese Standard Solution:

Dissolve 0.288 g potassium permanganate (KMnO_4) AR grade in 300 ml deionizer water in a beaker. Add 20 ml concentrated H_2SO_4 , warm to about 60°C and add oxalic acid solution drop wise to make the solution colorless. Cool and transfer to a 1 litre measuring flask and make volume to the mark. This solution contains $100\text{ }\mu\text{g Mn/ml}$ (100 ppm). To prepare working standards, transfer 1, 2, 4, 6 and 8 ml of the standard solution to a series of clean 100 ml volumetric flasks and dilute each to the mark with DTPA extracting solution.

Volume of stock Mn solution taken : 0 1 2 4 8 ml

Concentration of Mn in solution : 0 1 2 4 8 $\mu\text{g/ml}$ (ppm)

iv) : Copper standard solution:

Dissolve 0.393 copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) of AR grade in 400 ml glass distilled water in a beaker. Transfer to a liter measuring flask and make volume to the mark with glass distilled water. This is a standard solution ml of stock solution containing $100\text{ }\mu\text{g Cu/ml}$. To prepare the working standards, transfer 1, 2, 4 and 6 ml of stock solution to a series of clean 100 ml volumetric flasks and dilute each to the mark with DTPA extracting solution.

Volume of stock Cu solution taken : 0 1 2 4 6 ml

Concentration of Cu in solution : 0 1 2 4 6 $\mu\text{g/ml}$ ppm

f. Extraction and Determination:

Weigh 10 g of air dried soil in a 125 ml conical flask or polypropylene bottle. Then add 20 ml of the DTPA extracting solution. Cork the bottles or flask and place them upright on a horizontal shaker. Shake for two hours with a speed of 120 cycles per minute. Filter the suspension through whatman no 42 filter paper. Keep the filtrate in polypropylene bottles to be analyzed for Zn, Cu, Mn and Fe with an atomic

absorption spectrophotometer. When samples need dilution before measurement, they should be diluted with DTPA solution to maintain a constant matrix.

Experimental conditions such as shaking time, DTPA concentration, pH and temperature during shaking influence the amount of Zn, Cu, Mn and Fe extracted by DTPA. The most suitable pH of extracting solution is 7.3, shaking time 2 hours and temperature during shaking $25 \pm 1^\circ\text{C}$. The values of the nutrient extracted will change if these precautions are not followed. Increase in shaking time and temperature markedly enhance the extractability of Zn, Cu, Mn and Fe. The increase in pH from neutral (7.0) to 7.9 had no effect on Zn and Cu while extractability of Fe and Mn was increased markedly.

3.8 Methodology for micronutrients status evaluation:

The data on available zinc, copper, iron and manganese of soils were characterized for deficient and adequate status using the threshold values 4.5 mg/kg for Fe, 0.2 for Cu, (Katyal and Randhawa, 1983), 3 mg/kg for Mn (Shukla and Gupta, 1975) and 0.6 mg/kg for Zn (Katyal, 1985).

Table: 3.2 Criteria for assessment of micronutrients in soils:

	Micronutrients				
	Deficient	Marginal	sufficient	Higher	Toxicity
Av. Fe (mg/kg)	<4.5	4.5-9.0	9-18	18-27	>27
Av. Mn (mg/kg)	<3.5	3.5-7.0	>7.8	-	-
Av. Cu (mg/kg)	<0.2	0.2-0.4	0.4-0.8	0.8-1.6	>1.6
Av. Zn (mg/kg)	<0.6	0.6-1.2	1.2-2.4	>2.4	-

3.9 Methodology for macronutrients status evaluation:

The categorization of the soils of the individual blocks as a whole into the three fertility classes was done according to the nutrient index values calculated from the soil test summaries giving their percentage distribution into low, medium and high categories.

The nutrient index (Muhr *et al.*, 1965) was given by-

Nutrient index = [% in high category $\times$ 3 + % in medium

Category $\times$ 2 + % in low category $\times$ 1] / 100

In this percent assessment, a nutrient index less than 1.65 denotes low category and that falling between 1.65 and 2.33 represents the medium fertility class. Value of 2.34 and above (maxi 3.00) signifies a high fertility class in respect of the particular nutrient (Ghosh and Hasan, 1976).

The rating of the individual soil test values in to the three classes was performed according to the following limits. (Ramamoorthy and Bajaj, 1969) which have been adopted by most of the soil testing laboratories in the country:

Table: 3.3 Rating of the soil test values of the nutrients:

Nutrient	Rating of the soil test values			
	Very low	Low	Medium	High
O. C. (%)	<0.25	0.25-0.50	0.5 – 0.75	More than 0.75
Av. N (kg.ha ⁻¹)	Below 280		280 – 500	More than 560
Av. P (kg.ha ⁻¹)	Below 12.5		12.5 – 25	More than 25
Av. K (kg.ha ⁻¹)	Below 135		135 – 335	More than 335

3.9 Statistical Analysis-

A complete enumeration of all sample points taken from each of 10 hectares grid area of different soil strata was used for different soil variables of interest under different fertility groups. Standard statistical procedure including correlation studies was adopted to analyze the data.

A. Collection of soil sample

1. A sampling frame of sample points was prepared for different soil types of entire block, which will constitute the population. The soil types were different strata of the population.
2. Grid based soil samples were taken from each of 10 hectares area using Global Positioning System (GPS) from each village of the Sakti block.

B. Soil Analysis

1. The soil samples were analyzed for different physico-chemical properties such as pH, EC, Organic carbon, available N, P and K and for micronutrients viz: Fe, Mn, Cu, and Zn for all strata (*i.e.* soil types)

Results and Discussion

CHAPTER-IV

RESULTS AND DISCUSSION

Macronutrients (N, P and K) and micronutrients (Zn, Fe, Cu and Mn) are important soil elements that control its fertility. Soil fertility is one of the important factor controlling yields of the crops. Soil characterization in relation to evaluation of fertility status of the soils of an area is an important aspect in context of sustainable agriculture production. Soil testing is the key to fertility management while reclamation and rehabilitation of degraded lands is strategic to maintain over all soil health.

The results achieved from the present investigation are presented in this chapter determining the assessment of the soil fertility status of the Sakti block of Janjgir-Champa district. The soil samples were analyzed for the physico-chemical properties *i.e.* pH, electrical conductivity, organic carbon and available nutrients (N, P, K, Fe, Cu, Zn and Mn) content. The soils under study were evaluated for nutrient availability in respect of the major elements, the nutrient index, the values were worked out and the soils were categorized to different fertility units. DTPA-extractable content of Zn, Fe, Cu and Mn elements determined the micronutrient status of soils. The salient significant correlation findings of the investigation are also presented in systematic manner.

Table 4.1: Salient soil properties of study area

Soil characteristics	Range	Mean	S.D
pH (1:2.5, Soil:water)	5.2-7.8	6.1	± 0.5
E.C. (dS m ⁻¹)	0.03-0.43	0.14	± 0.06
O.C. (%)	0.14-0.72	0.47	± 0.10
Available N (kg ha ⁻¹)	100-439	206	± 63
Available P (kg ha ⁻¹)	1.3-24.1	8.6	± 4
Available K (kg ha ⁻¹)	104-667	316	± 111
Available Fe (mg kg ⁻¹)	4.0-68.1	27.5	± 13.9
Available Mn (mg kg ⁻¹)	4.2-73.4	35.7	± 17.2
Available Cu (mg kg ⁻¹)	0.1-10.6	2.4	± 1.9
Available Zn (mg kg ⁻¹)	0.06-2.02	0.80	± 0.41

Table 4.2: Limits for the soil test values used for rating the soil

Classification for pH values				
Strongly acid	Moderately acid	Slightly acid	Neutral	Slightly alkaline
<5.0	5.0-6.0	6.1-6.5	6.6-7.5	7.6-8.5
Classification for total soluble salt content (EC as dS m ⁻¹)				
<1.0	1.0-2.0		2.0-3.0	>3.0
Parameters	Very Low	Low	Medium	High
O.C. (%)	<0.25	0.25-0.50	0.50-0.75	>0.75
	Macronutrients			
Av. N (kg ha ⁻¹)	<280		280-560	>560
Av. P (kg ha ⁻¹)	<12.5		12.5-25	>25
Av. K (kg ha ⁻¹)	<135		135-335	>335
	Micronutrients			
	Deficient		Sufficient	High level
Av. Fe (mg kg ⁻¹)	<4.50		>4.50	>9.00
Av. Mn (mg kg ⁻¹)	<3.50		>3.50	>7.00
Av. Cu (mg kg ⁻¹)	<0.20		>0.20	>0.40
Av. Zn (mg kg ⁻¹)	<0.60		>0.60	>1.20

Table 4.3: Category of soil samples under different pH rating of Sakti block

Classes	Limit	Alfisols		Vertisols		Total (%)
		No. of Samples	% Samples	No. of Samples	% Samples	
Strongly acid	<5.0	0	0	0	0	0
Moderately acid	5-6.0	620	55.5	0	0	52.2
Slightly acid	6.1-6.5	300	26.8	0	0	25.3
Neutral	6.6-7.5	197	17.6	50	70.4	20.7
Slightly alkaline	7.6-8.5	0	0	21	29.6	1.8

4.1 Physico-chemical characteristics

4.1.1 Soil reaction (pH)

A study on soil pH presented in table 4.1 revealed that the soils of farmer's field was acidic to alkaline in reaction and pH ranged from 5.2 to 7.8 in *Alfisols* and *Vertisols* of Sakti block. Soil samples were collected from 108 villages in Sakti block covering 1188 sites representing soils using Global Positioning System (GPS) such that from each 10 ha area represented one grid based soil samples. Singh *et al.*, (2009) reported that surface and subsurface soils were normal to slightly alkaline in reaction in the soils of district Ghazipur, Uttar Pradesh. Considering the table 4.2, the soils having pH <5.0 are considered strongly acidic, pH 5.0 to 6.0 as moderately acidic, pH 6.1 to 6.5 as slightly acidic, neutral considered for pH 6.6 to 7.5 and slightly alkaline soils are considered for pH 7.6 to 8.5. The pH ranged from 5.2 to 7.3 and 6.7 to 7.8 in *Alfisols* and *Vertisols*, respectively (Appendix-II). In general, out of 1188 samples, 52.2% soils were found moderately acidic, 25.3% slightly acidic, 20.7% neutral and only 1.8% slightly alkaline in reaction (Table 4.3).

Further, the data presented in table 4.3 showed that nearly 55.5% samples in moderately acidic, 26.8% in slightly acidic and 17.6% in neutral soil were categorized

in *Alfisols*. The maximum 70.4% samples were observed under neutral and 29.6% under slightly alkaline in *Vertisols*.

The pH value recorded minimum in Jampali village *i.e.* 5.2 however, the higher value of pH *i.e.* 7.8 was observed in Tendutola village of Sakti block (Table 4.1). Similar results were also found in soils of Katol tahsil in Nagpur district of Maharashtra, in which pH ranges from 7.1 to 8.1 and the alkaline reaction of soils is probably due to the presence of sufficient free lime content as reported by Jibhakate *et al.*, (2009).

Table 4.4: Electrical conductivity of surface soils in Sakti block

Limits EC (dS m ⁻¹)	Alfisols		Vertisols		Total (%)
	No. of Samples	% Samples	No. of Samples	% Samples	
<1.0	1117	100	71	100	100
1.0-2.0	0	0	0	0	
2.0-3.0	0	0	0	0	
>3.0	0	0	0	0	

4.1.2 Electrical conductivity (EC)

The electrical conductivity (EC) varied from 0.1 to 0.5 dS m⁻¹ with a mean value of 0.2 dS m⁻¹ at 25°C (Table 4.1) of the Sakti block. The total salt content of these soils expressed as EC are categorized as <1.0, 1.0 to 2.0, 2.0 to 3.0 and >3.0 dS m⁻¹. The normal EC may be ascribed to leaching of salts to lower horizons due to heavy rainfall and surface run-off.

The EC ranged from 0.1 to 0.3 and 0.1 to 0.4 dS m⁻¹ in *Alfisols* and *Vertisols*, respectively with an average of 0.2 and 0.3 dS m⁻¹ (Appendix-II). Data presented in table 4.4 revealed that in Sakti block, 100% soil samples were found under (<1.0 dS m⁻¹).

The results have shown that all the EC values were under normal range ($<1.0 \text{ dS m}^{-1}$), therefore these soils are denoted as non saline and it was reported by Bali *et al.*, (2010). Similar results were also found in soils of Pamgarh block in Janjgir-Champa district (C.G.), in which EC ranges from 0.05 to 0.86 dS m^{-1} (mean – 0.13 dS m^{-1}) as reported by Shukla (2011).

The normal EC may be ascribed to leaching of salts to lower horizons due to heavy rainfall and surface run off from these soils. The average value of EC of the soil was found minimum *i.e.* 0.1 dS m^{-1} in the village Pasid and maximum 0.3 dS m^{-1} in Achanakpur village (Appendix-I). All the soil samples have safe range of electrical conductivity with respect to crop growth and development.

Table 4.5: Distribution and categorization of organic carbon status in soils of Sakti block.

Organic carbon (%)	Alfisols		Vertisols		Total (%)
	No. of Samples	% Samples	No. of Samples	% Samples	
Very Low (<0.25)	33	2.9	3	4.2	3.0
Low ($0.25-0.50$)	629	56.3	34	47.8	55.8
Medium ($0.50-0.75$)	455	40.7	34	47.8	41.2
High (>0.75)	0	0	0	0	

4.1.3 Organic carbon (OC)

Data presented in table 4.1 and 4.5 revealed that most of the soils are having low to medium status of organic carbon. It ranged from 0.1 to 0.7 % with a mean value of 0.5% in *Alfisols* and *Vertisols* of Sakti block. Nearly, 41.2 % soil samples of Sakti block of Janjgir-Champa district were medium in organic carbon content considering the soils having $<0.25\%$ as very low, 0.25- 0.50 % as low, 0.50- 0.75% medium and $>0.75\%$ as high in OC status. The overall organic carbon content ranged

from 0.1 to 0.7 and 0.2 to 0.6% with mean of 0.5 and 0.5% in *Alfisols* and *Vertisols*, respectively (Appendix-II). The soils of Sakti had 3.0% soil samples in very low, 55.8% in low, 41.2% in medium and 0% in high organic status. The majority of the soil samples analyzed for soil organic C content *i.e.* 40.7% and 47.8% soil samples were rated as medium and only 2.9% and 4.2% samples were reported as very low classes in *Alfisols* and *Vertisols*, respectively.

High temperature and good aeration in the soil increased the rate of oxidation of organic matter resulting in reduction of organic carbon content. The high temperature prevailing in the area is responsible for the rapid burning of organic matter, thus resulting in medium organic carbon content of these soils. Similar results were also noted by Sharma *et al.* (2008) in soils of Amritsar district.

The above findings also corroborate with the results of Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh, Vaisnow (2010) in soil of *Vertisols* of Dhamtari block under Dhamtari district in Chhattisgarh and Shukla (2011) in soils of Pamgarh block in Janjgir-Champa district (C.G.).

An average value of OC content of the soil was found minimum *i.e.* 0.2% for the village Jamchuva and maximum *i.e.* 0.6% for Kandanara, Joba, Nandourkhurd villages (Appendix-I) of Sakti block.

Table 4.6: Horizontal distribution of available nitrogen status in the soils of Sakti block

Available N (kg ha ⁻¹)	Alfisols		Vertisols		Total (%)
	No .of Samples	% Samples	No .of Samples	% Samples	
Low (<280)	985	88.1	58	81.6	87.8
Medium (280-560)	132	11.9	13	18.4	12.2
High (>560)	0	0	0	0	

4.2 Available macronutrients status of soils.

4.2.1 Available N status

The available N content (Table 4.1) of *Alfisols* and *Vertisols* varied from 100 to 439 kg ha⁻¹ with an average value of 206 kg ha⁻¹. The available N content ranges from 100 to 439 and 112 to 414 kg ha⁻¹ with mean values of 209 and 221 Kg ha⁻¹ in *Alfisols* and *Vertisols*, respectively (Appendix II). Considering the soil test rating for available N (<280 as low, 280-560 as medium and >560 as high in the status of N), the soil sample *i.e.* 88.1 and 81.6%, were found as low available N content in *Alfisols* and *Vertisols*, respectively. The majority of soils of Sakti block fell under low status (<280 kg ha⁻¹) in available N content. In general, out of 1188 samples, 87.8% fell under low status and 12.2% samples were categorized under medium N status (Table 4.6). In this way, almost all the soil samples tested for available N were found to be deficient in N. The mean value of N was found minimum *i.e.* 133 kg ha⁻¹ in the village Jamchuva and maximum 311 kg ha⁻¹ in Balin village (Appendix I). Similar results were also reported by Rajeshwar *et al.* (2009) in the soils of Krishna in District Andhra Pradesh and Kumar *et al.* (2009) in Dumka and Lachinpur series of Jharkhand.

These results are also in agreement with the findings of Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

Although, it is fact that the available N analyzed by alkaline KMnO₄ method as suggested by Subbiah and Asija, (1956) do not exhibit the exact availability of N in dry soil. It is the measure of the oxidisable N in dry soil.

Table 4.7: Distribution of available phosphorus status in the soils of Sakti block

Available P (kg ha ⁻¹)	Alfisols		Vertisols		Total (%)
	No. of Samples	% Samples	No. of Samples	% Samples	
Low (<12.5)	957	85.6	56	78.8	85.2
Medium (12.5-25)	160	14.2	15	21.2	14.8
High (>25)	0	0	0	0	0

4.2.2 Available P status

The average available P content in various soils was noted from 1.3 to 24.0 kg ha⁻¹ with a mean value of 8.6 kg ha⁻¹ (Table 4.1) in the study area. The range is quite large which might be due to variation in soil properties viz. pH, organic matter content, texture and various soil management and agronomic practices. The value of available phosphorus content varied from 1.3 to 24.0 and 3.0 to 24.0 kg ha⁻¹ with an average value of 8.3 and 9.3 kg ha⁻¹ in *Alfisols* and *Vertisols*, respectively (Appendix-II). Considering the soil test rating for available phosphorus (<12.5 kg ha⁻¹ as low, 12.5-25 kg ha⁻¹ as medium and >25 kg ha⁻¹ as high) majority of the soils fell under low to medium status. Nearly, 85.6% (*Alfisols*) and 78.8% (*Vertisols*) soil samples were observed under low status in available phosphorus. The 14.4 and 21.2% soil samples of study area were categorized under medium available P content in *Alfisols* and *Vertisols*, respectively. Phosphorus is present in soil as solid phase with varying degree of solubility. When water soluble P is added to the soil, it is converted very quickly to insoluble solid phase by reacting with soil constituents. These may include calcium Carbonate (Olsen, 1953), Fe and Al oxides (Dean and Rubins, 1947 and Chu *et al.* 1962) and partly organic matter. These reactions affect the availability of P and as a result of these reactions, a very small amount of total P is present in soil solution at any time reflected by soil testing. However, a low to medium range of soil available P under study area may be mostly affected by past fertilization, pH, organic matter

content, texture, various soil management and agronomic practices (Verma *et al.* 2005). The highest mean values of available phosphorus were recorded 18.7 kg ha⁻¹ in Nandourkhurd and lowest 3.1 kg ha⁻¹ in Kanethi village of Sakti block (Appendix I). These results confirm the finding as reported by Nirawar *et al.* (2009) and Kumar *et al.* (2009) in Dumka and Lachinpur series of Jharkhand.

Similar results were also reported by Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

Table 4.8: Distribution of available potassium status in soils of Sakti block

Available K (kg ha ⁻¹)	Alfisols		Vertisols		Total (%)
	No. of Samples	% Samples	No. of Samples	% Samples	
Low (<135)	35	3.1	0	0	2.9
Medium (135-335)	632	56.5	16	22.5	54.5
High (>335)	450	40.2	55	77.6	42.6

4.2.3 Available K status

The results showed that the available potassium content ranges from 104 to 667 kg ha⁻¹ with an average value of 316 kg ha⁻¹ in soils of Sakti block, (Table 4.1). The available potassium ranged from 104 to 667 and 183 to 595 kg ha⁻¹ with an average 311 and 410 kg ha⁻¹ in *Alfisols* and *Vertisols*, respectively (Appendix-II) of the study area. Considering the soils having <135 kg ha⁻¹ as low, 135-335 kg ha⁻¹ as medium and >335 kg ha⁻¹ as high in available potassium contents, the data presented in table 4.8 revealed that 54.5% had medium available potassium content, whereas 42.6% samples had high in available potassium content of the study area. Distribution of the samples with respect to available potassium indicated (Table 4.8) that in

Alfisols, about 56.5% samples were found in medium and 40.2% samples were found in high K content, where as in *Vertisols* 77.6% soil samples were recorded in high K content and 22.5% samples in medium K content.

These results confirmed the finding as reported by Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.). Adequate (medium or high) available K in these soils may be attributed to the prevalence of potassium-rich minerals like *Illite* and *Feldspars* (Sharma *et al.*, 2008). The highest and lowest mean values of available potassium content were recorded to be 490 and 141 kg ha⁻¹ K in Charpar and Limtara villages, respectively of Sakti block (Appendix-I).

4.3 Available micronutrients status of soils

The data pertaining to status of available zinc, copper, iron and manganese of Sakti block under investigation are summarized in Table. 4.9 to 4.12.

Table 4.9: Distribution of available iron status in surface soils of Sakti block

Available Fe (mg kg ⁻¹)		Alfisols		Vertisols		Total (%)
		No. of Samples	% Samples	No. of Samples	% Samples	
Deficient	<4.5	7	0.6	1	1.4	0.6
Sufficient	4.5-9	107	9.5	3	4.2	9.2
High level	>9	1003	89.9	67	94.3	90.2

4.3.1 Available Fe status

The available Fe content ranged from 4.0 to 69.1 and 4.3 to 38.3 mg kg⁻¹ with an mean of 27.9 and 20.5 mg kg⁻¹ in *Alfisols* and *Vertisols*, respectively of study area (Appendix-II) table 4.1. These findings corroborate with results as reported by Rajeshwar *et al.* (2009) in soils of Krishna district of Andhra Pradesh and also

confirm the findings of Singh *et al.* (2009) in the DTPA-extractable Fe in the soils of district Gajipur, Uttar Pradesh.

Similar results were also reported by Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

Considering 4.5 mg kg^{-1} DTPA-extractable Fe as critical limit (Table 4.2) (Lindsay and Norvell, 1978), 0.6% soil samples were found deficient, and 9.2% found sufficient however, 90.2% samples recorded higher level of available Fe content (Table 4.9). High available Fe content in soils of Sakti block might be due to its topography and cultivation of rice, which induced prolonged submergence coupled with reducing conditions. Majority of the soils were not deficient in Fe as the amount of iron required by crops is being released by iron bearing minerals in these soils. The soil pH had reverse effect on the availability of Fe content in soil. It was concluded from the table 4.9 that 89.9% and 94.3% samples recorded higher level of Fe and 0.6% and 1.4% samples observed deficient level of Fe, where as 9.5 and 4.2% samples recorded sufficient Fe in *Alfisols* and *Vertisols*, respectively. The highest and lowest mean values of DTPA-extractable Fe was recorded 63.2 and 5.6 mg kg^{-1} Fe in Jamchuva and Borda villages, respectively (Appendix-I) of Sakti block.

Table 4.10: Distribution of available copper status in surface soils of Sakti block

Available Cu (mg kg^{-1})		Alfisols		Vertisols		Total (%)
		No. of Samples	% Samples	No .of Samples	% Samples	
Deficient	<0.2	15	1.4	1	1.4	1.3
Sufficient	0.2-0.4	23	2.0	1	1.4	2.0
High level	>0.4	1079	96.6	69	97.2	96.7

4.3.2 Available Cu status

The DTPA-extractable Cu content of soils under study varied from 0.1 to 10.6 mg kg⁻¹ with an average content of available Cu recorded as 2.4 mg kg⁻¹ (Table 4.1). The results were in conformity with the findings of Meena *et al.*, (2006), Yadav and Meena, (2009) and Singh *et al.*, (2009).

The available Cu ranged from 0.1 to 10.6 and 0.1 to 10.5 mg kg⁻¹ with an mean value of 2.3 and 2.7 mg kg⁻¹ in *Alfisols* and *Vertisols*, respectively of study area (Appendix-II). Considering deficient (<0.2), sufficient (0.2-0.4) and high (>0.4 mg kg⁻¹) level of DTPA-extractable Cu as critical limit in table 4.2, on an average 96.7% soil samples were found to be in higher level, 2.0% soil samples were found to be in sufficient level and only 1.3% in deficient available content of Cu, in soils of Sakti block (Table 4.10). A major group of soils fell under higher level of available copper (>0.4 mg kg⁻¹) having 96.6% and 97.2%, in *Alfisols* and *Vertisols*, respectively of Sakti block.

Most of the soil samples were found under high level in available Cu content with a model class of >0.4 mg kg⁻¹ DTPA-extractable Cu (Table 4.10). Kumar *et al.*, (2009), Rajeshwar *et al.* (2009), Meena *et al.* (2006), Jatav (2010), Shukla (2011) and several other workers reported available copper in similar range. The highest and lowest mean values of available Cu for *Alfisols* and *Vertisols* were 7.3 and 0.7 mg kg⁻¹ in Mohgaon and Dholnara villages, respectively (Appendix-I) of Sakti block.

Table 4.11: Distribution of available manganese status in surface soils of Sakti block

Available Mn (mg kg ⁻¹)		Alfisols		Vertisols		Total (%)
		No. of Samples	% Samples	No. of Samples	% Samples	
Deficient	<3.5	0	0	0	0	0
Sufficient	3.5-7.0	32	2.9	9	12.7	3.4
High level	>7.0	1085	97.1	62	87.3	96.6

4.3.3 Available Mn status

The available Mn content ranged from 4.2 to 73.4 mg kg⁻¹ with mean value of 35.7 mg kg⁻¹ in soils of study area (Table 4.1). Considering the soil test rating for DTPA-extractable Mn (<3.5 mg kg⁻¹ as deficient, 3.5 to 7.0 mg kg⁻¹ as sufficient and >7.0 mg kg⁻¹ as higher level), the data presented in table 4.11 revealed that 3.4% of samples were sufficient and 96.6% soil samples were found in higher range of available Mn in soils of Sakti block. The available Mn content ranged from 4.2 to 76.1 and 4.2 to 68.2 mg kg⁻¹ with an average of 36.1 and 27.9 mg kg⁻¹ in *Alfisols* and *Vertisols*, respectively of Sakti block (Appendix-II).

The DTPA-extractable Mn content estimated from total 1188 soil samples of Sakti block covering about 108 villages observed that nearly 97.1% samples recorded higher and 2.9%, samples were in sufficient level under *Alfisols*. Similarly, 87.3% samples recorded higher level and only 12.7% samples recorded under sufficient level in *Vertisols* (Table 4.11).

Similar results were also reported by Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

The Mn bearing minerals in the parent material might be the reason for higher Mn content in the soils and due to better supply of manganese to rice in flooded soil because Mn is soluble under relatively acid and reducing conditions. Higher organic carbon may further increase the DTPA-extractable Mn content in soil. Mn deficiency was not observed in major parts of the block because the soils are dominantly medium to fine in texture and Mn is mobilized under reduced conditions during rice cultivation which resulted in higher availability of Mn to rice (Mandal and Halder, 1980). The highest and lowest mean values of available Mn content in study area were 64.2 and 5.8 mg kg⁻¹ in Pali and Kanchanpur villages, of Sakti block, respectively (Appendix-I).

Table 4.12: Distribution of available zinc status in surface soils of Sakti block

Available Zn (mg kg ⁻¹)		Alfisols		Vertisols		Total (%)
		No .of Samples	% Samples	No .of Samples	% Samples	
Deficient	<0.6	380	34.0	29	41.0	34.4
Sufficient	0.60-1.2	530	47.4	32	45.0	47.3
High level	>1.2	207	18.6	10	14.0	18.3

4.3.4 Available Zn status

The DTPA-extractable Zn varied from 0.1 to 2.1 mg kg⁻¹ with an average available zinc of 0.8 mg kg⁻¹ in the study area (Table 4.1). The available Zn ranged from 0.1 to 2.1 and 0.1 to 1.8 mg kg⁻¹ with an average of 0.8 and 0.7 mg kg⁻¹ in *Alfisols and Vertisols*, respectively of study area (Appendix-II). Considering the soil test rating for DTPA-extractable Zn (<0.6 as deficient, 0.6-1.2 as sufficient and >1.2 mg kg⁻¹ as high level) as critical limit for Zn deficiency (Lindsay and Norvell, 1978) (Table 4.2), 34.4% samples were found to be deficient, 47.3% samples sufficient and

18.3% samples were found to be under higher level in available content of Zn (Table 4.12).

Distribution of samples with respect to available Zn indicated that in *Alfisols*, 34.0% samples fell under deficient, 47.4 % under sufficient and 18.6% under high level in available Zn content , where as in *Vertisols* 41.0% samples fell under deficient and 45.0% samples under sufficient level of Zn content (Table 4.12). In well drained aerated calcareous soils, zinc exists in oxidized state and their availability becomes low. The results are in conformity with the findings of Rajeswar *et al.*, (2009) in Garikapadu of Krishna district of Andhra Pradesh and similar results were also reported by Singh *et al.*, (2009) in the soils of Ghazipur district of Uttar Pradesh.

These results were also supported by Jatav (2010) in the soils of *Inceptisols* group of Baloda block of Janjgir-Champa district of Chhattisgarh and Shukla (2011) in the *Inceptisols*, *Alfisols* and *Vertisols* orders of Pamgarh block in Janjgir-Champa district (C.G.).

The highest and lowest mean values of available Zn in the study area were 1.7 and 0.3 mg kg⁻¹ in Mohgaon and Karrapali, Kanethi, Dumarpara, Bokraguda villages, respectively (Appendix-I).

4.4 Available N, P and K content in relation to soil reaction and organic carbon status

In order to study the effect of soil attributes on available nutrients, the data were simply averaged and relationships were worked out for all the soil samples collectively. The soil attributes included in this study were pH and organic carbon per cent and the pertaining results are presented in table 4.13.

Soil reaction (pH) & EC

Soil pH showed positive relationship (Table 4.13) with available P and K in all the samples of Sakti block, (Fig 4.2-4.3). But there was no definite relationship between available N and soil pH. Above pH 7 available P was found in decreasing order.

Organic Carbon (OC)

Data in table 4.13 revealed that a positive relationship was observed between OC and available N, however, a negative relation was ascribed between OC and available phosphorus content in the soils of Sakti block under study, (Fig 4.1-4.2).

Table 4.13: Availability of major nutrients in different ratings of pH, EC and Organic carbon

Soil properties	Limit	No. of Samples	Major nutrients (kg ha ⁻¹)		
			N	P	K
pH	<5.0	0	-	-	-
	5-6.0	620	212.9	8.2	305.2
	6.1-6.5	300	201	9	325
	6.6-7.5	247	213	9	332
	7.6-8.5	21	231	7	378
EC dS m ⁻¹	<1.0	1188	206	8.6	316
	1.0-2.0	0	-	-	-
	2.0-3.0	0	-	-	-
	>3.0	0	-	-	-
Organic carbon (%)	(<0.25)	36	133	9	302
	(0.25-0.50)	663	183	8	321
	(0.50-0.75)	489	212	8	317
	(>0.75)	0	-	-	-

Table 4.14: Availability of micronutrients in different ratings of pH, EC and organic carbon

Soil properties	Limit	No. of Samples	micro nutrients (mg kg ⁻¹)			
			Fe	Cu	Mn	Zn
pH	<5.0	0	-	-	-	-
	5-6.0	620	28.1	2.4	36.9	0.8
	6.1-6.5	300	28	2	36	1
	6.6-7.5	247	26	3	33	1
	7.6-8.5	21	11	3	21	1
EC dS m ⁻¹	<1.0	1188	27.5	2.4	35.7	0.80
	1.0-2.0	0	-	-	-	-
	2.0-3.0	0	-	-	-	-
	>3.0	0	-	-	-	-
Organic carbon (%)	(<0.25)	36	32	3.1	29	0.9
	(0.25-0.50)	663	28	2.4	36	0.8
	(0.50-0.75)	489	27	2.3	36	0.8
	(>0.75)	0	-	-	-	-

4.5 Available Fe, Mn, Cu and Zn content in relation to soil characteristics. Soil reaction (pH)

The data presented in table 4.14 and also depicted in Fig. 4.4-4.7 envisaged that there is no definite trend in relation to pH and availability of Cu and Zn. However, the availability of Mn and Fe was found higher in acidic range of pH. The availability of iron (fig.4.5) and Mn (fig.4.6) showed decreasing trend with increase in soil pH.

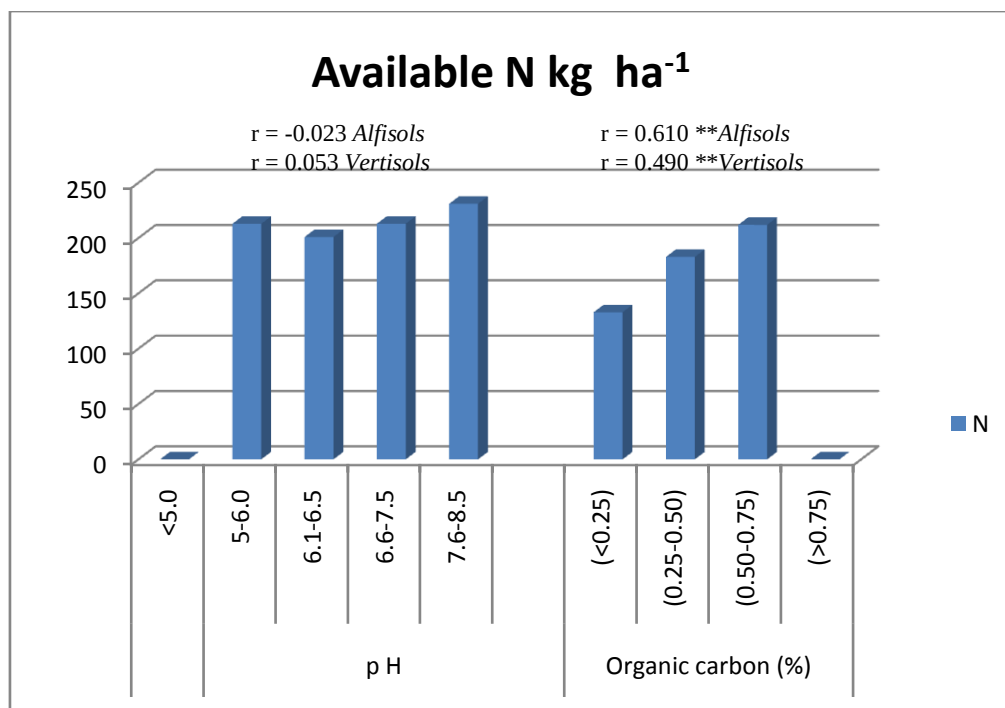


Fig 4.1: Soil available N as affected by pH and Organic C

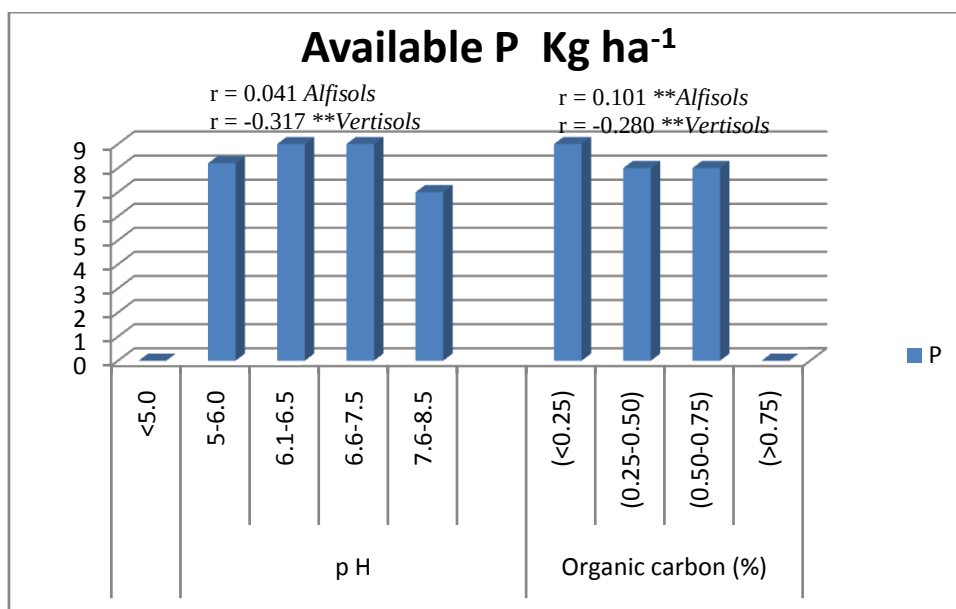


Fig 4.2: Soil available P as affected by pH and Organic

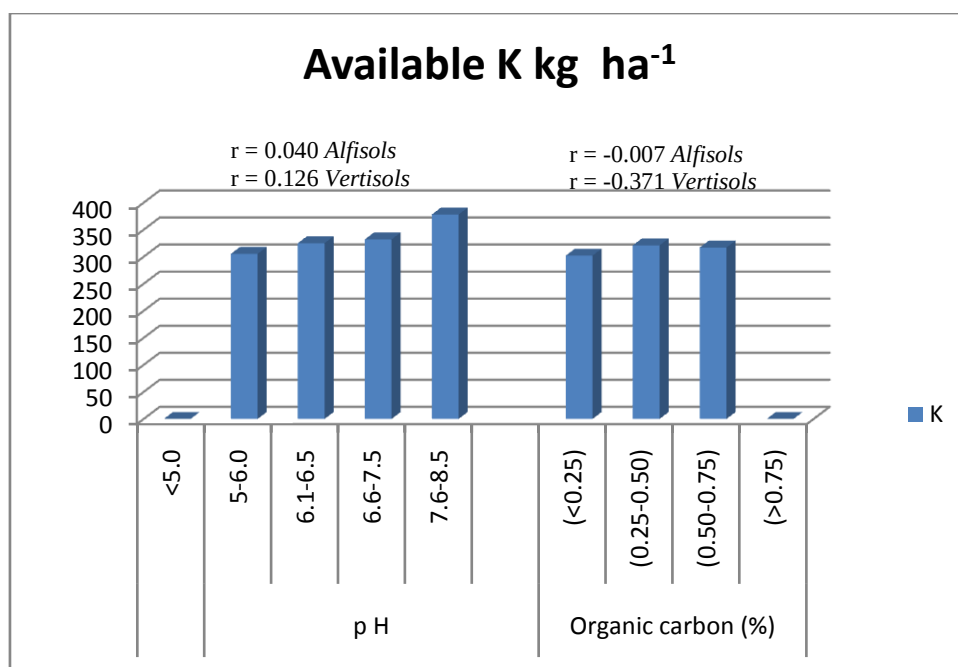


Fig 4.3: Soil available K as affected by pH and Organic C

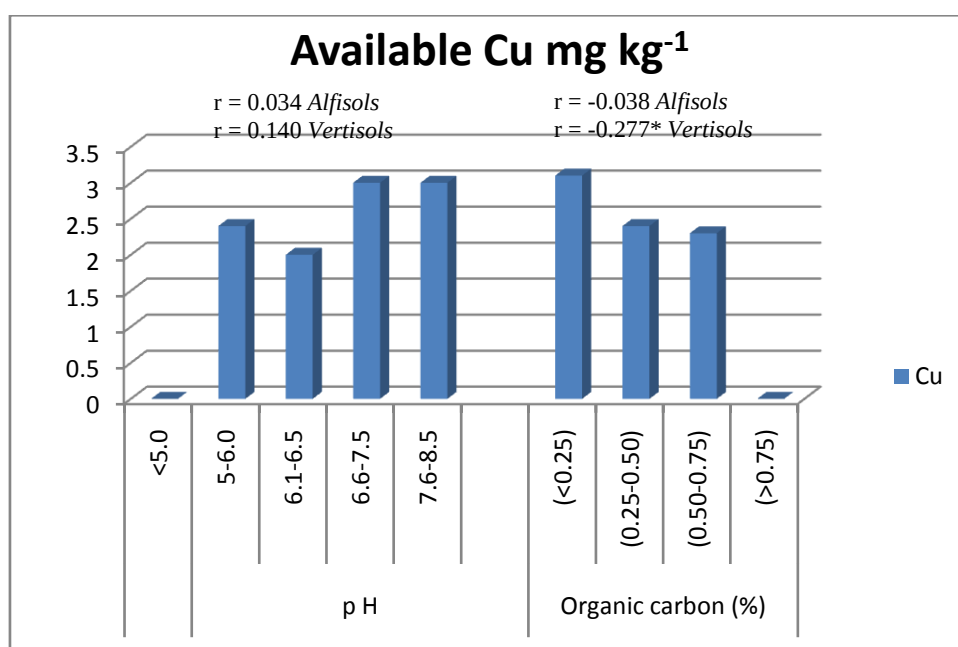


Fig 4.4: Soil available Cu as affected by pH and Organic C

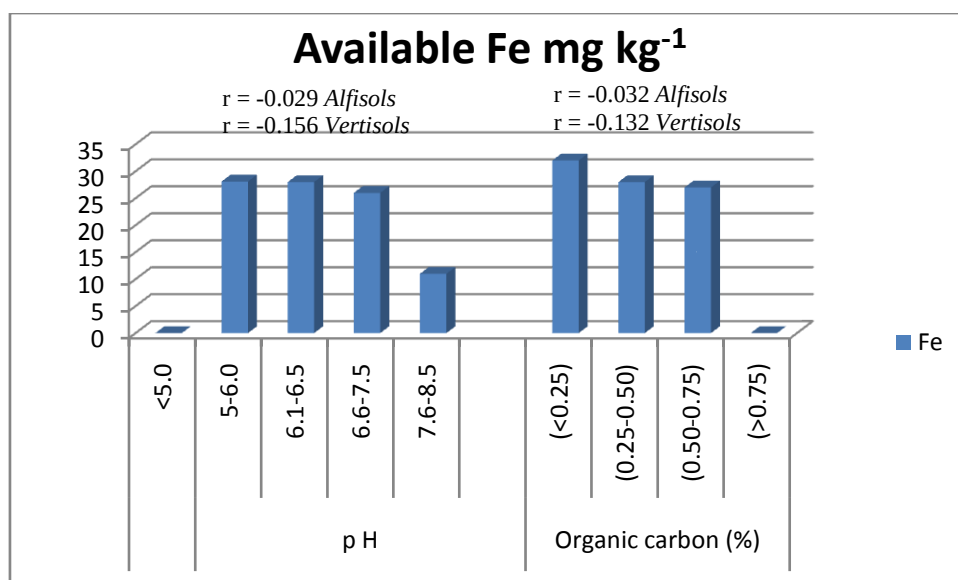


Fig 4.5: Soil available Fe as affected by pH and Organic C

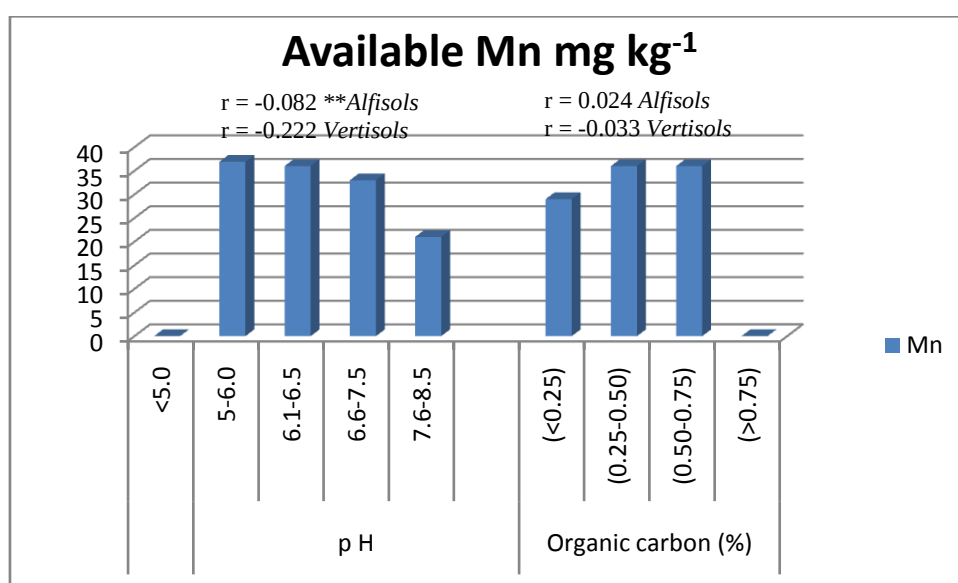


Fig 4.6: Soil available Mn as affected by pH and Organic C

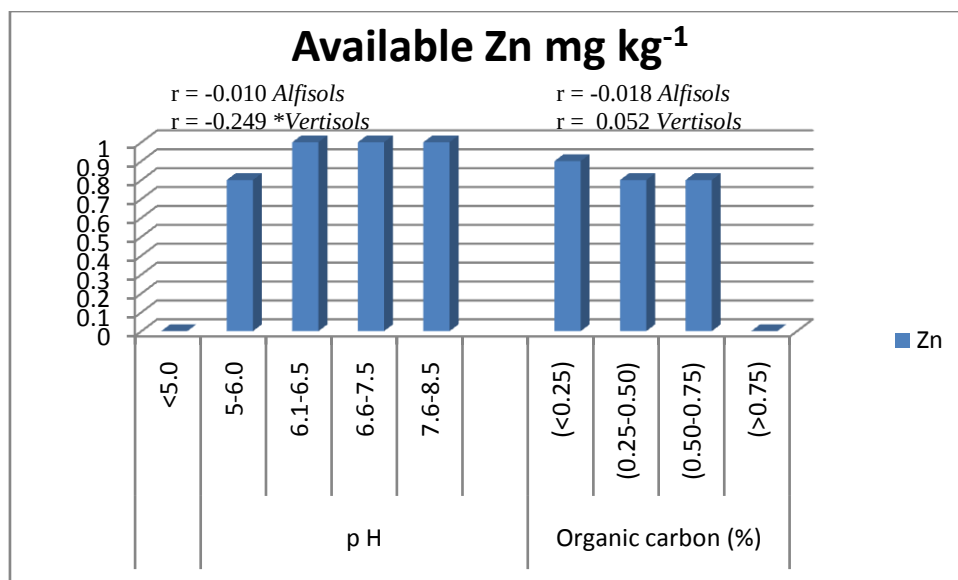


Fig 4.7: Soil available Zn as affected by pH and Organic C

Electrical Conductivity

EC of all soil samples are less than 1.0 dS m^{-1} table (4.14). So there is no relationship found between EC and micronutrients from this table (4.14).

Organic carbon

It is evident from table 4.14 and that there was no definite relationship observed between per cent OC and available content of micronutrients. However, the availability of copper and iron affected adversely with increase in organic carbon content.

Table 4.15: Correlation coefficient (r) between physico-chemical properties and available N, P and K in Alfisols of Sakti block

	pH	EC	OC	N	P
pH					
EC	0.610**				
OC	-0.004	0.029			
N	-0.023	0.008	0.684**		
P	0.041	0.034	0.101**	0.098**	
K	0.040	0.075*	-0.007	0.015	0.012

*Significant at 5% level

**Significant at 1% level

4.6 Relationship between soil characteristics and available N, P and K in Alfisols

Available N had non-significant negative correlation with pH ($r = -0.023$) as presented in table 4.15. The results indicated that available N decreased with rise in pH. Similar results were reported by Kumar *et al.* (2009) soils of Dumka and Lachimpur series in Santhal Paraganas Region of Jharkhand.

A significant positive correlation was observed between available N and OC ($r = 0.684^{**}$) as presented in table 4.15. Similarly, OC markedly affected the soil N

status and the results are in agreement with those of workers like Sharma *et al.* (2008), Kumar *et al.* (2009) and Shukla (2011).

A non-significant and positive correlation ($r = 0.040$) was found between available K with pH (Table 4.15). Similar results were obtained by Shukla (2011) in the soils of Pamgarh block in Janjgir-Champa district (C.G.).

Electrical conductivity of these soils showed non-significant and positive correlation ($r = 0.008$ and $r = 0.034$) with nitrogen and phosphorus, respectively (Table 4.15). These results are in agreement with finding of Sharma *et al.* (2008).

A significant and positive correlation ($r = 0.101^{**}$) was also found between available P and organic carbon (Table 4.15). This relationship was also observed by Shukla (2011) in the soils of Pamgarh block in Janjgir-Champa district (C.G.).

Table 4.16: Correlation coefficient (r) between physico-chemical properties and available N, P and K in Vertisols of Sakti block

	pH	EC	OC	N	P
pH					
EC	0.490**				
OC	0.053	-0.096			
N	0.093	-0.027	0.621**		
P	-0.317**	-0.120	-0.280**	0.030	
K	0.126	0.025	-0.371	-0.148	0.198

**Significant at 1% level

*Significant at 5% level

4.7 Relationship between soil characteristics and available N, P and K in Vertisols

The soil reaction (pH) showed significant and positive correlation ($r = 0.490^{**}$) with electrical conductivity. These results are in agreement with Shukla (2011). A positive and non-significant correlation ($r = 0.0126$) was also observed

between pH and available K content (Table 4.16). Similar results were also reported by Shukla (2011).

The significant positive correlations were recorded between available N with soil OC ($r = 0.621^{**}$) as presented in table 4.16. The results indicated that available N increased with rise in OC. Similarly, OC status also markedly affected the soil N status and the results are in agreement with those of workers like Sharma *et al.* (2008) and Shukla (2011).

The data on physico-chemical properties and available macro-nutrients in soils of Sakti block (Table 4.16) revealed that the available phosphorus was found to be negative and significantly correlated with pH ($r = -0.317^{**}$). Similar results were also reported by Shukla (2011) in the vertisols of Pamgarh block in Janjgir-Champa district (C.G.).

Table 4.17: Correlation coefficients (r) between physico-chemical properties and DTPA -extractable Zn, Cu, Fe and Mn in Alfisols of Sakti block

Soil properties	Available Micro-nutrients			
	Cu	Mn	Fe	Zn
pH	0.034	-0.082 ^{**}	-0.029	-0.010
EC	0.120 ^{**}	-0.115 ^{**}	-0.079 [*]	0.046
O.C.	-0.038	0.024	-0.032	-0.018

* Significant at 5% level

** Significant at 1% level

4.8 Relationship between soil characteristics and DTPA-extractable Zn, Cu, Fe and Mn in Alfisols

Mn status resulted in a negative and significant correlation with pH ($r = -0.082^{**}$). The possible reason behind this may be due to the formation of insoluble higher valent oxides of Mn at high pH (Sahoo *et al.* 1995). Bansal and Takkar (1985) reported that the DTPA-extractable Mn decreased significantly with increase in pH.

Similar results were also reported by Kumar *et al.* (2009), Andrabi and Shah (2010) and Shukla (2011) in the soils of Pamgarh block in Janjgir-Champa district (C.G.). Positive and non-significant correlation of available Mn with OC ($r = 0.024$) were found in *Alfisol* of Sakti block (Table 4.17). This is in conformity with the finding of Nazif *et al.* (2006) in the micronutrient status of soils of district Bhimber (Azad Jammu and Kashmir).

The available Cu was negatively but non-significantly correlated ($r=-0.03$) with organic carbon content. Such relationship was also reported by Shukla (2011).

Organic carbon of the soils exercised negative correlation ($r = -0.032$) with available content of Fe and non-significant, negative correlation ($r=-0.018$) was found with Zn, respectively (Table 4.17). Similar results were also reported by Shukla (2011) for available Zn and Fe.

Table 4.18: Correlation coefficients (r) between physico-chemical properties and DTPA-extractable Zn, Cu, Fe and Mn in Vertisols of Sakti block

Soil properties	Available Micro-nutrients			
	Cu	Mn	Fe	Zn
pH	0.140	-0.222	-0.156	-0.249*
EC	0.271*	-0.203	0.136	-0.396**
O.C.	-0.277*	-0.033	-0.132	0.052

*Significant at 5% level

** Significant at 1% level

4.9 Relationship between soil characteristics and DTPA-extractable Zn, Cu, Fe and Mn in Vertisols

A non-significant negative correlation ($r = -0.222$) of available Mn with pH (Table 4.18) was observed which confirm the observations reported by Kumar *et al.* (2009) in Santhal Paraganas region of Jharkhand, Andrabi and Shah (2010) and Shukla (2011).

A negative correlation ($r = -0.249^*$) of available Zn with pH (Table 4.18) was observed in *Vertisols* of Sakti block. The findings are in conformity with observations reported by Ajay *et al.* (2009). The availability of Zn content show higher values due to their solubility effects. Similar results were also reported by Kumar *et al.* (2009) and Shukla (2011) for available Zn and Fe. Organic carbon was positive and non-significantly correlated ($r = 0.052$) with available content of zinc (Table 4.18). It is also confirmed results reported by Sharma *et al* (2003).

The organic carbon content of the soils was found negative and significantly correlated with available copper ($r = -0.277^*$), and negatively correlated ($r = -0.033$), with available manganese, respectively. These results are in agreement with the findings of Kumar *et al.* (2009) and Shukla (2011).

The electrical conductivity of soils exercised significant and positive correlation ($r = 0.271^*$) with available copper and negative non-significant ($r = -0.203$) with available manganese, positive non significant correlation ($r = 0.136$) with available iron and significant and negative ($r = -0.396^{**}$) with available content of zinc, respectively (Table 4.18). These results are contradicted with the findings of Shukla (2011).

Table 4.19: Mean value of soil fertility index and per cent distribution of soil fertility classes in soils of Sakti block

Available Nutrients	No. of village	Mean value of soil fertility index	Per cent distribution of soil fertility class		
			Low	Medium	High
N	108	1.11	100% (32)	0	0
P	108	1.15	99.0% (107)	1.0% (1)	0% (0)
K	108	2.38	2.7(%) (3)	50(%) (54)	47.3% (51)

() indicates No. of villages

4.10 Soil fertility index and soil fertility class

The data pertaining to soil fertility index and soil fertility classes of status of available nitrogen, phosphorous and potassium are presented in Appendix-III and summarized in table 4.19.

4.10.1 Available nitrogen status

The status of available N in Sakti block under present investigation ranged from 100 to 439 kg ha⁻¹ with a mean value of 206 kg ha⁻¹ (Table 4.1).

Using the criteria of Ramamoorthy and Bajaj (1969), the 100 per cent of the villages in the present study were found under the low fertility class (Table 4.19). The reason for low content of available nitrogen might be due to the fact that N is lost through various mechanism like NH₃ volatilization, nitrification, denitrification, chemical and microbial fixation, leaching and runoff which resulted in low amount of available N in soil. Using the model class of Ramamoorthy and Bajaj (1969), 100 per cent soil samples in the present study were classified as low fertility class (Table 4.19). Considering the soils having the nutrient index values <1.67 for low, 1.67 to 2.33 for medium and >2.33 for high fertility class, the nutrient index mean value of nitrogen was 1.11 (Table 4.19 and Appendix-III). The soils of Sakti block was found in category of low fertility class of nitrogen.

4.10.2 Available phosphorous status

The status of available P content in soils under present investigation varied from 1.3 to 24.1 kg ha⁻¹ with a mean value of 8.6 kg ha⁻¹ (Table 4.1). Almost similar ranges of available P were found by Kumar *et al.* (2009) in Lachchampur series of Santhal Paraganas region of Jharkhand and Shukla (2011) in the soils of Pamgarh block in Janjgir-Champa district (C.G.).

Using the criteria of model class of Ramamoorthy and Bajaj (1969), 99.0% villages in the present study were classified as low fertility class, 1.0% villages were

classified as medium fertility class and only 0% villages were classified in high fertility class of phosphorus (Table 4.19). Considering the soils having the nutrient index values <1.67 for low, 1.67 to 2.33 for medium and >2.33 for high fertility class, the nutrient index mean value of phosphorous was 1.15 (Table 4.19 and Appendix-III). The soils of Sakti block was found in category of low fertility class of phosphorous.

4.10.3 Available potassium status

The status of available potassium content of different soil samples collected from different villages of Sakti block are given in table 4.1. The results showed that the available potassium content ranged from 104 to 667 kg ha⁻¹ with an average value of 316 kg ha⁻¹.

Using the model class of Ramamoorthy and Bajaj (1969), nearly 50% villages under the study were classified as medium fertility class and 47.3% villages were high in fertility class of potassium (Table 4.19) in the study area.

It is evident (Table 4.19 and Appendix III) that considering the concept of “Soil Nutrient Index”, the *Alfisols and Vertisols* of the study area were found in low fertility class of nitrogen and phosphorous and medium fertility class with respect to potassium. The mean values worked out from nutrient index for nitrogen, phosphorous and potassium were 1.1, 1.1 and 2.3, respectively against the nutrient index values <1.67 for low, 1.67 to 2.33 for medium and >2.33 for high fertility status of study area of Sakti block.

Table 4.20: Soil fertility assessment based on soil fertility index

Fertility class	No. of villages
Low-Low-Medium(LLM)	54
Low-Low-High(LLH)	51
Low- Medium-low (LML)	1
Low- Low-Low (LLL)	2

4.11 Soil fertility assessment

Based on the criteria given in table 4.20, the *Alfisols and Vertisols* of Sakti block have been characterized into four soil fertility categories (available N, P and K), viz. Low- Low - Medium (LLM), Low - Low – High (LLH) Low- Medium - Low(LML) and Low- Low-Low (LLL). Most of the soils of Sakti block were covered in LLM and LLH, categories (Table 4.20 and Appendix-III).

*Summary, Conclusion & Suggestions
for Future Research Work*

CHAPTER-V

SUMMARY, CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH WORK

The present investigation was undertaken with a view to evaluate the fertility status in black soils of Sakti block in Janjgir-Champa district of Chhattisgarh and its relationship with important physico-chemical characteristics for identifying the location, specific conditions, promoting nutrient deficiencies and realistic assessment of need for nutrients. The highlights of the investigation are summarized and concluded as follows.

SUMMARY

Grid based surface (0-15cm) soil samples by systematic survey were collected using global position system from 108 villages in Sakti block in such a way that each sample of 10 ha area represented one sampling point using 1:4000 scale cadastral maps and total 1188 soil samples covering two soil types out of which, 1117 and 71 samples were identified by the help of Munsell Colour Chart as *Alfisols* and *Vertisols*, respectively. These samples were analyzed for pH, EC, organic C, available N, P, K and DTPA-extractable Zn, Cu, Fe and Mn. Their results are summarized in the following heads.

Physico-chemical properties

The pH of *Alfisols* and *Vertisols* of Sakti block varied from 5.2 to 7.8. The Electrical conductivity of soil water suspension ranged from 0.1 to 0.5 dS m⁻¹ with a mean value of 0.2 dS m⁻¹. The variations in organic carbon content in these soils were observed from 0.1% to 0.7% with a mean value of 0.5%. In general, the organic carbon status of soils of Sakti block was low.

Status of available N, P, K, Zn, Cu, Fe, and Mn in soils

Available N content in soils of Sakti block ranged from 100 to 439 kg ha⁻¹ with an average of 206 kg ha⁻¹. Nutrient index values were in low fertility class in soils of each village. Thus, the overall poor status of available nitrogen was observed in these soils.

The status of available phosphorous varied from 1.3 to 24.1 kg ha⁻¹ with a mean value of 8.6 kg ha⁻¹. About 99.0% soil samples from the study area were classified as low fertility class, 1.0% in medium and 0% in high fertility class. The nutrient index value for P was in low fertility class of Sakti block.

The status of available potassium content varied from 104 to 667 kg ha⁻¹ with a mean value of 316 kg ha⁻¹. Nearly 50% soil samples under the study were classified as medium and 47.3% samples observed as high fertility class.

The status of available iron varied from 4.0 to 68.1 mg kg⁻¹ with a mean value of 27.5 mg kg⁻¹. The status of available manganese and Copper varied from 4.2 to 73.4 mg kg⁻¹ and 0.1 to 10.6 mg kg⁻¹ with a mean value of 35.7 and 2.4 mg kg⁻¹, respectively. Similarly, the status of available zinc varied from 0.1 to 2.1 mg kg⁻¹ with a mean value of 0.8 mg kg⁻¹.

Correlation studies

A positive significant correlation was found between pH and EC in Alfisols and Vertisols. Further, the correlation studies of OC with available phosphorus had at significant positive correlation in Alfisols. The positive significant correlation was also found between OC and available N in Alfisols and Vertisols. However, pH had negative and significant correlation with available Mn in Alfisols. A negative and significant correlation was found between pH and available P in vertisols of study area.

Correlation studies amongst available major nutrients revealed that there was positive & significant correlation existed between available N and P in *Alfisols* only. All the remaining correlations had been found non-significant may be either positive or negative in all soils of Sakti block.

CONCLUSIONS

It can be concluded from the above results that most of the *Alfisols* and *Vertisols* of Sakti block in Janjgir-Champa district of Chhattisgarh showed low status in available N, low status in P and medium to high level in available K Table 4.6-4.8 and characterized under moderately acidic to slightly alkaline in soil reaction (pH) and less than 1 dS m⁻¹ soluble salt content (EC) which comes under safe limit for all soils Table 4.3- 4.4. Most of soil samples tested observed high level of DTPA-extractable Fe, Mn and Cu. Whereas, Zn deficiency was observed in study area Table 4.9-4.12. The organic carbon level exhibited low to medium Table 4.5 and positively significant correlation was exhibited amongst OC and available N Table 4.13 and Fig 4.1. Most of the soils of Sakti block were characterized by Low-Low - Medium (LLM), Low - Low – High (LLH) Low- Medium – Low (LML) and Low- Low-Low (LLL) were observed in soils of Sakti Block. Most of the soils of Sakti were characterized in Low-Low-Medium and Low-Low-High categories.

Hence, the soils require attention regarding nutrient management practices and regular monitoring of soil health for better crop production, in future.

Needs Future Research Works

- The soil test results so obtained under study must be translated into digital map at village level as well as block level for balanced fertilizer application guide. These guidelines will help to the farmers to obtain the balanced fertilizer doses prescribed for different crops and soils.

- Refinement of general recommendations based on soil fertility index of an area as an intermediate approach is to be under taken.
- Effect of adverse soil conditions such as acidity on soil test crop response correlations should be quantified.
- The available soil fertility map should be utilized for advisory work.
- Soil-test crop response correlation studies are needed for nitrogen, phosphorous and potassium and other nutrients for rain fed/dry land crops. Correlation of crop responses to applied nutrients with varying moisture regime is required.
- Investigation should be carried out to identify location specific conditions i.e. physic-chemical characteristics of soils that modify or promote the nutrients deficiencies.

Abstract

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“FERTILITY EVALUATION IN BLACK SOILS OF SAKTI BLOCK, IN JANJGIR-CHAMPA DISTRICT OF CHHATTISGARH”

BY
ASHISH SONI

ABSTRACT

A Study was undertaken to evaluate the fertility status of Sakti block in Janjgir-Champa district, Chhattisgarh covering 108 villages during 2011-2012. The systematic collection of samples was carried out in geo-referenced surface (0-0.15m) soils samples from 1188 sites representing *Alfisols* and *Vertisols* using Global Positioning System. The samples were analyzed for DTPA-extractable zinc, copper, iron, manganese, and available nitrogen, phosphorous and potassium content for delineation of the fertility status in relation to salient physico-chemical characteristics.

The statistical description of soil characteristics indicated that the pH of the soils varied from 5.2 to 7.8. The electrical conductivity of soil-water suspension ranged from 0.1 to 0.5 dS m⁻¹. The organic carbon content in these soils varied from 0.1 to 0.7%, which was observed to be low to medium in organic matter status. The status of available nitrogen ranged from 100 to 439 kg ha⁻¹ and concluded that soils were found to be low in N status. The status of available P in soils ranged from 1.3 to 24.0 kg ha⁻¹. The available potassium content generally found medium to high. It ranged from 104 to 667 kg ha⁻¹. The nutrient index with respect to available nitrogen, phosphorus and potassium were also calculated on village basis. Four categories of soil fertility class viz. Low- Low - Medium (LLM), Low - Low - High (LLH) Low- Medium - Low (LML) and Low-Low-Low (LLL) were observed in soils of Sakti Block. Most of the soils of Sakti were characterized in Low-Low-Medium and Low-Low-High categories.

The DTPA-extractable copper content ranged from 0.1 to 10.6 mg kg⁻¹. The available Mn, Fe and Zn content ranged from 4.2 to 73.4, 4.0 to 68.1 and 0.1 to 2.1 mg kg⁻¹, respectively. These results indicated that zinc was deficient 34% of the total sample in soils of Sakti block.

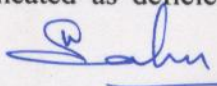
A positive significant correlation was found between pH and EC in *Alfisols* and *Vertisols*. Further, the correlation studies of OC with available phosphorus had at significant positive correlation in *Alfisols*. The positive significant correlation was also found between OC and available N in *Alfisols* and *Vertisols*. However, pH had negative and significant correlation ship with available Mn in *Alfisols*. A negative and significant correlation was found between pH and available P in *vertisols* of study area.

Correlation studies amongst available major nutrients revealed that there was positive & significant correlation ship existed between available N and P in *Alfisols* only. All the remaining correlations had been found non-significant may be either positive or negative in all soils of Sakti block.

The present study revealed that there is wide variation in soil fertility status in soils of Sakti block, the soils are moderately acidic to slightly alkaline in reaction, low to medium in organic carbon, low status in available nitrogen and phosphorus content, medium to high level in available K. The available copper, manganese and iron content showed high level, whereas about 34% soil samples were delineated as deficient in available zinc content.

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Appendices

Appendix I: Range and mean values of different nutrients in different villages of study area

S.NO.	Village	pH	EC(dS m ⁻¹)	OC (%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
1	DODKI	5.9-7.5 6.4	0.1-0.2 0.2	0.4-0.6 0.5	163.1-263.4 197.3	5.0-11.0 7.2	158.3-19.2 232.0	0.1-1.6 0.8	7.5-18.3 13.4	20.4-36.8 26.6	0.4-1.0 0.7
2	LOVSARA	6.4-7.3 6.9	0.2-0.3 0.2	0.4-0.6 0.5	150.5-276.0 214.4	10.0-16.3 12.7	124.0-187.8 160.6	0.1-2.2 1.4	16.1-20.0 18.2	23.0-28.8 25.5	0.1-2.1 1.0
3	ARJUNI	5.9-6.4 6.1	0.1-0.2 0.2	0.3-0.7 0.5	125.4-301.1 212.0	2.6-21.0 10.2	226.8-390.8 309.5	0.1-3.6 1.8	28.4-49.2 39.0	22.6-46.5 34.8	0.4-0.8 0.6
4	PARSADA KALA	5.8-7.3 6.6	0.1-0.3 0.2	0.3-0.7 0.5	125.4-276.0 190.8	4.8-22.0 10.3	194.3-461.6 318.5	0.1-3.1 1.4	39.1-64.5 52.4	59.5-63.8 61.3	0.5-1.0 0.7
5	KANDA NARA	6.2-6.9 6.6	0.1-0.3 0.2	0.5-0.6 0.6	150.5-301.1 227.6	8.5-15.0 11.4	348.0-404.8 371.3	0.9-2.6 1.9	23.9-66.1 36.1	27.8-36.7 33.2	0.6-0.8 0.7
6	PARSADA KHURD	5.7-7.8 6.9	0.1-0.3 0.2	0.4-0.5 0.5	175.6-200.7 188.2	4.1-7.8 5.7	251.4-365.1 319.0	1.6-2.7 2.1	17.2-52.3 32.7	44.9-57.3 51.7	0.6-1.2 0.9
7	BARADWAR	5.4-6.9 6.1	0.1-0.3 0.2	0.3-0.7 0.5	138.0-338.7 230.1	1.7-13.0 7.2	130.0-484.8 287.1	1.0-8.6 2.9	6.9-48.0 30.8	23.2-66.1 49.2	0.6-2.0 1.2
8	PALI	6.8-6.8 6.8	0.2-0.2 0.2	0.5-0.5 0.5	238.3-238.3 238.3	7.3-7.3 7.3	391.2-391.2 391.2	1.2-1.2 1.2	61.1-61.1 61.1	64.2-64.2 64.2	1.2-1.2 1.2
9	BHAKTUDERA	7.0-7.8 7.2	0.2-0.4 0.3	0.3-0.6 0.4	138.0-326.1 195.1	8.1-24.0 14.5	397.2-570.3 480.9	4.6-9.7 7.1	15.3-30.7 24.1	7.0-18.3 14.4	0.1-0.3 0.2
10	SAPANAI PALI	5.4-5.6 5.5	0.1-0.2 0.2	0.4-0.5 0.5	188.2-225.8 207.0	3.9-4.7 4.3	112.2-119.8 116.0	0.1-2.0 1.1	33.1-34.5 33.8	37.0-38.6 37.8	0.8-1.0 0.9
11	PASID	5.4-6.9 6.1	0.1-0.2 0.1	0.3-0.6 0.5	163.1-388.9 253.2	3.3-13.0 7.7	178.2-452.0 318.3	0.6-2.5 1.5	20.7-43.2 31.5	31.3-67.8 57.1	0.5-1.1 0.8
12	SIPAHIMUDA	5.6-6.7 6.1	0.1-0.2 0.1	0.4-0.6 0.5	163.1-401.4 264.7	7.0-14.2 10.3	138.0-638.1 309.2	0.8-2.5 1.4	22.2-36.4 26.9	22.4-47.5 31.1	0.4-1.3 0.9
13	NAYA BARADWAR	5.4-6.8 6.1	0.1-0.2 0.1	0.4-0.6 0.5	175.6-326.1 233.5	4.0-18.0 9.7	170.0-287.3 238.6	2.0-2.8 2.4	7.8-16.2 11.5	29.4-66.4 59.2	0.6-0.9 0.8
14	SARAIPALI	5.4-6.7 6.2	0.1-0.2 0.1	0.2-0.6 0.4	112.9-313.6 183.5	2.8-18.0 8.2	143.9-435.2 337.6	0.2-2.5 1.3	23.5-69.4 40.2	21.6-61.6 42.4	0.1-0.6 0.3
15	BHAGODIH	6.0-6.4 6.2	0.1-0.3 0.2	0.3-0.5 0.4	138.0-263.4 192.3	1.9-11.8 6.8	274.2-483.5 389.9	1.1-3.1 1.8	12.8-22.8 16.7	28.6-55.0 43.2	0.8-0.9 0.9
16	KAIRA	5.6-5.8 5.7	0.1-0.1 0.1	0.4-0.6 0.5	138.0-326.1 220.8	4.7-10.9 7.6	266.9-358.0 305.1	3.6-7.2 5.0	41.8-56.4 49.4	4.9-46.3 29.7	0.5-1.4 1.0

17	BAIRDIH	6.1-6.8 6.5	0.1-0.2 0.2	0.4-0.6 0.5	213.2-376.3 280.1	3.8-14.7 8.8	234.0-291.0 261.9	0.9-1.7 1.2	13.4-20.0 17.4	26.4-40.2 32.7	0.8-1.7 1.2
18	BALIN	5.4-5.6 5.5	0.1-0.1 0.1	0.5-0.6 0.5	276.0-351.2 311.1	5.8-16.5 10.6	238.6-364.0 293.0	1.5-2.7 2.1	31.5-35.2 33.1	42.9-50.2 47.1	0.5-0.9 0.7
19	PORTHA	5.4-7.1 6.1	0.1-0.3 0.2	0.3-0.7 0.5	125.4-414.0 238.3	2.3-22.0 8.3	247.5-556.5 402.3	0.8-10.6 3.0	6.4-44.8 19.5	5.9-62.0 28.2	0.2-2.0 0.9
S.NO.	Village	pH	EC(dS m ⁻¹)	OC (%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
20	TEMAR	5.4-6.8 6.0	0.1-0.2 0.1	0.4-0.6 0.5	112.9-313.6 209.8	2.5-17.0 8.7	183.7-543.5 297.6	0.5-1.6 1.1	18.8-51.2 34.1	24.3-56.5 42.6	0.4-1.4 0.8
21	GADGODI	5.4-7.0 6.1	0.1-0.3 0.1	0.3-0.6 0.5	112.9-401.4 204.9	3.3-15.1 8.2	120.1-465.4 271.7	1.0-2.8 2.0	4.3-17.5 8.8	5.2-53.6 23.7	0.2-0.5 0.3
22	BHADRIPALI	5.4-6.8 5.9	0.1-0.2 0.1	0.4-0.6 0.5	150.5-401.4 249.7	2.7-14.2 9.2	300.9-487.9 405.5	0.6-2.1 1.3	9.2-27.8 18.6	24.2-29.4 26.3	0.4-1.9 1.1
23	TURRI	5.5-6.8 6.1	0.1-0.2 0.1	0.2-0.5 0.3	100.4-263.4 147.6	3.2-13.3 7.0	109.3-410.0 220.6	0.7-1.8 1.3	6.4-55.6 29.1	13.2-24.9 19.8	0.4-1.1 0.7
24	KARRAPALI	5.6-6.0 5.8	0.1-0.2 0.1	0.5-0.7 0.6	200.7-426.5 305.2	3.0-10.7 6.7	237.9278.9 255.4	3.2-3.5 3.4	19.9-23.9 22.4	62.0-64.6 63.3	0.1-0.6 0.3
25	MUKTA RAJA	5.4-6.9 5.9	0.1-0.2 0.1	0.3-0.6 0.5	112.9-301.1 200.7	1.3-6.4 3.7	189.2-408.0 249.7	2.1-3.5 2.6	5.8-20.1 13.4	19.1-57.3 47.4	0.8-1.4 1.1
26	KANETHI	5.3-6.8 6.1	0.1-0.2 0.1	0.4-0.4 0.4	138.0-188.2 163.1	3.0-3.3 3.1	207.6-286.5 247.1	0.4-1.4 0.9	27.9-34.4 31.2	37.2-66.5 51.9	0.2-0.4 0.3
27	KARIBANDHA	5.4-6.9 6.2	0.1-0.2 0.1	0.5--0.6 0.5	150.5-313.6 235.5	6.5-16.3 10.5	131.2-190.4 160.5	0.1-1.9 1.2	27.6-46.9 36.5	24.6-49.1 40.5	1.1-1.5 1.3
28	NANDELI	6.3-7.1 6.6	0.2-0.3 0.2	0.4-0.6 0.5	163.1-401.4 249.5	4.4-10.4 7.2	202.3-319.4 260.6	0.7-1.5 1.1	19.1-37.5 27.5	47.9-57.1 52.7	0.7-0.8 0.7
29	HARDA	5.9-6.4 6.1	0.1-0.2 0.1	0.3-0.6 0.5	125.4-276.0 191.3	2.1-9.7 5.2	323.1-431.3 371.1	0.7-2.8 1.8	24.2-44.2 33.9	33.4-46.0 40.8	0.4-0.8 0.6
30	JIRLADIH	5.6-6.5 6.0	0.1-0.2 0.1	0.2-0.6 0.4	112.9-326.1 190.4	1.5-8.1 5.4	361.8-505.5 430.3	1.1-6.6 4.1	5.6-44.4 27.7	11.0-28.1 18.6	0.3-1.7 0.9
31	LIMTRA	5.6-6.3 6.0	0.1-0.2 0.1	0.4-0.6 0.5	138.0-301.1 215.3	5.3-14.9 11.1	115.0-181.7 141.5	0.7-2.2 1.2	20.3-39.7 31.2	31.5-38.5 35.3	0.6-1.1 0.9
32	KANCHANPUR	6.5-6.8 6.7	0.2-0.2 0.2	0.5-0.5 0.5	213.2-250.9 232.1	4.7-7.3 6.0	227.9-309.1 268.5	2.6-7.2 4.9	42.0-43.8 42.9	4.2-7.4 5.8	1.6-1.7 1.6
33	CHARPAR	5.8-6.7 6.2	0.1-0.2 0.1	0.4-0.5 0.5	175.6-276.0 224.2	3.8-11.7 7.8	236.3-642.7 490.9	0.7-1.3 1.1	25.5-39.9 31.9	8.5-21.6 15.0	0.3-1.1 0.8

34	RATANPALI	5.4-6.8 5.9	0.1-0.3 0.2	0.4-0.5 0.5	163.1-263.4 213.2	7.8-13.9 9.9	165.2-358.8 271.1	0.9-6.5 3.4	38.7-43.3 41.4	12.0-19.9 15.6	0.2-0.6 0.4
35	DUMARPARA	5.4-6.1 5.7	0.1-0.1 0.1	0.3-0.6 0.5	163.1-313.6 232.4	2.6-12.1 8.1	156.5-534.7 325.4	0.1-1.5 0.9	5.5-46.7 29.8	14.4-64.1 52.7	0.1-0.9 0.3
36	PUJERI PALI	6.9-7.8 7.4	0.2-0.3 0.3	0.4-0.6 0.5	163.1-263.4 213.2	4.2-8.2 6.1	270.8-556.1 442.8	0.9-3.1 1.8	12.4-30.8 19.1	30.8-61.0 50.2	0.4-0.9 0.7
37	ACHANAKPUR	6.9-7.8 7.4	0.2-0.3 0.3	0.4-0.6 0.5	188.2-301.1 245.5	4.9-8.4 6.6	424.7-492.0 455.2	0.9-2.2 1.4	16.5-26.9 22.2	21.5-47.8 34.5	0.7-1.1 0.9
38	GHUICHUVA	5.9-6.8 6.3	0.1-0.2 0.1	0.5-0.5 0.5	175.6-238.3 202.8	15.8-21.9 18.5	116.3-385.7 238.9	1.7-2.7 2.3	22.8-61.6 45.3	12.7-36.5 27.4	1.2-1.4 1.3
S.NO.	Village	pH	EC(dS m ⁻¹)	OC(%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
39	PALARI KALA	5.6-6.3 5.9	0.1-0.2 0.1	0.2-0.6 0.4	100.4-351.2 196.0	1.5-8.3 4.7	224.4-403.3 316.6	1.7-8.5 5.1	28.2-45.4 37.2	8.5-16.6 12.1	0.3-1.4 0.8
40	NAVAPARA	6.7-7.7 7.2	0.1-0.3 0.2	0.4-0.6 0.5	175.6-338.7 245.0	9.8-15.0 12.3	364.4-573.9 470.3	0.8-3.6 1.8	9.0-25.1 17.5	4.2-24.1 11.4	0.4-1.8 0.9
41	MOHGAON	5.7-6.9 6.3	0.1-0.2 0.2	0.3-0.5 0.4	138.0-250.9 186.6	1.4-13.6 6.3	126.7-219.2 169.9	5.0-9.7 7.3	26.1-52.4 42.2	6.0-17.3 11.2	1.3-1.9 1.7
42	JAMCHUVA	5.5-5.6 5.5	0.1-0.1 0.1	0.1-0.2 0.2	112.9-150.5 133.0	5.6-5.8 5.7	142.8-239.1 197.8	1.9-2.1 2.0	60.4-65.6 63.2	25.1-33.3 29.6	0.2-1.4 0.7
43	JAMPALI	5.1-6.5 5.8	0.1-0.2 0.1	0.4-0.6 0.5	175.6-414.0 285.7	4.9-17.3 10.1	337.8-638.0 442.6	0.9-2.1 1.6	22.9-37.9 31.7	29.9-47.6 37.4	0.3-0.9 0.5
44	SONGUDA	5.4-6.9 6.3	0.1-0.2 0.2	0.4-0.6 0.5	175.7-288.5 222.7	8.5-17.1 12.3	286.6-453.3 380.7	2.9-8.7 6.8	24.0-32.4 28.5	9.9-14.9 12.3	0.1-0.5 0.3
45	AJORIPALI	5.8-6.1 6.0	0.1-0.1 0.1	0.5-0.6 0.5	163.1-238.3 200.7	7.9-11.6 9.7	161.1-208.3 184.7	2.0-8.6 5.3	15.0-20.0 17.5	8.8-14.1 11.5	0.4-1.8 1.1
46	SINGHANSARA	5.8-6.5 6.1	0.1-0.2 0.1	0.5-0.6 0.5	188.2-288.5 246.7	4.07.7 6.1	186.1-300.7 253.4	0.7-1.3 1.0	14.9-26.4 19.5	26.5-38.6 31.7	0.6-0.9 0.7
47	BOKRAGUDA	5.4-6.2 5.7	0.1-0.1 0.1	0.4-0.6 0.5	150.5-313.6 214.5	5.5-12.4 8.3	186.4-314.3 262.8	2.6-3.8 3.1	4.9-7.3 5.8	59.3-65.3 62.5	0.1-0.4 0.3
48	RAINKHOL	5.5-6.1 5.8	0.1-0.1 0.1	0.5-0.6 0.5	200.7-388.9 273.5	4.4-9.0 6.1	162.2-264.1 194.9	0.7-2.0 1.4	24.7-64.9 47.6	6.9-36.2 23.4	0.9-1.8 1.4
49	JOBA	5.8-5.9 5.9	0.1-0.1 0.1	0.5-0.6 0.6	188.2-276.0 228.3	7.7-17.7 12.5	154.9-481.3 286.3	3.7-9.6 6.2	8.1-40.2 24.5	11.6-24.4 16.8	0.3-0.9 0.6
50	NANDOUR KALA	6.8-7.6 7.1	0.2-0.3 0.2	0.4-0.6 0.5	112.9-213.2 164.5	3.7-10.7 7.8	379.8-595.3 472.4	0.1-3.1 1.7	15.2-24.6 19.1	28.2-59.1 49.2	1.0-1.5 1.3
51	NANDOUR KHURD	5.4-6.7 6.2	0.1-0.2 0.1	0.5-0.6 0.6	163.0-213.2 190.2	9.232.8 18.7	192.0-365.0 285.7	0.3-4.7 2.2	41.8-47.4 44.8	6.1-10.1 8.6	0.3-0.4 0.3

52	SARVANI	5.9-6.9 6.4	0.2-0.2 0.2	0.3-0.5 0.4	138.0-225.8 185.4	9.7-19.5 16.1	111.8-285.2 182.9	1.3-2.2 1.6	15.6-23.4 19.6	20.9-39.6 31.6	0.4-0.7 0.6
53	ASOUDA	5.4-6.5 6.2	0.1-0.2 0.1	0.4-0.6 0.5	163.1-238.3 199.1	4.6-11.4 7.2	286.0-477.3 403.9	0.7-1.6 1.1	20.4-29.4 24.4	24.1-31.4 26.3	0.6-1.5 1.2
54	NAVAPARA KHURD	5.6-7.2 6.0	0.1-0.3 0.1	0.2-0.6 0.5	125.4-388.9 236.9	2.9-18.1 8.2	218.6-359.4 284.1	1.0-2.8 2.0	6.3-33.7 18.3	36.9-70.0 48.5	0.4-0.9 0.7
55	JOGARA	5.5-7.2 6.5	0.1-0.3 0.2	0.3-0.6 0.5	138.0-363.8 220.3	4.5-17.7 9.4	153.2-296.4 213.0	0.8-2.0 1.3	21.340.8 33.3	20.0-54.9 40.4	0.1-0.4 0.3
56	PUTEKELA	5.4-6.9 6.1	0.1-0.2 0.1	0.4-0.6 0.5	138.0-326.1 214.8	8.1-15.8 12.3	200.4-317.2 268.2	0.8-2.1 1.5	5.7-18.6 10.7	21.4-53.1 40.9	0.1-0.4 0.3
57	AMAPALI	6.7-7.7 7.2	0.2-0.3 0.2	0.5-0.6 0.5	150.5-301.1 220.4	5.2-13.7 8.6	311.7-477.6 390.1	1.1-2.9 1.9	6.2-28.7 15.4	14.7-44.4 30.4	0.5-1.1 0.8
58	JAGAJUNG	5.7-6.8 6.2	0.1-0.2 0.1	0.3-0.7 0.5	138.0-439.0 224.1	2.8-14.2 8.9	250.9-493.8 348.1	0.2-2.2 1.2	20.2-39.6 28.2	20.0-49.0 30.6	0.4-1.4 0.9
S.NO.	Village	pH	EC(dS m ⁻¹)	OC (%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
59	BAASINPARA	5.5-6.1 5.8	0.1-0.1 0.1	0.3-0.4 0.4	100.4-138.0 119.2	4.3-7.6 6.1	256.4-387.2 316.6	2.2-10.6 6.7	33.4-48.1 39.7	8.9-17.3 13.3	0.6-1.5 1.0
60	JAGADALLA	5.4-6.6 6.0	0.1-0.2 0.1	0.5-0.6 0.6	150.5-225.8 190.3	5.1-12.8 8.6	253.2-267.3 260.6	1.0-1.3 1.2	7.4-11.3 9.3	22.0-33.6 28.4	0.3-1.3 0.7
61	SUNDARRELI	5.4-6.3 5.8	0.1-0.2 0.1	0.4-0.6 0.5	138.0-301.1 215.1	2.2-15.5 8.2	127.7-492.8 320.9	0.8-3.9 2.0	8.4-39.4 24.5	4.7-61.3 38.5	0.2-1.5 0.8
62	JAGDALI	5.4-6.7 6.3	0.1-0.2 0.1	0.3-0.6 0.4	150.5-238.3 190.9	5.5-13.2 8.8	320.1-501.6 394.6	2.0-3.4 2.7	4.9-8.4 6.3	21.9-41.1 34.0	0.6-0.9 0.8
63	AMALDIHA	5.4-6.2 5.7	0.1-0.1 0.1	0.3-0.6 0.5	138.0-263.4 185.0	5.5-13.2 9.9	114.8-231.8 165.7	0.8-1.7 1.2	26.2-39.5 34.2	20.7-38.3 31.0	0.4-0.8 0.6
64	MASANIAKALA	5.6-6.6 6.1	0.1-0.2 0.1	0.2-0.6 0.4	138.0-238.3 185.4	8.3-17.5 12.5	241.5-432.3 320.0	1.1-6.2 3.9	8.6-37.4 25.3	5.6-25.6 16.8	0.4-1.4 0.9
65	DHOLNARA	5.3-5.7 5.5	0.1-0.1 0.1	0.2-0.6 0.4	100.4-326.1 178.5	3.7-12.6 7.2	208.3-309.1 254.5	0.3-1.5 0.7	4.3-10.7 6.7	38.2-66.5 53.4	0.6-2.0 1.3
66	UPKACHUMBA	5.66.6 6.0	0.1-0.2 0.1	0.2-0.6 0.3	100.4-276.0 173.1	3.2-17.0 10.4	130.5-301.4 218.1	4.0-8.0 5.9	35.3-61.7 46.0	7.0-19.9 13.7	0.7-1.7 1.2
67	BHURSIDIH	5.4-6.1 5.7	0.1-0.1 0.1	0.2-0.5 0.3	112.9-200.7 154.7	6.6-15.6 9.5	118.9-462.8 302.3	0.9-2.7 1.9	5.7-49.0 24.1	27.7-53.5 41.7	0.4-0.9 0.7
68	GEHRINMUDA	5.4-6.4 5.8	0.1-0.1 0.1	0.3-0.6 0.5	150.5-363.8 233.0	2.9-13.7 7.7	420.7-471.5 450.6	0.9-1.4 1.1	37.6-46.0 42.0	30.3-40.6 34.5	1.1-1.3 1.2
69	BUDHANPUR	5.9-6.6 6.1	0.1-0.1 0.1	0.2-0.5 0.4	138.0-276.0 183.5	2.2-10.5 5.4	340.7-606.1 477.2	0.6-1.6 0.8	18.3-39.8 28.6	37.6-59.0 48.9	0.3-1.8 0.9

70	KURDA	5.7-6.7 6.1	0.1-0.2 0.1	0.3-0.5 0.4	163.1-250.9 195.3	3.0-19.1 9.5	190.2-463.9 355.5	0.4-2.4 1.2	20.1-51.0 33.4	21.3-56.2 42.9	0.1-1.5 0.7
71	SENDARI	6.0-6.9 6.5	0.1-0.2 0.1	0.4-0.6 0.4	125.4-276.0 196.1	4.0-11.1 6.8	244.2-505.0 369.2	0.7-3.1 1.6	21.1-48.9 33.7	40.4-70.1 56.1	0.4-1.9 1.0
72	NAVAGAON	5.4-6.8 5.7	0.1-0.3 0.1	0.4-0.6 0.5	125.4-414.0 254.7	4.3-17.6 12.0	365.1-496.9 423.6	0.6-2.1 1.1	25.4-38.5 32.7	26.7-47.9 39.5	0.7-1.2 1.0
73	NAGARDA	5.4-6.9 6.0	0.1-0.2 0.2	0.2-0.6 0.4	138.0-313.6 196.9	2.8-12.5 6.7	178.4-420.8 311.2	0.4-2.9 2.0	4.0-32.9 14.9	24.0-43.1 34.4	0.3-1.3 0.7
74	CHINDUDA	5.5-6.5 6.0	0.1-0.2 0.1	0.5-0.7 0.6	150.5-401.4 253.2	1.6-9.5 6.1	104.9-317.4 199.5	0.6-2.8 1.4	14.3-35.6 25.0	15.0-53.0 35.2	0.5-1.0 0.7
75	GUDHWA	5.4-7.1 6.1	0.1-0.3 0.2	0.4-0.6 0.5	150.5-414.0 242.5	1.3-10.7 6.5	257.2-501.2 395.7	0.3-2.2 1.1	6.5-57.5 22.5	20.0-41.9 28.6	0.6-1.1 0.8
76	JUNWANI	6.8-7.2 7.0	0.2-0.3 0.3	0.3-0.6 0.4	125.4-276.0 189.2	5.5-14.9 8.4	140.0-286.8 208.6	3.9-9.8 6.3	4.2-9.5 6.6	6.6-20.7 12.8	0.5-1.6 1.1
77	GATWA	5.7-6.2 5.9	0.1-0.2 0.1	0.5-0.5 0.5	163.1-225.8 198.2	3.9-10.7 7.2	425.4-539.4 472.8	1.2-1.8 1.5	21.5-25.8 23.9	16.8-23.3 20.4	0.2-0.4 0.3
78	TOHILADIH	5.9-7.2 6.6	0.1-0.2 0.2	0.4-0.6 0.5	125.4-288.5 194.4	3.0-12.3 7.1	213.1-472.9 332.5	0.6-9.3 4.0	6.9-55.8 35.0	6.0-34.5 18.6	0.1-1.5 0.7
S.NO.	Village	pH	EC(dS m ⁻¹)	OC (%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
79	MASANIYA KHURD	5.5-5.8 5.7	0.1-0.1 0.1	0.5-0.5 0.5	150.5-200.7 180.6	4.9-8.2 6.5	360.4-516.3 451.3	1.2-2.4 1.8	18.0-41.7 28.4	35.6-55.2 45.7	0.4-1.1 0.8
80	MANIKPUR	5.4-5.9 5.6	0.1-0.2 0.1	0.2-0.5 0.4	125.4-213.2 164.6	4.7-9.0 6.6	229.9-269.0 250.7	2.6-3.4 2.9	22.8-67.4 49.1	40.9-55.6 47.8	0.1-1.7 1.1
81	BAHERA	5.7-6.5 6.1	0.1-0.2 0.1	0.4-0.5 0.4	125.4-188.2 152.3	7.3-14.6 11.0	317.7-476.3 415.4	3.1-3.7 3.5	15.5-50.9 36.6	27.9-39.2 33.0	0.9-1.5 1.2
82	JUDGA	5.4-6.5 6.0	0.1-0.2 0.1	0.4-0.6 0.5	138.0-250.9 189.1	3.1-14.0 7.9	177.2-291.9 228.3	0.4-2.1 1.0	26.3-53.7 40.5	34.4-73.4 54.3	0.4-1.0 0.7
83	BARPALI KALA	5.6-6.8 6.1	0.1-0.2 0.1	0.3-0.5 0.4	138.0-263.4 179.8	2.5-11.0 5.8	327.4-477.3 386.9	1.1-2.9 1.9	6.1-17.3 12.1	25.0-44.4 33.0	0.5-1.1 0.8
84	JARWE	5.4-6.3 6.0	0.1-0.2 0.1	0.2-0.6 0.5	125.4-401.4 217.2	4.5-19.8 11.8	123.3-382.0 239.3	1.0-3.6 2.7	5.7-36.7 17.6	32.8-67.6 55.2	0.2-1.0 0.5
85	GHOGHRA	5.5-6.7 5.9	0.1-0.2 0.1	0.2-0.6 0.4	125.4-288.5 202.4	3.9-10.8 8.0	236.3-514.0 380.9	0.7-4.1 2.2	41.6-67.1 51.1	26.7-52.9 38.0	0.5-1.6 1.1
86	DHANPUR	5.8-7.2 6.6	0.1-0.3 0.2	0.4-0.6 0.5	175.6-439.0 257.7	3.3-6.7 5.4	334.4-479.7 391.2	1.8-3.1 2.6	33.7-68.1 47.7	26.8-37.4 32.7	0.4-1.1 0.7
87	KUDHARITAR	6.0-6.4 6.2	0.2-0.2 0.2	0.4-0.6 0.5	112.9-263.4 193.2	5.8-12.1 9.2	431.3-479.6 455.7	1.3-1.9 1.5	5.2-12.5 8.6	20.7-36.3 28.9	1.0-1.2 1.1

88	PATERAPALI KALA	5.4-5.9 5.7	0.1-0.1 0.1	0.3-0.6 0.5	150.5-301.1 207.4	3.2-14.9 9.3	183.1-291.0 231.0	0.4-2.1 0.8	9.7-27.4 16.0	22.4-38.7 29.7	0.1-1.1 0.5
89	DEVARMAAL	5.7-6.8 6.2	0.1-0.2 0.2	0.2-0.7 0.5	125.4-439.0 207.0	1.4-14.9 6.3	122.8-481.6 239.5	1.3-4.1 3.0	23.7-45.7 34.9	15.7-43.1 30.8	0.4-1.7 0.9
90	DEVARI	5.4-6.4 5.9	0.1-0.2 0.1	0.3-0.6 0.5	112.9-276.0 198.8	5.5-20.0 12.3	173.6-316.0 238.8	2.0-5.5 3.6	23.4-48.8 37.6	4.6-15.4 9.7	1.0-2.0 1.4
91	CHAMRABARPALI	5.5-6.1 5.8	0.1-0.1 0.1	0.4-0.6 0.5	100.4-401.4 256.4	3.1-10.1 7.1	170.1-357.3 257.3	0.5-8.3 3.6	19.3-48.1 33.0	7.4-62.1 29.6	0.3-1.2 0.7
92	KIRARI	5.4-6.2 5.7	0.1-0.1 0.1	0.3-0.6 0.4	138.0-301.1 201.7	1.9-17.2 7.8	354.7-500.0 407.3	3.0-4.2 3.5	14.3-27.4 20.8	34.0-70.1 58.6	0.1-0.6 0.3
93	BAILACHUVA	5.4-6.9 6.2	0.1-0.2 0.2	0.5-0.6 0.5	188.2-401.4 269.0	4.8-11.3 7.6	154.0-306.0 209.6	0.6-2.6 1.9	16.2-34.9 22.4	21.2-50.2 39.6	0.3-0.5 0.4
94	BUGUDVA	5.5-7.3 6.6	0.1-0.3 0.2	0.4-0.6 0.5	138.0-313.6 226.8	5.0-13.0 8.6	244.2-460.4 358.6	0.6-2.5 1.3	22.2-32.8 27.6	33.5-52.4 45.8	0.1-0.9 0.5
95	SAKTI	5.7-6.8 6.1	0.1-0.3 0.2	0.3-0.6 0.4	163.1-414.0 223.3	2.8-18.6 8.8	277.6-579.7 410.5	1.3-5.6 4.5	21.2-50.5 32.8	27.0-64.3 51.3	0.2-1.0 0.5
96	DURPA	6.0-6.9 6.6	0.1-0.3 0.2	0.4-0.6 0.5	112.9-288.5 199.9	3.9-14.2 9.3	185.0-398.6 313.0	1.6-4.1 2.7	19.6-60.1 35.7	19.8-67.8 50.8	0.7-1.3 0.9
97	LAHAGA	5.5-6.3 5.8	0.1-0.2 0.1	0.3-0.6 0.5	163.1-263.4 202.0	3.4-6.9 4.7	257.5-425.9 322.4	1.3-3.1 2.2	11.0-65.6 38.4	25.3-49.1 40.2	0.3-1.5 1.1
98	REDA	5.4-6.8 6.0	0.1-0.2 0.1	0.4-0.6 0.5	150.5-414.0 231.5	6.6-23.8 13.4	336.1-667.0 456.8	0.4-6.4 1.9	20.9-59.5 36.7	25.1-60.0 40.2	0.3-1.3 0.8
S.NO.	Village	pH	EC(dS m ⁻¹)	OC(%)	N (kg ha ⁻¹)	P (kg ha ⁻¹)	K (kg ha ⁻¹)	Cu (mg kg ⁻¹)	Fe (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Zn (mg kg ⁻¹)
99	SOTHI	5.5-6.9 6.2	0.1-0.2 0.1	0.4-0.6 0.5	150.5-250.9 198.4	3.1-16.2 9.6	333.8-575.3 417.2	1.7-3.6 2.6	4.9-26.9 12.9	34.0-58.3 49.5	0.1-1.0 0.5
100	SARAHAR	5.4-6.9 5.9	0.1-0.3 0.1	0.1-0.6 0.4	112.9-263.4 170.8	3.4-14.0 7.4	293.4-594.9 429.1	0.9-10.3 3.4	10.5-47.8 26.6	8.0-44.3 25.2	0.5-1.9 1.1
101	DERAGARH	5.2-6.5 5.8	0.1-0.2 0.1	0.2-0.6 0.4	100.4-263.4 161.4	4.0-9.9 7.2	274.3-543.0 361.1	0.6-9.9 5.3	47.9-54.0 51.8	4.2-23.1 12.7	0.6-1.8 1.3
102	BORADA	6.0-7.1 6.7	0.1-0.3 0.2	0.2-0.6 0.5	112.9-388.9 230.8	5.2-17.0 11.2	139.8-401.4 296.5	2.4-6.8 4.5	4.2-7.1 5.6	4.5-20.6 9.9	0.4-1.6 1.0
103	TENDUTOLA	7.4-7.8 7.6	0.2-0.4 0.3	0.4-0.6 0.5	188.2-414.0 252.6	3.0-12.3 6.4	213.1-343.4 297.4	0.9-10.5 4.2	4.3-38.3 25.2	6.0-17.2 10.1	0.1-0.6 0.3
104	HARETHI	5.4-5.7 5.6	0.1-0.2 0.1	0.3-0.7 0.5	175.6-426.5 243.0	6.7-14.7 10.6	153.3-466.6 272.2	1.7-2.4 2.0	7.8-20.2 14.7	15.4-33.5 21.2	0.2-1.3 0.6
105	SARWANI	5.4-6.6 5.9	0.1-0.3 0.1	0.2-0.6 0.4	138.0-401.4 200.1	3.9-16.6 9.8	113.3-600.1 285.5	0.5-5.6 1.8	4.5-55.3 24.7	21.1-62.2 41.8	0.3-1.1 0.6

106	SAKRELI KALA	5.4-6.1 5.8	0.1-0.1 0.1	0.3-0.6 0.5	163.1-439.0 253.2	5.9-15.9 11.0	212.0-315.4 246.8	1.9-3.1 2.4	21.1-45.6 32.0	43.2-65.5 54.8	0.4-1.7 0.9
107	SAKRELI	5.4-6.9 5.9	0.1-0.3 0.1	0.2-0.6 0.4	112.9-426.5 194.9	4.1-18.5 8.6	104.2-579.0 223.7	0.6-5.8 2.0	9.7-54.1 27.8	19.5-69.6 46.9	0.4-1.3 0.7
108	PALARI KHURD	5.4-6.0 5.7	0.1-0.1 0.1	0.5-0.6 0.5	238.3-313.6 271.0	4.6-12.6 9.0	170.8-206.9 189.4	1.3-1.8 1.6	13.4-16.2 14.6	23.0-31.7 26.8	0.5-0.8 0.7

**Appendix-II: Range and Mean values of different nutrients in study area
according to soil type**

SOIL PARAMETERS	ALFISOLS		VERTISOLS	
	RANGES	MEAN	RANGES	MEAN
pH	5.2-7.3	6.1	6.7-7.8	7.3
EC(dS m⁻¹)	0.03-0.35	0.14	0.1-0.4	0.3
Organic carbon%	0.1-0.7	0.5	0.2-0.6	0.5
Available N kg ha⁻¹	100-439	209	112-414	221
Available P kg ha⁻¹	1.25-24	8.3	3.0-24.0	9.3
Available K kg ha⁻¹	104-667	311	183-595	410
Available Cu mg kg⁻¹	0.1-10.6	2.3	0.1-10.5	2.7
Available Fe mg kg⁻¹	4.0-69.1	27.9	4.3-38.3	20.5
Available Mn mg kg⁻¹	4.2-76.1	36.1	4.2-68.2	27.9
Available Zn mg kg⁻¹	0.1-2.1	0.8	0.1-1.8	0.7

Appendix – III Sample distribution , Nutrient index and fertility class of available N, P and K in study area

Sr. No.	VILLAGE NAME	No. Of sample	N			P			K			P	K	Fertility Class		
			L	M	H	L	M	H	L	M	H					
1	DODAKI	9	9	0	0	9	0	0	0	9	0	1.00	2.00	L	L	M
2	LOVSARA	9	9	0	0	5	4	0	1	8	0	1.44	1.89	L	L	M
3	ARJUNI	18	17	1	0	12	6	0	0	13	5	1.33	2.28	L	L	M
4	PARSADAKALA	17	17	0	0	14	3	0	0	10	7	1.18	2.41	L	L	H
5	KANDANARA	5	4	1	0	4	1	0	0	0	5	1.20	3.00	L	L	H
6	PARSADAKHURD	3	3	0	0	3	0	0	0	1	2	1.00	2.67	L	L	H
7	BARADAWAR	24	17	7	0	22	2	0	2	12	10	1.08	2.33	L	L	M
8	PALI	1	1	0	0	1	0	0	0	0	1	1.00	3.00	L	L	H
9	BHAKTUDEA	7	6	1	0	3	4	0	0	0	7	1.14	1.57	L	L	H
10	SAPAINAPALI	2	2	0	0	2	0	0	2	0	0	1.00	1.00	L	L	L
11	PASID	14	9	5	0	12	2	0	0	10	4	1.36	1.14	L	L	M
12	SIPAHIMUDA	8	6	2	0	6	2	0	0	5	3	1.25	2.38	L	L	H
13	NAYABARADAWAR	11	10	1	0	8	3	0	0	11	0	1.09	1.27	L	L	M
14	SARAIPALI	14	13	1	0	12	2	0	0	3	11	1.07	1.14	L	L	H
15	BHAGODIH	7	7	0	0	7	0	0	0	1	6	1.00	2.86	L	L	H
16	KHAIRA	8	6	0	2	8	0	0	0	6	2	1.50	2.25	L	L	M
17	BOIRDIH	4	3	1	0	3	1	0	0	4	0	1.25	2.00	L	L	M
18	BALIN	3	1	2	0	2	1	0	0	2	1	1.67	2.33	L	L	M
19	PARTHA	51	38	13	0	44	7	0	0	10	41	1.25	2.80	L	L	H
20	TEMAR	16	14	2	0	13	3	0	0	12	4	1.13	2.25	L	L	M
21	GADHGODHI	13	12	1	0	12	1	0	2	8	3	1.08	2.08	L	L	M
22	BHADRAPALI	20	15	5	0	18	2	0	0	4	16	1.25	2.80	L	L	H
23	TURRI	11	11	0	0	10	1	0	0	10	1	1.00	2.09	L	L	M
24	KARRAPALI	4	2	2	0	4	0	0	0	4	0	1.50	2.00	L	L	M
25	MUKTARAJA	29	27	2	0	27	0	0	2	24	7	1.07	2.45	L	L	H

55	JOGARA	14	13	1	0	11	3	0	0	14	0	1.07	1.21	2.00	L	L	M
56	PUTEYKALA	6	5	1	0	3	3	0	0	6	0	1.17	1.50	2.00	L	L	M
57	AMAPALI	12	10	2	0	11	1	0	0	0	12	1.17	1.08	3.00	L	L	H
58	JAANG	36	31	5	0	33	3	0	0	18	18	1.14	1.08	2.50	L	L	H
59	BASIOPARA	4	4	0	0	4	0	0	0	3	1	1.00	1.00	2.25	L	L	M
60	JUGDALLA	4	4	0	0	3	1	0	0	4	0	1.00	1.25	2.00	L	L	M
61	SUNDERALI	18	16	2	0	14	4	0	1	8	9	1.11	1.22	2.44	L	L	H
62	JUGDALLI	7	7	0	0	6	1	0	0	1	6	1.00	1.14	2.86	L	L	H
63	AMALDIH	10	10	0	0	9	1	0	4	6	0	1.00	1.10	1.60	L	L	L
64	MASANLYAKALA	7	7	0	0	5	2	0	0	4	3	1.00	1.29	2.43	L	L	H
65	DHOLNARA	11	10	1	0	10	1	0	0	11	0	1.09	1.09	2.00	L	L	M
66	UPKACHUVA	8	8	0	0	6	2	0	0	8	0	1.00	1.25	2.00	L	L	M
67	BHURSIDIH	7	7	0	0	6	1	0	1	3	3	1.00	1.14	2.29	L	L	M
68	GHARINMUDA	5	4	1	0	3	2	0	0	0	5	1.20	1.40	3.00	L	L	H
69	BUDANPUR	14	14	0	0	14	0	0	0	0	14	1.00	1.00	3.00	L	L	H
70	KURDA	19	19	0	0	16	3	0	0	5	14	1.00	1.16	2.74	L	L	H
71	SENDRI	17	17	0	0	17	0	0	0	4	13	1.00	1.00	2.76	L	L	H
72	NAVAGAON	11	9	2	0	4	7	0	0	0	11	1.18	1.64	3.00	L	L	H
73	NAGARDA	21	20	1	0	20	1	0	0	14	7	1.05	1.05	2.33	L	L	M
74	CHINDMUDA	14	11	3	0	14	0	0	2	12	0	1.21	1.00	1.86	L	L	M
75	GUDWA	19	16	3	0	19	0	0	0	4	15	1.16	1.00	2.79	L	L	H
76	JUNWANI	10	10	0	0	9	1	0	0	10	0	1.00	1.10	2.00	L	L	M
77	GATWA	3	3	0	0	3	0	0	0	0	3	1.00	1.00	3.00	L	L	H
78	TOHILADIH	22	21	1	0	22	0	0	0	14	8	1.05	1.00	2.36	L	L	H
79	MASANIYAKHURD	3	3	0	0	3	0	0	0	0	3	1.00	1.00	3.00	L	L	H
80	MANIKPUR	6	6	0	0	6	0	0	0	6	0	1.00	1.00	2.00	L	L	M
81	BAHERA	5	5	0	0	4	1	0	0	1	4	1.00	1.20	2.80	L	L	H
82	JUDAGA	12	12	0	0	11	1	0	0	12	0	1.00	1.08	2.00	L	L	M
83	BARPALIKALA	10	10	0	0	10	0	0	0	2	8	1.00	1.00	2.80	L	L	H

84	JARWE	14	11	3	0	7	7	0	2	9	3	1.21	1.50	2.07	L	L	M
85	GHOGHARA	13	12	1	0	13	0	0	0	3	10	1.08	1.00	2.77	L	L	H
86	DHANPUR	9	9	0	0	9	0	0	0	0	9	1.00	1.00	3.00	L	L	H
87	KUDHARITAR	3	3	0	0	3	0	0	0	0	3	1.00	1.00	3.00	L	L	H
88	PATERAPALIKALA	13	12	1	0	10	3	0	0	13	0	1.08	1.23	2.00	L	L	M
89	DEWARBHAL	22	20	2	0	19	3	0	2	16	4	1.09	1.14	2.09	L	L	M
90	DEWARI	18	18	0	0	9	9	0	0	18	0	1.00	1.50	2.00	L	L	M
91	CHAMARBARPALI	14	8	6	0	14	0	0	0	12	0	1.43	1.00	1.71	L	L	M
92	KIRARI	11	10	1	0	10	1	0	0	0	11	1.09	1.09	3.00	L	L	H
93	BAILACHUVA	7	5	2	0	7	0	0	0	7	0	1.29	1.00	2.00	L	L	M
94	BAGBUDWA	11	8	3	0	10	1	0	0	5	6	1.27	1.09	2.55	L	L	H
95	SUKTI	13	12	1	0	11	2	0	0	4	9	1.08	1.15	2.69	L	L	H
96	DURPA	14	12	2	0	13	1	0	0	9	5	1.14	1.07	2.36	L	L	H
97	LAHANGA	8	8	0	0	8	0	0	0	5	3	1.00	1.00	2.38	L	L	H
98	REDA	20	17	3	0	11	9	0	0	0	20	1.15	1.45	3.00	L	L	H
99	SOTHI	9	9	0	0	7	2	0	0	0	9	1.00	1.22	3.00	L	L	H
100	SARHAR	29	29	0	0	27	2	0	0	4	25	1.00	1.07	2.86	L	L	H
101	DERAGARH	13	13	0	0	13	0	0	0	7	6	1.00	1.00	2.46	L	L	H
102	BARADA	13	9	4	0	8	5	0	0	9	4	1.31	1.38	2.31	L	L	M
103	TENDUTOLA	13	9	4	0	13	0	0	0	12	1	1.31	1.00	2.08	L	L	M
104	HARETHI	6	5	1	0	6	0	0	0	5	1	1.17	1.00	2.17	L	L	M
105	SARVANI	20	18	2	0	15	5	0	3	12	5	1.10	1.25	2.10	L	L	M
106	SARKELIKALA	14	10	4	0	9	5	0	0	14	0	1.29	1.36	2.00	L	L	M
107	SARKELI	35	32	3	0	31	4	0	3	30	2	1.09	1.11	1.97	L	L	M
108	PALARIKURD	3	2	1	0	2	1	0	0	3	0	1.33	1.33	2.00	L	L	M

Appendix IV - List of farmers with their village location of their field and its soil test value of Alfisols and Vertisols of Sakti block.

S.No.	VILLAGE NAME	P.H.No.	Khasra No.	Farmer Name	Father/Husband Name	Latitude	Longitude	Altitude	Soil Type	pH	EC	Dc	N	P	K	Cu	Fe	Mn	Zn
8	ODDAKI	5	100/1			22.66211N	82.99211E	860	A	6.2	0.21	0.5	201	6.18	319	0.4	15.5	24.8	0.4
9	ODDAKI	5	284			22.62111N	82.99211E	860	A	5.9	0.13	0.4	176	5.02	270	0.1	17.7	26.4	0.7
10	ODDAKI	5	380			22.399211N	82.92121E	830	A	6.1	0.18	0.5	188	6.63	237	1.5	18.3	22.7	0.6
11	ODDAKI	5	375			22.99112N	82.99211E	838	A	6.3	0.2	0.4	163	5.82	158	0.1	17.1	24.7	0.8
15	ODDAKI	5	355			22.62111N	82.9911E	842	A	6.5	0.16	0.4	176	5.91	183	0.9	8.4	32.9	0.6
16	ODDAKI	5	360			22.20911N	82.9111E	836	A	6	0.2	0.6	263	9.32	295	1.6	11.2	23.4	0.7
18	ODDAKI	5	321			22.92666	82.9211E	809	A	6	0.15	0.5	188	5.11	158	1.6	8.8	36.8	1.0
19	ODDAKI	5	174			22.39211N	82.30001E	812	V	7.5	0.23	0.5	176	7.80	287	0.8	7.5	23.6	0.7
20	ODDAKI	5	274			22.40401	82.30999E	819	A	6.1	0.18	0.6	213	11.02	167	0.1	17.4	20.4	0.7
1	LOVSARA	11	225/1			22.932211N	81.09921E	850ft.	A	7.2	0.32	0.5	201	12.54	159	0.1	17.7	24.7	1.8
7	LOVSARA	11	39/1			21.93091N	81.98812E	809	A	6.9	0.21	0.6	238	10.75	158	0.3	17.3	24.7	0.14
8	LOVSARA	11	787			21.93091N	81.8821E	780	A	6.5	0.19	0.5	176	10.30	140	2.2	18.4	23.0	0.3
9	LOVSARA	11	414			21.909991N	81.93221E	792	A	7.2	0.23	0.4	151	15.32	183	2.1	16.1	25.3	1.08
10	LOVSARA	11	166			21.940001N	81.94999E	790	A	7	0.22	0.5	276	14.87	172	2.0	18.4	24.0	1.38
11	LOVSARA	11	74/1			21.939991N	81.94309E	770	A	7.1	0.24	0.5	188	16.31	160	2.0	19.5	26.8	0.42
12	LOVSARA	11	39/12			21.93321N	81.99301E	798	A	6.4	0.15	0.5	201	10.04	124	2.1	17.9	25.9	1.08
13	LOVSARA	11	822			21.943091N	81.93092E	788	A	6.5	0.16	0.5	238	12.19	188	2.0	20.0	26.0	0.9
14	LOVSARA	11	614/3			21.933331N	81.921301E	795	A	7.3	0.23	0.5	263	10.57	169	0.1	18.3	28.8	2.1
1	ARJUNI	10	36			21.59842	83.00207	76ft.	A	6.1	0.14	0.4	176	5.20	333	0.4	28.4	23.3	0.56
2	ARJUNI	10	62			21.59861N	83.00226E	763	A	6.2	0.16	0.6	251	12.01	227	0.2	49.2	25.2	0.50
3	ARJUNI	10	99/3			21.598791N	83.00351E	766	A	6.2	0.13	0.6	276	13.80	264	0.2	48.1	24.7	0.82
4	ARJUNI	10	88/1			21.599010N	83.00318E	764	A	6.4	0.18	0.4	151	2.60	282	1.4	29.9	43.5	0.54
5	ARJUNI	10	16			21.59528N	83.00206E	764	A	6.3	0.14	0.6	263	12.19	295	2.4	48.8	22.6	0.64
6	ARJUNI	10	123			21.59854N	83.00331E	764	A	6.2	0.13	0.6	201	7.97	317	0.5	30.7	30.8	0.66
7	ARJUNI	10	119/4			21.59612N	83.00447E	767	A	6	0.14	0.5	188	11.02	287	2.8	41.8	29.1	0.66
8	ARJUNI	10	214			21.59568N	83.00396E	767	A	5.9	0.17	0.6	263	14.96	350	2.3	29.5	26.7	0.78
9	ARJUNI	10	165/2			21.59611N	83.00379E	767	A	6.2	0.18	0.6	251	20.97	290	3.3	45.1	26.6	0.40

10	ARJUNI	10	203				2159769N	83.00429E	767	A	6.1	0.18	0.3	125	5.56	317	0.1	32.7	40.9	0.52
11	ARJUNI	10	599/3				2159855N	83.00720E	767	A	6.1	0.12	0.5	188	6.99	277	0.1	34.2	46.5	0.46
12	ARJUNI	10	297				21598511N	83.00200E	779	A	5.9	0.14	0.5	201	13.80	238	3.3	40.0	39.5	0.72
13	ARJUNI	10	498				2159420N	83.00059E	821	A	6	0.18	0.7	276	16.31	317	3.4	49.2	40.4	0.70
14	ARJUNI	10	490/2				2159510N	83.00147E	835	A	5.9	0.18	0.6	301	12.99	375	3.4	47.0	37.7	0.46
15	ARJUNI	10	427/3				2159349N	83.00142E	749	A	6.3	0.15	0.5	188	12.01	306	2.1	31.8	36.7	0.48
16	ARJUNI	10	659/4				215975N	83.00140E	795	A	6.1	0.16	0.5	201	4.03	331	3.2	43.6	43.0	0.62
17	ARJUNI	10	670				2159540N	83.00307E	780	A	6	0.23	0.5	188	4.57	359	3.6	39.8	46.4	0.58
18	ARJUNI	10	466/1				2159740N	83.00307E	800	A	6.1	0.2	0.3	125	3.85	367	0.4	33.4	42.3	0.62
9	PARSADAKALA	11	838/1				22.00.050	82.54.219E	859	A	6.7	0.15	0.3	138	4.84	194	0.2	53.4	60.1	0.6
10	PARSADAKALA	11	460/3				22.00.059N	82.54.194E	831	A	6.5	0.1	0.5	188	11.02	450	3.1	52.9	62.4	0.7
11	PARSADAKALA	11	341				22.00.060N	82.54.150E	798	A	5.8	0.19	0.6	251	11.1	274	1.0	40.2	60.9	0.7
12	PARSADAKALA	11	939				22.00.073N	82.54.194E	794	A	7.3	0.21	0.6	276	14.96	413	2.7	39.1	59.5	0.8
13	PARSADAKALA	11	913				22.00.071N	82.54.159E	817	A	7.2	0.32	0.5	201	6.63	449	3.0	45.3	60.2	0.9
14	PARSADAKALA	11	300				22.00.034N	82.54.104E	803	A	7	0.24	0.6	238	10.39	438	1.8	42.6	60.1	0.8
15	PARSADAKALA	11	269				22.00.021N	82.54.157E	807	A	6.9	0.19	0.5	138	12.63	410	1.3	51.1	63.8	0.9
16	PARSADAKALA	11	973				22.00.065N	82.54.207E	816	A	6.8	0.17	0.6	201	8.60	462	1.7	64.5	61.0	0.6
17	PARSADAKALA	11	220				22.00.050N	82.54.229E	830	A	6.7	0.18	0.6	276	21.95	215	2.7	57.9	62.4	1.0
18	PARSADAKALA	11	1369				22.00.063N	82.54.154E	837	A	6.2	0.17	0.4	151	6.99	202	0.4	53.5	60.2	0.5
19	PARSADAKALA	11	330				22.00.069N	82.54.274E	821	A	6.2	0.11	0.5	188	7.08	272	0.2	59.3	62.4	0.8
20	PARSADAKALA	11	1242				22.00.104N	82.54.135E	816	A	6.3	0.14	0.7	188	10.66	244	0.1	48.9	61.5	0.6
1	KANDANARA	7	191				22.01.896N	82.59.003E	811ft.	A	6.2	0.21	0.6	301	10.75	405	2.6	23.9	35.6	0.6
2	KANDANARA	7	213				22.01.720N	82.59.013E	821	A	6.9	0.13	0.5	151	10.04	363	2.5	24.7	30.9	0.8
6	KANDANARA	7	153.154				22.01.674N	82.59.132E	793	A	6.8	0.25	0.6	213	14.96	370	2.4	66.1	36.7	0.8
12	KANDANARA	7	394				22.02.634N	82.59.013	816	A	6.8	0.2	0.6	263	11.83	348	0.9	24.0	36.5	0.7
16	KANDANARA	7	258				22.01.856N	82.59.043E	836	A	6.6	0.19	0.5	213	8.51	361	1.7	24.1	27.8	0.8
13	PARSADAKHURO	7	540				22.0148N	82.00519E	795	A	5.7	0.07	0.5	201	7.80	251	1.7	52.3	44.9	0.64
17	PARSADAKHURO	7	863/1				22.01527N	82.00301E	795	V	7.4	0.21	0.4	188	4.84	362	2.7	24.4	54.0	0.86
18	PARSADAKHURO	7	839				22.01342N	82.00302E	796	V	7.8	0.34	0.4	176	4.12	365	1.6	17.2	57.3	1.24
5	PALARIKHURO	15	961/1				21.97729N	82.79346E	822	A	6.0	0.12	0.5	251	10.84	2107	1.3	13.4	24.7	0.8

II	PALARIKHURO	15	748/1	Chamru ram	Ganesh	21.9732N	82.7061I	801	A	5.5	0.1	0.6	314	12.63	192	1.4	13.8	23.0	0.5
16	PALARIKHURO	15	1312/2.1312/3	Baharam.Dhanaram	Tilak ram	21.9012N	82.62021E	830	A	5.4	0.09	0.5	238	4.57	171	1.8	16.2	31.7	0.7
9	BARADWAR	15	59-60	Gorelal	Runju ram	22.5877N	82.4965E	925	A	5.4	0.11	0.7	339	11.02	190	1.5	24.1	48.9	0.9
10	BARADWAR	15	50/1	Yashwant das	Mahantar	22.587N	82.4971E	988	A	6.2	0.1	0.4	138	4.66	353	2.1	25.6	47.5	0.8
11	BARADWAR	15	295	Nanda lal	Mukhtiyar	22.5873N	82.4969E	928	A	5.8	0.1	0.6	289	12.19	380	1.0	32.7	56.9	1.3
12	BARADWAR	15	310	Shanti bai	Mukunda	22.5858N	82.4939E	923	A	6.5	0.19	0.5	263	8.60	159	1.8	48.0	58.2	0.6
13	BARADWAR	15	305/3	Bahoran	Dular say	22.5869N	82.4973E	928	A	5.7	0.13	0.5	176	11.29	387	2.8	28.9	43.1	2.0
14	BARADWAR	15	619	Nohar say	Banku	22.5859N	82.4983E	927	A	6.2	0.24	0.5	201	6.54	282	2.4	26.7	50.9	1.1
15	BARADWAR	15	610	Baldev	Darsu lal	22.5857N	82.4985E	927	A	5.8	0.19	0.4	163	3.85	240	2.4	24.5	35.4	1.4
16	BARADWAR	15	351/2	Hem charan	Dhana ram	22.5851N	82.4831E	928	A	5.6	0.16	0.5	201	3.58	216	2.5	38.6	48.2	0.9
17	BARADWAR	15	440	Mahadev	Daya ram	22.5845N	82.4840E	921	A	5.8	0.12	0.3	151	1.97	376	2.4	26.0	44.2	1.9
18	BARADWAR	15	560	Chamra	Piya ram	22.5839N	82.4849E	928	A	6.8	0.2	0.5	226	4.66	434	2.8	36.4	64.8	0.7
19	BARADWAR	15	519.519/2	Panchram.Dhansay	Nanhu	22.5853N	82.4989E	927	A	5.6	0.1	0.5	251	4.57	130	2.1	32.8	64.0	0.9
38	BARADWAR	15	979/3	Jag ram	Gajanand	22.5893N	82.4949E	928	A	5.9	0.2	0.6	314	12.99	130	1.6	33.7	63.0	1.5
39	BARADWAR	15	1393	Larikh	Kiranji	22.5891N	82.4951E	928	A	6.5	0.16	0.5	201	12.45	343	1.5	46.0	62.2	1.4
40	BARADWAR	15	714	Peela babu	sukul	22.5889N	82.4953E	928	A	6.9	0.25	0.3	138	1.70	190	1.4	34.7	62.2	1.4
41	BARADWAR	15	1241/1	Jarhan	Ghasiya	22.5870N	82.4947E	930	A	6.6	0.17	0.4	176	7.71	164	1.9	39.8	62.0	1.3
42	BARADWAR	15	1283	Ashavani kumar	kishan lal	22.5848	82.49152E	915	A	5.5	0.14	0.5	213	8.78	213	1.5	33.1	56.9	1.7
43	BARADWAR	15	1301/1.1302/1	Punidas bahadur	jami ram	22.58787	82.49222E	928	A	5.8	0.12	0.7	301	12.81	327	2.4	24.9	66.1	0.7
44	BARADWAR	15	1312	Ganga prasad	Baiya ram	22.587	82.5057	927	A	5.9	0.08	0.6	326	8.15	367	1.7	22.6	54.9	0.7
45	BARADWAR	15	1814/5	Mangal	Shashi	22.5865	82.5041E	920	A	5.8	0.13	0.6	289	6.54	485	1.4	22.5	64.0	0.7
88	BARADWAR	15	2342/1	Rasiya	Makhan	22.58658	82.49801	938	A	5.8	0.12	0.5	188	2.87	307	3.2	33.8	25.5	1.9
89	BARADWAR	15	2326	Prem das	Lain das	22.58662	82.49792	925	A	5.8	0.14	##	201	5.20	268	7.4	6.9	27.4	1.4
90	BARADWAR	15	1880/1	Dharam lal	Sunder lal	22.58651	82.49767	920	A	6.6	0.23	##	263	6.27	358	2.9	30.4	23.2	1.8
91	BARADWAR	15	1864/5	Karaman lal	Jagat ram	22.58663	82.49762	931	A	6.0	0.18	##	326	9.32	343	5.4	31.0	27.7	1.38
92	BARADWAR	15	2352	Sukhandi	Sakhava	22.58672	82.49762	917	A	6.5	0.21	##	176	4.75	228	8.6	42.0	33.38	1.58
5	PALI	4	31/1			21.78765	82.82212	850	A	6.8	0.16	0.5	238	7.35	391	1.2	61.1	64.2	1.2
1	BHAKTUDERA	11	30/2			22.00208	82.52839	846	V	7.1	0.24	0.5	163	11.92	397	6.5	24.8	18.3	0.1
2	BHAKTUDERA	11	69			22.00196	82.52369	836	V	7.0	0.39	0.6	326	15.50	451	8.8	15.3	13.5	0.3
3	BHAKTUDERA	11	180/7			22.00867	82.52796	796	V	7.8	0.35	0.3	163	15.77	570	6.4	27.2	7.0	0.2

4	BHAKTUDERA	11	172				22.00276	82.52568	809	V	7.1	0.41	0.3	138	8.06	561	5.6	25.5	18.3	0.1
5	BHAKTUDERA	11	89/2				22.00269	82.52554	806	V	7.0	0.32	0.4	163	24.01	422	4.6	30.7	16.8	0.3
6	BHAKTUDERA	11	123				22.00256	82.52524	801	V	7.4	0.34	0.3	163	8.06	474	9.7	22.5	17.5	0.2
7	BHAKTUDERA	11	125/7				22.00246	82.58799	801	V	7.0	0.26	0.3	176	15.23	485	8.0	24.6	13.2	0.2
5	SAPANAIPALI	10	69/1				21.59073	82.59615	869	A	5.4	0.11	0.5	226	4.66	120	2.0	33.1	37.0	0.8
8	SAPANAIPALI	10	233				21.59074	82.59354	854	A	5.6	0.22	0.4	188	3.85	112	0.1	34.5	38.6	1.0
19	PASID	13	757			Jharu ram	22.12863	82.83293	181	A	5.9	0.2	0.5	263	6.00	248	0.6	31.00	50.90	1.1
21	PASID	13	707			Prahalad	22.12952	82.8328	815	A	5.6	0.08	0.6	326	11.1	334	1.1	33.88	57.96	0.6
30	PASID	13	25				22.13076	82.59615	821	A	6.7	0.15	0.4	226	4.12	358	0.8	42.00	53.34	0.9
35	PASID	13	328			Niadhar	22.18151	82.83072	814	A	6.4	0.16	0.4	213	5.82	341	1.4	34.74	44.68	0.6
38	PASID	13	269			Bhagat ram	22.18166	82.83072	813	A	6.1	0.1	0.3	163	3.32	320	0.8	29.58	65.54	0.5
39	PASID	13	458			Khageswar	22.18157	82.83089	818	A	5.8	0.13	0.6	314	9.05	279	1.4	31.70	64.78	0.8
40	PASID	13	260			Rath ram	22.18174	82.83097	819	A	5.6	0.06	0.4	176	5.38	178	1.4	29.60	67.80	0.7
41	PASID	13	252			Buddu ram	22.18157	82.83113	819	A	5.4	0.08	0.5	213	7.80	323	1.9	27.56	65.80	0.5
42	PASID	13	472			Badau	22.18149	82.83099	816	A	5.8	0.07	0.4	163	6.45	255	2.2	28.24	63.76	0.9
43	PASID	13	223			Devcharan	22.18107	82.83127	817	A	6.3	0.06	0.6	351	12.99	311	2.1	27.42	63.92	0.7
44	PASID	13	479			Hari ram	22.18132	82.83119	819	A	6.7	0.18	0.6	389	12.81	317	2.2	32.80	64.30	0.6
49	PASID	13	149			Rakmu	22.18251	82.83115	836	A	5.9	0.09	0.5	289	5.82	295	2.5	43.18	66.58	0.6
53	PASID	13	3			Chandika prasad	22.18273	82.83132	839	A	6.2	0.12	0.5	226	7.88	452	1.0	27.94	53.10	1.0
56	PASID	13	37			Bhagwat ram	22.18171	82.83318	812	A	6.9	0.22	0.4	188	7.80	452	1.0	20.66	31.28	1.0
6	SPAHMUDA	009	123				22.00876	82.56539	770	A	6.1	0.16	0.6	401	11.20	638	1.6	36.4	33.6	1.3
12	SPAHMUDA	009	2001				22.01135	82.56386	775	A	6.4	0.17	0.6	376	13.98	448	1.3	26.4	47.5	1.0
13	SPAHMUDA	009	69				22.00847	82.56768	775	A	5.7	0.1	0.4	188	6.99	400	2.5	29.7	43.5	1.1
7	NAYABARADWAR	18	511			Battu lal	22.00132	82.82920	844	A	6.8	0.13	0.6	276	11.02	287	2.4	11.9	64.7	0.9
8	NAYABARADWAR	18	776/1			Ravi shankar	22.00001	82.82840	838	A	5.9	0.12	0.6	238	18.01	257	2.0	7.8	66.1	0.7
9	NAYABARADWAR	18	7				22.00325	82.82675	843	A	6.3	0.12	0.6	251	11.65	254	2.2	11.6	65.2	0.7
10	NAYABARADWAR	18	759			Jivan lal	22.00075	82.82930	856	A	6.1	0.16	0.5	213	12.54	170	2.1	13.3	66.1	0.8
11	NAYABARADWAR	18	805			Darshan	22.00065	82.82950	849	A	5.7	0.10	0.5	176	8.24	229	2.6	16.2	66.2	0.9
12	NAYABARADWAR	18	801/1			Ram bai	22.00026	82.82320	838	A	5.4	0.13	0.6	201	4.03	269	2.8	13.2	66.4	0.8
13	NAYABARADWAR	18	911			Jay Prakash	22.00120	82.82430	850	A	6.6	0.13	0.6	326	12.81	235	2.5	11.5	65.7	0.7

28	NAYABARADWAR	18	129	Nira bai	Ganesh charan	22.00321	82.82431	841	A	5.7	0.10	0.5	226	6.45	264	2.4	9.8	52.4	0.8
29	NAYABARADWAR	18	203/1	Bachchan singh	Nilu singh	22.00441	82.82321	830	A	5.8	0.11	0.4	201	4.03	208	2.3	9.4	29.4	0.7
30	NAYABARADWAR	18	73	Guha ram	Dhanau	22.00032	82.82421	842	A	6.3	0.16	0.6	238	10.84	204	2.3	9.8	65.3	0.7
31	NAYABARADWAR	18	9/1	Sarita	Brij nandan	22.00031	82.82621	832	A	6.4	0.12	0.4	188	4.57	266	2.2	11.0	66.2	0.6
1	SARAPALI	12	212/4			21.99421	82.98421	768	A	6.4	0.18	0.37	151	3.94	390	1.8	29.3	40.9	0.3
2	SARAPALI	12	199			21.99341	82.98321	812	A	6.4	0.13	0.46	201	18.01	404	0.9	29.2	42.4	0.3
3	SARAPALI	12	130/2			21.99421	82.98121	809	A	6.5	0.16	0.33	163	6.81	144	1.1	25.6	42.1	0.1
4	SARAPALI	12	229			21.99321	82.98321	740	A	6.5	0.12	0.17	125	7.62	158	1.2	28.0	26.5	0.1
5	SARAPALI	12	259			21.99421	82.98811	730	A	5.7	0.12	0.59	213	9.68	400	1.6	69.4	57.6	0.4
6	SARAPALI	12	192/4			21.99830	82.99211	770	A	6	0.19	0.2	113	2.78	375	0.7	40.5	44.5	0.3
7	SARAPALI	12	129/2			21.99850	82.99043	768	A	6.5	0.15	0.34	163	12.54	426	0.2	31.6	21.6	0.1
8	SARAPALI	12	266			21.99340	82.93341	754	A	6.4	0.2	0.44	163	5.02	426	0.8	31.0	40.1	0.1
9	SARAPALI	12	275			21.99864	82.93340	725	A	6.7	0.18	0.56	263	10.93	356	0.7	23.5	40.8	0.1
10	SARAPALI	12	169/1			21.99830	82.93562	757	A	6.2	0.18	0.4	163	5.20	435	1.6	60.4	61.6	0.2
11	SARAPALI	12	351			21.99840	82.93530	758	A	5.4	0.12	0.61	314	9.32	379	1.9	65.8	50.6	0.6
12	SARAPALI	12	433/2			21.99839	82.93595	780	A	5.9	0.11	0.46	213	6.54	379	1.6	49.0	56.9	0.6
13	SARAPALI	12	448			21.99860	82.93556	764	A	6.2	0.17	0.33	138	2.78	381	0.9	26.2	22.1	0.1
14	SARAPALI	12	437/1			21.99820	82.93562	814	A	6.1	0.07	0.17	125	9.41	170	2.5	41.3	47.8	0.4
4	BHAGDOOH	16	236/2			22.0047	82.4757	824	A	6.4	0.28	##	138	2.492	382.096	2.08	14.42	33.86	0.92
5	BHAGDOOH	16	168/2			22.0048	82.4786	826	A	6.0	0.17	##	188	10.3936	395.584	3.08	22.84	36.00	0.84
6	BHAGDOOH	16	301			22.0047	82.4738	821	A	6.0	0.19	0.31	163	5.376	274.176	1.32	13.34	28.64	0.80
7	BHAGDOOH	16	261			22.0087	82.4777	822	A	6.2	0.11	##	226	8.96	465.136	1.28	20.14	54.98	0.88
8	BHAGDOOH	16	412/1			22.0076	82.4748	815	A	6.1	0.16	##	263	11.8272	341.264	1.72	17.92	51.02	0.86
9	BHAGDOOH	16	8/15			22.0046	82.4759	827	A	6	0.15	##	188	6.3616	483.504	1.50	12.76	46.22	0.92
10	BHAGDOOH	16	402			22.0021	82.4768	817	A	6.3	0.25	##	163	1.8816	429.52	1.08	13.18	54.68	0.88
5	KHAIRA	3	149			22.06361	82.67611	832	A	5.8	0.12	0.4	163	9.23	310	6.8	41.8	32.6	1.28
6	KHAIRA	3	68/6			22.03611	82.68101	838	A	5.7	0.12	0.4	138	6.72	267	3.8	48.4	29.1	0.7
13	KHAIRA	3	182			22.62001	82.38191	743	A	5.8	0.07	0.6	314	10.93	351	4.0	43.4	33.1	1.02
14	KHAIRA	3	197			22.32111	82.62112	738	A	5.7	0.09	0.4	188	6.81	358	4.9	47.7	31.6	0.54
15	KHAIRA	3	313/1			22.06960	82.87621	740	A	5.6	0.09	0.4	176	5.91	283	3.7	56.4	4.9	1.34

16	KHAIRA	3	347				22.03621	82.86112	809	A	5.7	0.11	0.6	326	10.21	272	3.6	49.6	41.9	1.04
17	KHAIRA	3	360/1				22.06121	82.8761	732	A	5.8	0.08	0.5	213	4.66	276	5.4	55.2	46.3	1.14
18	KHAIRA	3	165/13				22.06211	82.8712	809	A	5.7	0.09	0.5	226	5.64	309	7.2	53.1	25.8	1.44
3	BOUROH	7	201				22.01264	82.58626	848	A	6.8	0.14	0.5	238	14.69	234	1.0	19.4	33.8	0.8
4	BOUROH	7	383				22.01326	82.58419	845	A	6.5	0.20	0.6	376	11.83	291	1.2	13.4	40.2	1.7
5	BOUROH	7	372				22.01235	82.58279	858	A	6.1	0.18	0.4	213	3.76	279	1.7	18.0	26.4	1.4
6	BOUROH	7	350				22.01036	82.58306	850	A	6.8	0.16	0.4	263	4.12	242	0.9	20.0	29.0	0.9
19	BALIN	3	665				22.06792	82.87445	730	A	5.4	0.12	0.5	301	16.49	260	2.7	32.1	49.3	0.8
23	BALIN	3	100				22.8860	82.87472	750	A	5.5	0.07	0.6	351	8.60	239	1.5	31.5	50.2	0.5
24	BALIN	3	73				22.8890	82.87498	760	A	5.6	0.12	0.5	276	5.82	364	1.9	35.2	42.9	0.9
4	PORThA	10	1114/13				22.00871	82.55689	768	A	5.8	0.13	0.5	276	5.02	262	2.7	15.7	40.9	0.6
9	PORThA	10	1335				22.58871	82.54807	772	A	6	0.1	0.6	376	11.20	383	1.3	21.2	28.0	0.6
14	PORThA	10	1352/2				22.59852	82.54852	768	A	5.7	0.09	0.6	414	5.56	259	1.8	22.7	30.9	0.6
19	PORThA	10	1460/4				22.01698	82.55779	764	A	5.7	0.13	0.6	326	6.36	276	2.0	24.7	37.9	1.3
40	PORThA	10	388				22.00593	82.5556	758	A	5.7	0.07	0.5	226	7.08	342	1.7	13.96	27.88	0.78
41	PORThA	10	1000				22.01495	82.5547	804	A	6.5	0.18	0.6	326	11.92	435	1.8	21.1	23.28	0.52
42	PORThA	10	1056				22.00800	82.5567	855	A	5.6	0.15	0.5	213	4.75	304	2.3	11.08	29.24	0.82
43	PORThA	10	341				22.01673	82.5564	759	A	5.7	0.06	0.5	263	7.44	384	3.4	16.5	39.0	0.98
44	PORThA	10	352				22.00687	82.5564	757	A	5.9	0.06	0.5	238	8.69	248	1.9	11.62	33.7	0.76
45	PORThA	10	341				22.01693	82.55669	768	A	5.8	0.13	0.6	314	10.93	381	1.6	14.6	32.1	0.54
46	PORThA	10	1065				22.00874	82.55833	810	A	5.8	0.07	0.5	188	3.23	326	2.8	16.46	32.48	0.86
47	PORThA	10	1071				22.01880	82.5582	773	A	5.8	0.11	0.6	226	7.88	363	2.4	14.42	30.48	0.84
48	PORThA	10	923				22.01380	82.5534	800	A	6.3	0.21	0.4	176	3.05	326	3.2	18.2	10.6	1.38
49	PORThA	10	943				22.01380	82.5534	807	A	5.9	0.18	0.6	301	10.39	407	4.6	27.6	5.94	0.46
50	PORThA	10	30				22.00812	82.55787	790	A	6.3	0.21	0.7	401	22.04	359	6.6	14.6	16.3	1.86
51	PORThA	10	394				22.01840	82.55826	787	A	5.9	0.29	0.5	188	8.06	325	10.6	22.4	9.18	1.76
52	PORThA	10	1094				22.01863	82.55754	780	A	6.8	0.23	0.4	201	7.80	348	6.4	11.28	12.9	0.82
53	PORThA	10	1098				22.01869	82.55849	767	A	6.5	0.16	0.6	326	4.48	391	7.8	11.4	11.2	1.58
54	PORThA	10	1634/1				22.01440	82.55354	782	A	6.1	0.19	0.6	301	11.38	395	9.8	30.4	10.3	1.0
55	PORThA	10	1646/1				22.01870	82.559	800	A	7.0	0.22	0.5	263	12.81	394	6.4	22.2	14.6	1.00

56	PORThA	10	1651/3				22.00.806	82.55759	814	A	7.1	0.22	0.5	201	12.01	339	3.8	11.0	8.62	2.0
57	PORThA	10	1652				22.00.690	82.55635	778	A	6.0	0.17	0.4	151	3.05	390	8.2	11.8	8.24	0.62
58	PORThA	10	1710				22.00.510	82.55451	780	A	6.5	0.23	0.4	176	6.99	405	4.2	13.6	9.7	0.84
59	PORThA	10	1663/11				22.00.540	82.55506	790	A	5.4	0.09	0.5	251	3.76	359	8.6	12.4	7.92	0.22
63	PORThA	10	5				22.00.730	82.55714	810	A	6.5	0.17	0.4	188	6.63	465	1.4	16.14	55.0	0.9
64	PORThA	10	46				22.00.850	82.55816	814	A	6.1	0.13	0.5	201	12.81	459	0.9	6.4	20.5	0.9
65	PORThA	10	9				22.00.961	82.55985	803	A	6.3	0.17	0.6	263	14.78	471	1.7	28.0	38.6	1.1
66	PORThA	10	405				22.00.970	82.5898	805	A	5.9	0.11	0.6	314	7.17	363	1.9	14.8	62.0	1.1
67	PORThA	10	401				22.00.940	82.559	814	A	5.8	0.12	0.5	276	6.63	491	2.5	35.9	32.4	0.7
68	PORThA	10	1628				22.01.231	82.5778	891	A	6.3	0.2	0.4	188	4.84	453	1.3	21.8	28.1	0.4
69	PORThA	10	1079				22.00.940	82.5591	768	A	6.2	0.17	0.4	201	5.82	367	1.3	17.6	29.8	0.7
70	PORThA	10	1663/47				22.00.510	82.55765	767	A	6.3	0.18	0.5	188	9.59	464	2.0	19.8	26.8	0.7
71	PORThA	10	1663/39				22.00.674	82.55474	804	A	6.2	0.22	0.5	201	10.84	358	2.2	15.6	27.1	1.1
72	PORThA	10	417				22.00.975	82.55654	767	A	6.3	0.21	0.4	163	3.05	557	2.4	17.2	35.5	1.0
73	PORThA	10	248				22.00.851	82.55964	771	A	6.2	0.22	0.3	138	15.95	492	0.8	19.8	38.5	1.0
74	PORThA	10	1584/6				22.00.982	82.5583	780	A	6.4	0.21	0.5	263	8.60	370	1.1	13.7	25.1	0.7
75	PORThA	10	436				22.00.991	82.55969	774	A	6.2	0.22	0.4	176	7.53	469	2.1	19.3	34.8	0.3
76	PORThA	10	431				22.00.874	82.55984	772	A	6.4	0.21	0.3	125	5.82	515	0.9	16.8	40.8	0.8
77	PORThA	10	429				22.00.921	82.55988	770	A	6.2	0.22	0.5	238	3.23	469	1.1	44.8	34.2	0.8
78	PORThA	10	488				22.00.941	82.55994	772	A	6.3	0.2	0.4	176	3.85	470	2.2	16.5	37.1	0.7
79	PORThA	10	164				22.00.954	82.55843	773	A	6.4	0.18	0.5	213	5.20	552	2.0	33.3	28.0	0.8
80	PORThA	10	149				22.00.958	82.55972	772	A	6.1	0.17	0.4	138	2.33	527	2.2	17.4	31.2	0.9
81	PORThA	10	129				22.00.955	82.55982	773	A	6.1	0.17	0.5	201	5.02	340	2.0	29.6	39.3	0.6
82	PORThA	10	78				22.00.992	82.55991	774	A	6.2	0.19	0.6	301	6.72	362	1.6	26.7	25.3	0.5
83	PORThA	10	92				22.00.894	82.55972	775	A	6.2	0.15	0.5	263	9.14	261	1.0	13.4	20.7	0.6
84	PORThA	10	84				22.00.940	82.55981	774	A	6.3	0.15	0.4	176	12.99	498	0.9	13.6	34.6	1.0
85	PORThA	10	97				22.00.950	82.55949	780	A	6.3	0.17	0.4	201	7.88	472	1.3	20.3	27.2	1.1
86	PORThA	10	607				22.00.955	82.55958	782	A	6	0.22	0.5	188	8.51	516	2.2	23.5	39.0	0.7
87	PORThA	10	1556/3				22.00.958	82.55968	785	A	6.6	0.16	0.4	138	11.02	552	2.0	33.3	28.0	0.8
88	PORThA	10	1563/4				22.01.208	82.55971	801	A	5.4	0.08	0.5	289	8.78	543	0.9	19.1	38.5	0.7

92	PORTHA	10	1574				22.0425	82.55898	872	A	6.1	0.09	0.6	364	13.98	262	2.1	19.2	39.1	0.2
21	TEMAR	8	645				22.58.902	82.59.500	782	A	6.6	0.1	0.5	263	15.77	215	1.4	51.2	55.8	0.80
22	TEMAR	8	718				22.58.771	82.59.501	780	A	5.5	0.08	0.5	301	4.93	194	0.9	36.6	52.6	0.58
23	TEMAR	8	734				22.58.991	82.59.692	780	A	5.9	0.09	0.5	251	7.71	430	0.8	35.3	41.7	0.84
24	TEMAR	8	1165				22.58.910	82.59.631	780	A	6.1	0.12	0.4	188	17.02	233	0.5	32.1	56.2	0.82
25	TEMAR	8	693				22.58.593	82.59.761	782	A	5.9	0.13	0.5	226	4.57	184	1.3	23.3	47.3	0.66
26	TEMAR	8	1183				22.58.890	82.59.621	780	A	5.8	0.09	0.5	188	9.77	250	0.9	42.1	43.6	0.60
27	TEMAR	8	1383				22.58.705	82.59.429	780	A	5.4	0.07	0.6	314	3.76	228	1.1	43.1	56.3	0.82
28	TEMAR	8	1961				22.59.63	82.58.77	106.3M	A	6.2	0.11	0.5	238	4.66	520	1.6	25.2	28.3	0.36
29	TEMAR	8	1919				22.59.81	82.58.74	106.3M	A	6.8	0.13	0.5	276	10.57	241	0.8	42.8	46.0	0.62
30	TEMAR	8	1776				22.59.93	82.58.82	106.4M	A	5.4	0.09	0.5	163	5.82	209	1.6	23.5	56.5	0.96
31	TEMAR	8	1719				22.00.03	82.58.38	106.3M	A	6.4	0.17	0.4	138	2.51	213	1.2	47.7	27.8	0.62
32	TEMAR	8	134				22.00.09	82.58.39	106.5M	A	5.9	0.17	0.5	188	5.91	254	1.1	27.3	24.3	1.38
34	TEMAR	8	225				22.00.18	82.58.45	106.4M	A	5.9	0.14	0.5	213	11.02	248	1.4	20.5	41.6	0.84
45	TEMAR	8	2332				22.59.70	82.59.63	106.2M	A	6.4	0.10	0.5	138	15.77	408	1.0	18.8	37.9	0.72
61	TEMAR	8	1371				22.58.621	82.59.621	782	A	5.8	0.20	0.4	151	11.29	260	1.4	48.9	43.8	0.66
62	TEMAR	8	2021				22.58.658	82.59.658	780	A	6.0	0.22	0.4	113	5.91	544	0.7	25.1	26.6	0.70
12	GAOH600HI	7	1009				22.02.612	83.00.125	830	A	6.1	0.12	0.4	138	10.93	141	1.8	4.5	5.2	0.52
13	GAOH600HI	7	1097				22.02.586	83.00.139	831	A	5.9	0.1	0.5	238	10.12	215	2.3	17.5	34.1	0.34
14	GAOH600HI	7	1133				22.02.691	83.00.149	830	A	6.3	0.06	0.4	163	4.93	322	2.3	6.6	40.3	0.54
15	GAOH600HI	7	1145				22.02.621	83.00.102	830	A	5.7	0.06	0.5	163	11.83	207	2.8	12.3	40.2	0.24
16	GAOH600HI	7	1276				22.02.619	83.00.102	82.9	A	6.3	0.18	0.5	176	9.41	120	2.4	8.9	26.1	0.20
17	GAOH600HI	7	1234				22.02.610	83.00.203	82.8	A	6.2	0.17	0.6	263	7.88	287	2.3	12.1	7.9	0.36
18	GAOH600HI	7	1203				22.02.592	83.00.102	831	A	5.8	0.06	0.5	251	8.15	215	2.2	5.7	8.1	0.32
19	GAOH600HI	7	1061				22.02.741	83.00.215	831	A	6.4	0.12	0.6	401	4.03	121	1.8	4.7	10.8	0.36
43	GAOH600HI	7	611				22.02.615	83.00.109	856	A	6.2	0.18	0.3	125	5.02	430	1.0	8.0	51.0	0.20
44	GAOH600HI	7	566				22.02.631	83.00.074	858	A	7.0	0.25	0.5	201	5.29	454	2.2	8.1	53.6	0.28
45	GAOH600HI	7	594				22.02.430	83.00.127	853	A	5.5	0.08	0.5	176	8.33	273	2.2	12.5	5.8	0.28
46	GAOH600HI	7	175				22.02.567	83.00.130	862	A	5.4	0.07	0.5	151	3.32	250	1.9	4.7	5.3	0.46
47	GAOH600HI	7	170				22.02.620	83.00.114	853	A	6.7	0.13	0.3	113	15.14	465	1.4	4.3	8.2	0.18

1	BHADRAPALI	11	254				22.00.345	82.53.486	845	A	6.1	0.14	0.5	188	12.01	439	0.8	22.0	25.4	1.7
2	BHADRAPALI	11	212				22.00.193	82.53.489	842	A	5.4	0.16	0.5	176	6.36	368	1.5	21.8	25.4	1.3
3	BHADRAPALI	11	244				22.00.165	82.53.419	852	A	5.9	0.14	0.6	289	8.24	442	0.7	15.9	25.2	0.9
4	BHADRAPALI	11	198				22.00.289	82.53.315	848	A	5.7	0.09	0.6	263	9.77	378	2.0	22.6	29.4	1.2
5	BHADRAPALI	11	234				22.00.268	82.53.372	850	A	5.9	0.14	0.5	238	13.35	301	0.9	9.22	24.7	0.9
6	BHADRAPALI	11	309				22.00.521	82.53.512	779	A	5.9	0.14	0.6	401	9.59	342	1.4	11.7	29.3	1.1
7	BHADRAPALI	11	32				22.00.367	82.53.543	786	A	6.3	0.1	0.6	314	9.23	313	1.3	15.3	24.8	1.2
8	BHADRAPALI	11	62				22.00.367	82.53.812	777	A	5.8	0.15	0.5	263	9.32	450	1.7	12.1	28.8	1.3
9	BHADRAPALI	11	57				22.00.521	82.53.461	778	A	5.4	0.13	0.5	238	9.59	475	2.1	15.9	28.4	1.0
10	BHADRAPALI	11	182				22.00.346	82.53.422	779	A	5.7	0.15	0.6	276	2.69	358	1.1	26.2	25.9	1.4
11	BHADRAPALI	11	190/1				22.00.219	82.53.381	779	A	6.0	0.11	0.6	301	14.16	467	0.6	20.2	25.1	1.4
12	BHADRAPALI	11	473				22.00.549	82.53.389	778	A	5.7	0.12	0.6	213	10.21	464	1.1	19.8	25.3	0.9
13	BHADRAPALI	11	71				22.00.269	82.53.372	787	A	6.1	0.19	0.6	263	10.30	351	1.2	27.8	25.3	1.0
14	BHADRAPALI	11	164				22.00.342	82.54.126	792	A	6.8	0.1	0.5	238	6.45	310	0.9	12.3	28.5	1.3
15	BHADRAPALI	11	492				22.00.349	82.53.591	810	A	5.8	0.17	0.6	289	7.44	335	0.7	22.5	25.4	1.2
16	BHADRAPALI	11	59/				22.00.239	82.53.339	775	A	5.6	0.19	0.5	276	9.32	475	1.5	18.5	25.8	1.0
17	BHADRAPALI	11	105				22.00.202	82.53.527	786	A	6.0	0.12	0.5	188	8.33	488	1.1	19.9	24.5	0.4
18	BHADRAPALI	11	102				22.00.202	82.53.506	838	A	6.4	0.18	0.5	213	10.12	447	1.6	26.0	25.3	0.5
19	BHADRAPALI	11	153				22.00.139	82.53.449	858	A	5.8	0.12	0.4	151	8.24	449	1.6	10.7	28.4	1.9
20	BHADRAPALI	11	135				22.00.425	82.53.443	843	A	6.3	0.14	0.5	163	9.86	478	0.7	22.2	24.2	0.5
1	TURRI	13	148/2	Chan singh			22.06.799	82.86.240	829	A	5.6	0.04	0.2	100	7.44	138	0.9	30.5	13.8	0.4
2	TURRI	13	53	Chitarag			22.06.700	82.86.211	828	A	5.5	0.06	0.5	263	9.77	246	1.5	27.6	19.0	0.9
3	TURRI	13	95	Maik ram		Ganga ram	22.06.599	82.86.612	832	A	6.3	0.05	0.4	151	13.26	194	1.2	26.8	23.3	0.5
4	TURRI	13	135	Bhadha bai			22.06.621	82.81.211	820	A	6.6	0.07	0.4	176	7.88	182	1.2	30.2	24.9	0.5
5	TURRI	13	177	Chamra		shankar	22.06.211	82.81.211	840	A	6.2	0.07	0.3	113	3.85	109	1.2	36.8	19.7	1.1
6	TURRI	13	584	Kamhaiya lal			22.06.261	82.81.209	838	A	5.5	0.05	0.2	100	5.56	410	0.7	6.4	16.4	0.4
7	TURRI	13	628/1	Mohit ram			22.06.211	82.81.211	832	A	6.8	0.14	0.3	138	3.32	242	1.2	23.0	13.2	0.6
8	TURRI	13	466	Sadu ram			22.06.200	82.81.611	832	A	6.4	0.12	0.3	113	6.36	251	1.8	55.6	24.9	0.9
9	TURRI	13	257/2	Ganj ram			22.36.112	82.81.6121	837	A	6.8	0.15	0.3	151	6.54	199	1.7	26.5	19.1	0.5
10	TURRI	13	424/1	girdhari			22.36.21	82.86611	840	A	5.9	0.08	0.3	113	7.53	180	0.7	23.0	23.7	0.5

II	TURRI	13	508	Manohar		22.36.612	82.86121	856	A	5.6	0.07	0.3	138	3.23	197	1.8	30.1	21.0	0.9
7	KHARRAPALI	6	159			22.03.562	82.58.492	782	A	6	0.16	0.5	201	5.82	238	3.3	23.3	62.0	0.2
8	KHARRAPALI	6	284			22.03.572	82.58.499	781	A	5.6	0.08	0.6	314	10.66	256	3.5	23.6	64.6	0.1
9	KHARRAPALI	6	169/2			22.03.574	82.58.491	780	A	5.7	0.11	0.7	426	3.05	242	3.4	23.9	63.2	0.1
10	KHARRAPALI	6	195			22.03.572	82.58.481	782	A	5.9	0.1	0.5	263	6.72	279	3.2	19.9	63.1	0.6
1	MUKTARAJA	16	158			22.00.16	82.47.97	769	A	6.6	0.16	0.3	113	3.67	201	3.0	14.4	33.3	1.12
2	MUKTARAJA	16	181			22.00.31	82.47.90	758	A	6.6	0.13	0.5	213	3.05	355	3.5	17.0	47.9	0.94
3	MUKTARAJA	16	183/1			22.00.25	82.47.94	756	A	5.7	0.14	0.6	188	2.87	233	2.5	14.1	45.0	1.22
4	MUKTARAJA	16	196/1			22.00.30	82.47.93	769	A	5.8	0.15	0.4	151	4.12	240	2.5	7.7	43.9	1.26
5	MUKTARAJA	16	64/1			22.00.36	82.47.77	776	A	5.7	0.09	0.5	163	4.66	298	2.3	13.7	48.8	1.02
6	MUKTARAJA	16	628/4,215/4			22.00.29	82.47.86	769	A	5.4	0.08	0.5	201	6.36	341	2.5	20.1	52.6	1.36
7	MUKTARAJA	16	222			22.00.27	82.47.81	757	A	5.8	0.16	0.6	263	2.51	232	2.4	10.8	49.7	0.92
8	MUKTARAJA	16	135			22.00.23	82.47.87	768	A	6.8	0.23	0.4	188	2.87	214	2.7	11.4	56.2	1.22
9	MUKTARAJA	16	4			22.00.17	82.47.96	775	A	6.9	0.21	0.5	213	3.85	215	2.6	13.7	51.5	1.04
10	MUKTARAJA	16	75/13			22.00.19	82.47.94	770	A	5.9	0.13	0.6	301	4.03	211	2.8	18.6	40.4	0.80
11	MUKTARAJA	16	27			22.00.23	82.47.95	772	A	5.5	0.19	0.6	263	3.94	256	2.6	16.2	55.0	1.08
12	MUKTARAJA	16	69/2			22.00.27	82.47.83	787	A	5.8	0.14	0.4	138	2.60	241	2.1	11.8	46.3	0.84
13	MUKTARAJA	16	96			22.00.29	82.47.86	780	A	6.2	0.19	0.5	138	5.56	232	2.3	9.7	45.1	1.32
14	MUKTARAJA	16	17/3			22.00.35	82.47.80	727	A	5.7	0.13	0.5	226	2.33	204	2.4	10.7	44.2	0.92
15	MUKTARAJA	16	61			22.00.35	82.47.80	723	A	5.6	0.21	0.6	263	6.36	220	2.5	15.0	52.7	1.26
16	MUKTARAJA	16	44			22.00.37	82.47.78	775	A	5.7	0.16	0.5	163	2.06	236	2.4	13.5	51.1	1.24
17	MUKTARAJA	16	112			22.00.41	82.47.67	761	A	6.4	0.17	0.5	138	4.48	189	2.6	14.5	30.8	1.12
18	MUKTARAJA	16	125			22.00.36	82.47.72	785	A	6.1	0.17	0.6	201	3.14	194	2.6	5.8	45.9	0.98
19	MUKTARAJA	16	119			22.00.38	82.47.75	771	A	5.7	0.19	0.6	276	3.58	309	2.8	17.7	54.1	0.82
20	MUKTARAJA	16	307			22.00.36	82.47.77	772	A	5.7	0.11	0.5	263	3.23	418	2.8	11.6	55.0	1.00
21	MUKTARAJA	16	373			22.00.34	82.47.79	721	A	5.4	0.09	0.4	163	2.33	213	2.3	13.5	57.3	1.30
22	MUKTARAJA	16	605			22.00.32	82.47.81	770	A	5.5	0.07	0.6	238	1.34	299	2.7	15.7	54.3	1.18
23	MUKTARAJA	16	549			22.00.30	82.47.83	770	A	5.7	0.13	0.5	251	3.94	281	2.8	19.4	55.0	1.36
24	MUKTARAJA	16	529			22.00.28	82.47.85	770	A	5.7	0.19	0.6	301	1.52	216	2.6	12.4	51.4	1.16
25	MUKTARAJA	16	355			22.00.26	82.47.87	771	A	5.6	0.15	0.6	201	6.18	265	3.0	9.4	55.1	1.06

26	UKTARAJA	16	334				22.00.24	82.47.89	770	A	5.6	0.12	0.5	176	3.94	205	2.2	6.2	44.7	1.14
27	UKTARAJA	16	337				22.00.22	82.47.91	769	A	5.7	0.15	0.4	138	4.57	197	2.2	15.3	19.1	1.08
28	UKTARAJA	16	324/2				22.00.20	82.47.93	769	A	6.8	0.15	0.4	125	4.03	223	3.0	17.7	55.2	1.10
29	UKTARAJA	16	328/2				22.00.18	82.47.95	769	A	5.7	0.14	0.5	151	3.58	217	2.2	12.8	50.9	0.96
5	KANETHI	10	51				21.59.279	82.59.453	891	A	6.8	0.16	0.4	138	3.32	208	1.4	34.4	37.2	0.24
9	KANETHI	10	246				21.59.253	82.59.522	891	A	5.3	0.08	0.4	188	2.96	286	0.4	27.9	86.5	0.36
5	KARIBANDHA	7	330/3				22.00.656	83.00.39	796	A	6.3	0.14	0.5	238	16.31	177	0.2	31.1	44.4	1.44
10	KARIBANDHA	7	436				22.00.672	82.59.811	798	A	6.4	0.16	0.5	188	11.29	141	0.1	27.6	43.0	1.36
11	KARIBANDHA	7	432/2				22.00.621	82.39.721	798	A	6.6	0.13	0.5	276	10.66	131	1.9	43.2	24.6	1.44
12	KARIBANDHA	7	5/1				22.00.615	82.59.702	799	A	6.9	0.17	0.5	151	6.54	179	1.8	29.3	49.1	1.32
13	KARIBANDHA	7	37/1				22.00.755	82.59.992	800	A	5.7	0.05	0.5	238	8.87	190	1.8	46.9	48.4	1.30
14	KARIBANDHA	7	267/1				22.00.761	83.00.062	799	A	5.8	0.06	0.6	314	10.75	147	1.9	42.9	33.9	1.48
15	KARIBANDHA	7	496/1				22.00.744	83.00.009	799	A	5.4	0.07	0.5	251	7.26	158	0.9	33.6	47.4	1.10
4	NANDELI	07	224/1		Punushottam	Paras ram	22.01.62	82.58.518	794	A	6.3	0.24	0.4	201	4.39	319	1.1	24.6	56.5	0.70
5	NANDELI	07	125		Ratan lal	Muni ram	22.01.179	82.58.426	784	A	6.5	0.18	0.5	301	10.39	279	0.8	24.4	56.7	0.74
6	NANDELI	07	159		Samarin	Surajbhan satnami	22.01.362	82.58.408	790	A	7.1	0.26	0.5	276	7.17	309	0.7	35.9	47.9	0.66
7	NANDELI	07	186		Phakirchand sharma		22.01.382	82.58.506	794	A	6.7	0.19	0.6	401	4.48	274	1.2	37.5	48.4	0.70
8	NANDELI	07	359/2		Mohan lal	Thanda ram	22.01.0965	82.58.506	794	A	6.5	0.21	0.4	176	9.50	225	1.5	19.1	50.8	0.70
9	NANDELI	07	262		Guni ram satnami		22.01.326	82.58.623	796	A	6.5	0.19	0.4	163	7.97	215	1.2	20.8	52.2	0.78
10	NANDELI	07	340		Babu lal	Chhote lal	22.01.187	82.58.724	789	A	6.4	0.16	0.5	163	6.45	202	1.5	28.7	57.1	0.74
6	HARDA	07	299				22.01.136	82.59.341	812	A	6	0.15	0.6	201	8.33	392	1.7	24.2	46.0	0.38
9	HARDA	07	230/1				22.01.232	82.59.421	795	A	5.9	0.1	0.5	188	3.23	323	0.8	42.4	33.4	0.58
10	HARDA	07	85/5				22.01.391	82.59.463	794	A	6	0.12	0.4	125	4.12	370	2.0	26.7	36.8	0.56
11	HARDA	07	195/15				22.01.408	82.59.502	795	A	6.4	0.16	0.5	213	2.06	364	0.7	24.3	43.1	0.4
12	HARDA	07	357				22.01.418	82.59.572	797	A	6	0.12	0.6	276	2.69	431	2.7	41.1	42.3	0.84
13	HARDA	07	376/4				22.01.210	82.59.451	799	A	6.3	0.17	0.3	125	9.68	334	2.8	44.2	45.4	0.7
15	PARSADAKALA	11	220				22.01.108	82.59.339	798	A	6.7	0.10	0.3	125	8.60	205	0.8	57.9	62.4	1.0
16	PARSADAKALA	11	973				22.01.201	82.59.341	794	A	6.8	0.17	0.4	138	8.60	462	0.8	64.5	61.0	0.6
17	PARSADAKALA	11	1269				22.01.231	82.59.321	794	A	6.2	0.17	0.4	151	6.99	202	1.2	53.5	60.2	0.5
18	PARSADAKALA	11	330				22.01.150	82.59.349	796	A	6.2	0.11	0.5	188	7.08	272	1.3	59.3	62.4	0.8

7	DUMARPARA	14	104				22.98.542	82.84.379	838	A	5.4	0.11	0.6	289	11.29	404	0.4	26.9	50.1	0.3
8	DUMARPARA	14	111				22.98.555	82.84.366	831	A	5.5	0.10	0.6	276	8.87	167	0.1	31.0	30.7	0.3
12	DUMARPARA	14	143				22.98.601	82.84.308	858	A	5.6	0.07	0.5	226	4.66	371	0.9	28.6	61.3	0.3
15	DUMARPARA	14	239				22.98.85	82.84.25	843	A	5.7	0.06	0.5	213	11.1	417	1.5	38.0	62.6	0.4
18	DUMARPARA	14	320				22.98.70	82.84.30	857	A	5.9	0.07	0.4	201	5.56	260	1.2	36.7	61.9	0.2
25	DUMARPARA	14	451				22.98.67	82.84.30	815	A	5.5	0.07	0.5	213	7.08	174	1.2	46.7	57.7	0.3
27	DUMARPARA	14	554				22.98.64	82.84.30	840	A	5.9	0.09	0.5	226	7.80	328	1.0	28.1	53.1	0.1
29	DUMARPARA	14	768				21.98.61	82.84.35	861	A	5.7	0.11	0.4	213	5.64	335	0.8	24.3	57.0	0.1
33	DUMARPARA	14	1680				21.98.58	82.84.40	838	A	5.4	0.05	0.5	201	6.36	456	1.5	39.5	60.6	0.3
34	DUMARPARA	14	737				21.98.57	82.85.43	840	A	5.9	0.08	0.5	226	10.04	528	1.0	34.8	59.1	0.4
38	DUMARPARA	14	2000				21.98.55	82.84.40	835	A	5.9	0.11	0.6	314	7.26	162	0.7	23.1	60.9	0.2
39	DUMARPARA	14	1819				21.98.62	82.84.75	847	A	5.5	0.09	0.5	276	12.10	535	0.8	25.6	56.3	0.3
41	DUMARPARA	14	2040				21.98.51	82.84.78	842	A	5.7	0.07	0.5	251	2.60	199	1.0	31.7	58.0	0.4
44	DUMARPARA	14	2102				21.98.68	82.84.69	830	A	5.6	0.09	0.5	213	7.26	192	0.9	5.5	14.4	0.9
1	PUJERIPALI	6	5-Aug				22.03.87	82.57.15	799	V	7.2	0.23	##	163	6.09	554.4	1.30	14.9	40.3	0.58
2	PUJERIPALI	6	31				22.03.77	82.57.25	810	V	6.9	0.18	0.55	226	5.38	270.816	3.12	30.8	61.0	0.68
3	PUJERIPALI	6	44				22.03.57	82.57.45	809	V	7.4	0.32	##	213	7.08	361.536	2.12	15.5	59.7	0.48
4	PUJERIPALI	6	84				22.03.62	82.57.50	807	V	7.3	0.23	##	263	8.24	461.216	0.92	21.6	58.2	0.88
5	PUJERIPALI	6	112				22.03.52	82.57.60	804	V	7.8	0.25	##	238	5.29	556.08	1.16	12.4	30.8	0.84
6	PUJERIPALI	6	139				22.03.32	82.57.88	811	V	7.5	0.31	##	176	4.21	511.392	1.94	14.4	59.7	0.44
6	SPAHMUDA	2	108	Radha bai	Pawan singh		22.08.23	82.50.45	101.4.	A	5.6	0.06	0.5	251	7.71	155	1.2	22.7	24.3	0.64
7	SPAHMUDA	2	154	Ishwar lal	Abhay ram		22.08.26	82.50.48	102.1	A	5.9	0.19	0.4	213	7.88	138	1.3	23.2	22.7	1.26
8	SPAHMUDA	2	170	Ishwar lal	Abhay ram		22.08.13	82.50.59	101.8	A	6.7	0.2	0.5	263	14.25	149	0.8	22.2	22.4	0.4
9	SPAHMUDA	2	194	Ishwar lal	Abhay ram		22.08.18	82.50.54	101.6	A	6.3	0.12	0.5	226	10.12	162	1.5	24.9	23.4	0.72
10	SPAHMUDA	2	212	Bund ram	Dasha ram		22.08.20	82.50.48	101.7	A	5.6	0.07	0.4	163	9.32	227	0.9	24.9	24.2	0.66
5	ACHANAKPUR	8		Hira lal'	Dani ram		22.07.134	82.89.902	824	V	6.9	0.16	0.6	301	5.02	441	1.0	26.9	47.8	0.8
13	ACHANAKPUR	8		Hetram	Mulau ram		22.48.126	82.15.024	661	V	7.1	0.21	0.5	251	4.93	425	0.9	24.9	25.1	0.8
14	ACHANAKPUR	8		Ramkumar	Sampat lal		22.48.135	82.15.019	671	V	7.4	0.34	0.5	226	7.71	442	0.9	24.6	21.5	0.8
15	ACHANAKPUR	8		Dharam lal	Aatma ram		22.48.098	82.15.031	659	V	7.8	0.33	0.5	263	8.42	470	2.2	16.5	40.4	1.1
16	ACHANAKPUR	8		Kartik ram	Hira lal		22.48.127	82.15.056	665	V	7.7	0.27	0.4	188	6.99	492	1.9	18.7	37.7	0.7

5	GHUCHUVA	2	231				22.07.892	82.48.986	988	V	6.8	0.16	0.5	201	21.86	386	2.7	22.8	36.5	1.3
18	GHUCHUVA	2	197				21.43.135	83.15.019	667	A	5.9	0.06	0.5	238	18.55	144	2.3	46.9	33.8	1.3
19	GHUCHUVA	2	15				21.43.109	83.15.057	661	A	6.4	0.13	0.5	188	15.77	286	2.4	56.4	32.3	1.2
20	GHUCHUVA	2	10				21.43.214	83.16.127	765	A	5.9	0.08	0.5	176	16.93	116	1.7	61.6	12.7	1.4
6	PALARIKALA	13	124/1				22.3611	82.16211	820	A	5.7	0.14	0.6	351	8.33	307	8.5	40.4	11.1	0.4
7	PALARIKALA	13	109				22.3612	82.62111	822	A	6.0	0.12	0.4	125	1.52	279	6.9	40.2	16.6	0.3
8	PALARIKALA	13	219/1				22.44311	82.6434	862	A	5.9	0.10	0.2	100	6.54	403	6.4	35.9	9.8	1.4
9	PALARIKALA	13	246/1				22.0211	82.6441	850	A	6.3	0.17	0.3	163	1.79	224	1.7	45.4	8.5	0.6
10	PALARIKALA	13	310				22.66621	82.62112	842	A	5.6	0.08	0.4	176	1.70	312	2.2	28.2	12.6	1.4
11	PALARIKALA	13	255				22.33612	82.34212	830	A	5.8	0.08	0.5	201	7.80	379	4.7	33.7	13.0	0.9
1	NAVAPARA	11				Chhotu ram	21.59.313	82.57.536	798	V	7.4	0.27	0.5	276	14.16	486	1.3	17.8	19.0	1.4
2	NAVAPARA	11				Nayadu kavar	21.59.276	82.57.594	799	V	6.8	0.1	0.5	226	12.28	408	0.9	20.5	17.7	0.9
3	NAVAPARA	11				Siyaram patel	21.59.217	82.57.603	797	V	7.5	0.22	0.4	213	11.83	584	0.8	14.7	24.1	0.8
4	NAVAPARA	11				Sibu Agrawal	21.59.246	82.57.495	801	V	7	0.21	0.5	226	9.77	474	1.1	20.9	4.9	0.6
5	NAVAPARA	11				Gauri patel	21.59.211	82.57.467	801	V	7.7	0.21	0.4	201	11.74	574	1.6	17.7	8.9	0.9
6	NAVAPARA	11				Bhagirathi patel	21.59.178	82.57.427	798	V	7.5	0.23	0.5	238	13.98	485	2.7	21.0	15.1	1.8
7	NAVAPARA	11				Daya ram patel	21.59.589	82.57.541	787	V	7.3	0.23	0.5	213	14.96	475	2.1	11.3	6.6	0.6
8	NAVAPARA	11				Dilawar patel	21.59.761	82.57.513	798	V	7.4	0.23	0.5	289	13.44	507	2.4	21.0	8.0	0.8
9	NAVAPARA	11				Dwarka prasad	21.59.767	82.57.504	789	V	6.9	0.12	0.5	251	12.63	462	2.0	25.1	6.9	0.8
10	NAVAPARA	11				Bund ram kavar	21.59.801	82.57.679	790	V	6.8	0.2	0.4	226	13.08	395	3.6	22.7	5.7	1.1
11	NAVAPARA	11				Chatur singh	21.59.699	82.57.666	784	V	6.7	0.30	0.4	176	12.54	384	1.2	9.0	14.7	0.7
12	NAVAPARA	11				Santosh patel	21.59.600	82.57.644	788	V	7.0	0.34	0.5	289	10.04	450	1.5	12.5	4.2	0.4
13	NAVAPARA	11				Mohan ram	21.59.633	82.57.681	789	V	7.1	0.24	0.6	339	10.04	470	1.0	13.7	7.1	1.1
16	MOHA GAON	2	235				22.335711	82.34313E	834	A	5.7	0.12	0.5	201	9.32	127	6.4	26.1	6.0	1.8
17	MOHA GAON	2	432				22.33434	82.34543	874	A	5.8	0.11	0.5	251	13.62	171	5.0	45.3	11.0	1.9
18	MOHA GAON	2	89				22.33254	82.34656	862	A	6.6	0.17	0.5	176	1.43	167	9.7	52.4	17.3	1.3
19	MOHA GAON	2	258				22.33562	82.34834	839	A	6.9	0.23	0.3	138	2.78	166	9.7	46.8	13.2	1.7
20	MOHA GAON	2	199				22.34043	82.34764	845	A	6.8	0.18	0.4	188	1.52	164	7.7	42.0	13.2	1.7
21	MOHA GAON	2	458				22.33426	82.34762	854	A	5.8	0.17	0.3	151	6.72	219	5.0	46.7	6.0	1.7
4	JAMCHUVA	2	127/2				22.0765	82.50.33	890	A	5.6	0.04	0.1	113	5.56	143	2.1	65.6	25.1	1.44

5	JAMCHUVA	2	150				22.0739	82.50.61	878	A	5.5	0.04	0.2	151	5.82	225	2.0	60.4	33.3	0.18
6	JAMCHUVA	2	109				22.0719	82.50.63	867	A	5.5	0.05	0.1	138	5.64	239	1.9	64.1	30.9	0.30
25	JAMPALI	004	430				22.07006	82.91060	860	A	5.7	0.09	0.5	276	10.93	338	2.1	32.8	29.9	0.30
26	JAMPALI	004	110				22.07777	82.91051	865	A	6.5	0.14	0.4	176	8.60	354	2.1	37.9	33.9	0.86
27	JAMPALI	004	112				22.0701	82.91083	873	A	5.1	0.11	0.5	213	8.69	385	0.9	35.9	42.3	0.50
28	JAMPALI	004	380				22.07007	82.91060	880	A	5.7	0.12	0.4	238	17.29	410	2.0	34.4	36.0	0.28
29	JAMPALI	004	407				22.07767	82.91055	878	A	5.8	0.18	0.5	289	13.08	350	1.1	37.8	33.3	0.70
30	JAMPALI	004	423				22.07062	82.91051	886	A	6	0.17	0.6	376	4.93	533	1.3	22.9	36.4	0.60
31	JAMPALI	004	411				22.07015	82.91086	867	A	5.7	0.16	0.6	414	5.11	638	1.7	23.0	47.6	0.36
11	SONGUDA	1	287/1	Kashi bai			22.0883	82.4630	861	A	6.7	0.16	##	201	9.59	453	8.6	24.0	14.9	0.36
12	SONGUDA	1	124/1	Ghashi ram			22.0653	82.4650	863	A	6	0.15	##	188	17.11	299	8.4	32.4	11.1	0.32
13	SONGUDA	1	144				22.064	82.4660	871	A	6.9	0.17	##	176	15.86	287	2.9	26.0	9.9	0.14
14	SONGUDA	1	294/1	Bhagirathi	Pusram Bodhi ram		22.0645	82.4666	869	A	6.9	0.13	##	213	10.66	398	8.4	29.3	12.0	0.42
15	SONGUDA	1	299/1	bhujal			22.0660	82.4650	862	A	6.1	0.16	##	251	11.38	449	8.7	27.9	13.9	0.30
16	SONGUDA	1	295	Chhalsay	Mahesh ram		22.0655	82.4665	872	A	5.4	0.17	0.57	289	8.51	419	5.7	31.5	11.5	0.46
1	ANJORIPALI	4	3				22.04813	82.56843	807	A	6.8	0.28	##	213	9.59	329	2.9	26.2	14.0	0.90
2	ANJORIPALI	4	316				22.04819	82.56887	808	A	5.5	0.09	##	251	7.44	200	0.9	39.0	13.1	1.46
3	ANJORIPALI	4	337				22.04812	82.56893	809	A	5.8	0.12	0.61	238	9.23	215	3.3	19.4	10.6	1.28
4	ANJORIPALI	4	284/1				22.04839	82.5686	809	A	5.9	0.15	##	213	8.96	232	9.9	14.8	14.7	1.32
5	ANJORIPALI	4	270				22.0431	82.56866	807	A	6.2	0.11	0.55	226	9.77	194	6.5	27.4	15.1	0.28
6	ANJORIPALI	4	233				22.04776	82.56899	809	A	6.8	0.35	##	226	9.32	208	4.9	36.2	11.1	0.62
7	ANJORIPALI	4	222/2				22.04832	82.56739	807	A	6.7	0.14	0.41	176	8.60	312	3.0	11.2	11.1	0.68
8	ANJORIPALI	4	485				22.04815	82.56744	810	A	5.9	0.11	##	188	8.06	267	4.0	9.8	9.2	0.44
9	ANJORIPALI	4	467				22.0491	82.5674	810	A	5.6	0.15	##	176	9.32	316	6.5	17.2	17.5	0.90
10	ANJORIPALI	4	204/5				22.0503	82.5686	804	A	5.9	0.08	##	226	9.50	198	9.3	49.0	10.5	0.36
11	ANJORIPALI	4	216				22.0523	82.5666	817	A	5.6	0.1	##	163	11.38	139	2.1	43.2	12.2	0.34
12	ANJORIPALI	4	435/2				22.0533	82.5656	811	A	5.6	0.12	0.41	188	9.23	254	4.7	19.8	12.2	1.70
13	ANJORIPALI	4	94/7				22.0489	82.5685	810	A	5.7	0.08	##	151	8.33	268	4.9	44.2	9.1	1.00
14	ANJORIPALI	4	119/1				22.0484	82.5685	811	A	6.0	0.09	##	201	10.57	225	9.9	21.0	11.3	1.12
15	ANJORIPALI	4	180/8				22.048	82.569	812	A	6.0	0.11	##	213	7.53	224	2.8	17.0	7.0	1.82

9	NANDOUR KALA	14		Jiwan puri	Kartik puri	22.04056	82.89453	800	V	6.8	0.18	0.4	113	7.35	422	1.7	15.4	42.5	1.26
12	NANDOUR KALA	14		Raghunandan	Ghureu ram	22.04222	82.89590	793	V	7.3	0.24	0.5	151	10.04	456	0.4	18.9	59.1	1.28
4	NANDOUR KHURO	14		Mahant Rathour	Dhaniram rathour	22.01991	82.54294	770	A	6.4	0.10	0.6	201	10.84	192	2.2	47.2	9.9	0.26
5	NANDOUR KHURO	14		Ganga prasad	Khulu ram	22.02017	82.54315	790	A	6.6	0.11	0.6	213	19.08	365	0.9	47.4	9.5	0.26
7	NANDOUR KHURO	14		Rajendra kumar	Ramdhan	22.01868	82.54131	779	A	5.4	0.09	0.5	188	17.56	278	0.3	43.4	10.1	0.42
10	NANDOUR KHURO	14		Hemcharan	Ganga ram	22.02529	82.54733	768	A	6.7	0.16	0.5	163	9.23	322	4.7	41.8	6.1	0.26
4	SARVANI	05	72			22.0345	82.5728	807	A	6.3	0.19	0.3	138	17.83	129	1.3	15.6	20.9	0.6
10	SARVANI	05	549			22.0362	82.5701	806	A	6.5	0.21	0.5	188	19.53	279	1.3	17.2	34.3	0.5
14	SARVANI	05	226			22.0332	82.5731	801	A	5.9	0.15	0.4	163	16.22	146	1.4	19.8	32.5	0.5
15	SARVANI	05	714/1			22.0352	82.5711	804	A	6.4	0.17	0.5	226	17.38	186	1.7	23.4	39.6	0.7
16	SARVANI	05	390			22.0362	82.5701	810	A	6.6	0.18	0.5	213	18.01	285	2.2	21.2	34.6	0.6
17	SARVANI	05	753/2			22.0342	82.5721	801	A	6.9	0.23	0.3	151	17.11	112	1.4	19.8	35.5	0.4
18	SARVANI	05	818/4			22.0352	82.5731	805	A	6.2	0.24	0.4	226	9.68	112	1.6	20.5	26.5	0.5
8	ASOUNDA	12	731			22.3124	82.65342	840	A	6.4	0.1	0.4	163	4.57	355	1.3	29.4	25.4	1.44
43	ASOUNDA	12	727			22.3012	82.96121	852	A	6.5	0.1	0.6	238	5.56	442	1.0	28.6	24.1	1.02
44	ASOUNDA	12	243			22.33611	82.69611	842	A	6.3	0.16	0.4	163	7.62	463	0.7	24.6	24.8	0.62
45	ASOUNDA	12	332			22.36111	82.63011	839	A	6.4	0.12	0.5	238	4.57	445	1.6	21.3	31.4	1.54
46	ASOUNDA	12	258			22.06300	82.3361	861	A	6.3	0.11	0.5	176	11.38	286	1.1	20.9	24.2	1.32
47	ASOUNDA	12	313			22.03611	82.622	830	A	5.4	0.1	0.5	213	7.62	477	0.9	20.4	24.8	1.26
8	NAVAPARA KHURO	05	796/1	Buddhu ram		22.03911	82.92660	772	A	5.6	0.07	0.5	238	5.47	251	2.1	9.4	48.7	0.82
9	NAVAPARA KHURO	05	778	Avadh ram		22.03922	82.92221	762	A	5.6	0.07	0.6	251	2.87	337	2.3	27.8	60.0	0.52
10	NAVAPARA KHURO	05	767	Chamer singh		22.03611	82.92267	780	A	6.7	0.28	0.5	238	10.04	219	2.4	6.3	39.9	0.78
11	NAVAPARA KHURO	05	791	Alag das		22.03555	82.92221	790	A	5.8	0.09	0.6	301	8.60	237	1.1	11.7	43.7	0.68
12	NAVAPARA KHURO	05	574/3	Avadh ram		22.03621	82.92612	795	A	6.3	0.1	0.5	213	6.36	240	2.4	11.7	49.4	0.74
13	NAVAPARA KHURO	05	560	Bedram		22.03267	82.92500	785	A	5.7	0.14	0.6	289	8.33	346	2.4	31.9	61.7	0.50
14	NAVAPARA KHURO	05	535	Raghuvver singh		22.0328	82.92201	789	A	5.8	0.06	0.5	201	10.93	231	1.1	7.9	42.4	0.68
15	NAVAPARA KHURO	05	346	Puniram		22.0327	82.92237	795	A	5.7	0.11	0.6	389	3.85	318	2.1	26.9	47.5	0.42
16	NAVAPARA KHURO	05	101	Sabad das		22.03212	82.92811	785	A	6.3	0.11	0.5	213	6.63	232	1.0	8.5	41.0	0.80
17	NAVAPARA KHURO	05	614	Bishnu ram		22.03612	82.92521	795	A	5.6	0.09	##	151	3.94	310.8	2.60	17.24	41.7	0.92
18	NAVAPARA KHURO	05	330/3	Haniph		22.03361	82.92341	798	A	6.2	0.12	##	125	18.10	359.408	1.46	25.98	36.94	0.74

19	NAVAPARA KHURO	05	643	Sabad das			22.03611	82.92421	799	A	5.9	0.11	##	289	3.94	355.488	2.32	33.52	40.8	0.62
20	NAVAPARA KHURO	05	503	Puniram			22.03601	82.92421	799	A	7.2	0.18	0.4	163	7.17	267	1.9	7.8	45.5	0.76
21	NAVAPARA KHURO	05	671	Shukvara bai			22.03211	82.92361	795	A	5.7	0.06	0.5	188	12.90	312	2.8	33.7	70.0	0.52
22	NAVAPARA KHURO	05	316.319	Uhadu ram			22.03411	82.92621	799	A	5.7	0.08	0.5	263	8.78	235	2.1	10.2	48.2	0.72
6	JOGARA	6	269				22.0470	82.5822	870	A	6.1	0.15	0.5	201	7.53	256	1.4	37.0	54.9	0.34
14	JOGARA	6	153				22.0541	82.5827	871	A	6.48	0.1	0.4	138	7.97	153	1.2	33.7	53.1	0.30
15	JOGARA	6	211				22.0531	82.5827	865	A	6.4	0.14	0.6	276	11.92	186	2.0	36.1	47.2	0.24
16	JOGARA	6	176				22.0516	82.5842	858	A	6.6	0.17	0.6	251	10.48	172	2.0	35.1	51.2	0.10
17	JOGARA	6	344				22.0526	82.5832	851	A	6.3	0.17	0.6	364	5.20	206	1.6	27.7	53.2	0.24
18	JOGARA	6	432				22.0541	82.5817	859	A	6.7	0.19	0.4	176	6.45	185	1.3	27.7	53.0	0.28
19	JOGARA	6	494				22.0551	82.5807	865	A	6.4	0.17	0.3	163	8.15	213	0.9	38.4	43.0	0.40
20	JOGARA	6	361				22.0555	82.5801	868	A	6.7	0.1	0.5	188	12.54	224	0.8	34.4	45.7	0.28
23	JOGARA	6	376				22.0444	82.5804	866	A	6.2	0.11	0.6	213	7.71	175	2.0	37.1	47.2	0.30
38	JOGARA	6	519				22.0551	82.5807	867	A	6.9	0.19	0.5	238	9.95	177	0.8	35.1	25.8	0.34
39	JOGARA	6	505				22.0531	82.5827	871	A	7.2	0.21	0.4	163	5.56	190	1.1	36.7	24.0	0.24
40	JOGARA	6	497				22.0521	82.5817	869	A	6.8	0.14	0.5	201	12.90	294	1.1	40.8	21.5	0.24
41	JOGARA	6	530				22.0501	82.5837	871	A	5.5	0.12	0.5	176	17.74	296	0.9	21.3	32.1	0.24
42	JOGARA	6	540				22.05499	82.5847	863	A	6.9	0.25	0.5	276	4.48	232	1.1	29.5	20.0	0.24
12	PUTEY KALA	3	582				22.1254	82.5746	892	A	5.4	0.09	0.6	326	14.34	200	0.8	18.6	53.1	0.4
27	PUTEY KALA	3	72				22.0461	82.5759	899	A	6.4	0.07	0.6	251	9.23	289	2.0	11.8	49.7	0.3
28	PUTEY KALA	3	27/4				22.0483	82.5792	915	A	6.9	0.17	0.6	188	8.06	256	0.9	5.7	37.7	0.3
29	PUTEY KALA	3	29				22.0478	82.5736	918	A	6.0	0.05	0.4	151	12.36	317	2.1	8.4	47.3	0.4
30	PUTEY KALA	3	12				22.0469	82.5782	918	A	5.9	0.11	0.4	138	15.77	281	2.0	8.4	43.2	0.1
31	PUTEY KALA	3	6				22.047	82.5775	921	A	5.9	0.12	0.5	201	14.52	284	1.1	8.3	21.4	0.1
1	AAMAPALI	4	25				22.0426	82.5688	808	V	7.1	0.18	0.61	289	10.1248	360.304	1.78	17.48	14.66	0.62
2	AAMAPALI	4	751				22.0466	82.5690	810	V	7.6	0.23	##	163	11.0208	393.792	2.76	11.3	32.28	0.76
3	AAMAPALI	4	49				22.0451	82.5613	809	V	6.8	0.23	##	188	8.6912	311.696	1.12	20.52	27.1	0.84
4	AAMAPALI	4	266				22.0486	82.5678	815	V	6.7	0.17	##	226	5.2884	334.544	2.42	28.7	32.6	1.00
5	AAMAPALI	4	121/2				22.0476	82.5668	819	V	7.5	0.32	##	251	9.1392	431.76	1.22	11.08	33.4	0.88
6	AAMAPALI	4	89				22.0461	82.5685	820	V	7.2	0.21	##	301	13.7088	401.296	1.5	12.64	27.92	0.82

7	AAAPALI	4	258					22.04.51	82.56.95	810	V	6.9	0.20	0.57	226	5.1968	383.936	222	16.14	24.96	0.50
8	AAAPALI	4	177					22.04.62	82.56.86	808	V	7.3	0.16	0.51	163	7.4368	440.72	158	16.9	29.7	0.84
9	AAAPALI	4	445					22.04.42	82.56.87	803	V	7.7	0.24	0.61	238	5.9136	453.6	188	13.08	42.58	0.84
10	AAAPALI	4	54413					22.04.52	82.56.77	807	V	7.5	0.26	##	151	8.7808	477.568	2.3	11.3	44.44	1.14
11	AAAPALI	4	421					22.04.62	82.56.57	817	V	7.2	0.21	##	263	7.5264	336.12	2.88	6.24	27.1	0.86
12	AAAPALI	4	500					22.04.53	82.56.78	816	V	6.8	0.16	0.51	176	9.1392	347.312	1.06	15.02	29.06	0.68
2	JAJANG	05	1524					22.07421N	82.92160E	840	A	6.5	0.11	0.4	151	4.93	314	0.8	21.5	37.8	0.66
5	JAJANG	05	1629/5					22.07220N	82.92136E	870	A	6	0.17	0.6	188	9.32	340	1.3	21.1	20.0	0.46
6	JAJANG	05	1483/1					22.01129N	82.92167E	867	A	6.0	0.16	0.4	138	10.75	352	0.7	39.6	32.0	1.38
7	JAJANG	05	1472/					22.07162N	82.9220E	832	A	5.7	0.09	0.4	163	9.68	335	2.2	23.2	21.8	0.50
8	JAJANG	05	309/1					22.07210N	82.92167E	842	A	5.9	0.08	0.5	213	12.19	326	2.0	20.2	21.3	0.62
11	JAJANG	05	115					22.07140N	82.92140E	842	A	5.9	0.12	0.6	263	7.97	331	0.5	29.1	20.2	0.50
12	JAJANG	05	100					22.07160N	82.92130E	834	A	5.9	0.11	0.5	151	4.57	308	1.8	21.3	22.9	0.54
13	JAJANG	05	23/3					22.07167N	82.9220E	840	A	5.9	0.11	0.6	176	7.17	309	2.0	21.5	20.2	0.56
14	JAJANG	05	8/9					22.07220N	82.92160E	830	A	6	0.14	0.6	226	14.16	405	0.8	33.9	20.3	1.30
15	JAJANG	05	44/1					22.0715N	82.9220E	825	A	6.1	0.13	0.6	188	7.08	334	1.9	21.4	23.8	0.56
16	JAJANG	05	68/1					22.0725N	82.92220E	829	A	6.2	0.1	0.3	138	7.35	272	1.8	21.2	20.2	0.44
17	JAJANG	05	79					22.0721N	82.92212E	830	A	6.2	0.18	0.5	188	9.86	295	0.2	21.5	30.4	0.44
18	JAJANG	05	145					22.07122N	82.92111E	820	A	6	0.08	0.4	176	8.06	285	0.2	21.7	20.2	0.46
19	JAJANG	05	185					22.07198N	82.92000E	812	A	5.9	0.06	0.5	201	6.99	353	0.8	24.3	28.4	0.50
20	JAJANG	05	201					22.07191N	82.92018E	899	A	6	0.11	0.6	326	4.21	386	2.2	20.6	22.2	0.72
21	JAJANG	05	252					22.07400N	82.94336E	841	A	6.3	0.11	0.6	401	9.50	357	1.1	33.4	24.9	1.30
22	JAJANG	05	239					22.07426N	82.94300E	836	A	5.9	0.15	0.5	263	2.78	372	0.7	29.7	26.2	1.16
24	JAJANG	05	453/2					22.07432N	82.94437E	821	A	6	0.19	0.4	176	10.30	251	1.0	25.4	34.3	0.70
25	JAJANG	05	480					22.07422N	82.94267E	819	A	6.5	0.19	0.5	251	8.87	331	1.1	32.1	21.0	1.24
26	JAJANG	05	426/1					22.07440N	82.94372E	803	A	5.9	0.16	0.3	176	12.28	384	1.1	35.7	48.0	1.26
28	JAJANG	05	370					22.07399N	82.94361E	847	A	6.6	0.13	0.5	213	12.99	382	1.7	32.3	40.0	1.34
31	JAJANG	05	642					22.07440N	82.9241E	846	A	6	0.15	0.6	201	11.56	353	0.9	32.4	21.7	1.26
32	JAJANG	05	612					22.07425N	82.92467E	837	A	6	0.1	0.5	201	12.10	378	0.6	31.2	34.7	1.24
35	JAJANG	05	1749					22.07357N	82.92631E	858	A	6.1	0.12	0.4	151	8.33	281	0.4	37.6	20.2	0.44

36	JAJANG	05	1733/1			22.07260N	82.92120E	842	A	6.0	0.23	0.5	176	12.45	424	1.0	36.2	49.0	120
41	JAJANG	05	1214			22.05272N	82.92751E	827	A	6.2	0.18	0.6	201	5.64	446	1.3	30.8	41.7	0.64
43	JAJANG	05	1581			22.07363N	82.92101	820	A	6.5	0.12	0.4	188	12.81	380	1.1	30.6	39.0	1.30
44	JAJANG	05	1689			22.07522	82.92131	809	A	6.5	0.12	0.3	138	11.74	386	1.6	37.0	46.7	1.30
53	JAJANG	05	935			22.09366N	82.9261E	830	A	6.0	0.17	0.7	439	10.12	494	0.9	29.9	48.6	0.58
57	JAJANG	05	1907			22.09211N	82.9221E	860	A	6.7	0.16	0.6	389	11.38	327	0.7	21.8	211	0.50
61	JAJANG	05	848/1-2			22.07361N	82.9261E	840	A	6.2	0.19	0.5	289	7.17	373	1.1	30.0	41.2	1.22
62	JAJANG	05	1974			22.07420N	82.92260E	850	A	6.8	0.10	0.6	276	6.99	286	1.1	23.0	24.8	0.60
63	JAJANG	05	2012			22.07417	82.9211E	815	A	6.4	0.10	0.5	238	7.97	308	1.5	22.6	31.9	0.68
65	JAJANG	05	9122			22.07598	82.92130E	816	A	6.7	0.18	0.6	213	7.08	325	0.9	30.4	24.3	0.60
66	JAJANG	05	1992			22.0758	82.92215E	814	A	6.8	0.12	0.5	201	8.06	420	1.3	34.3	47.4	1.36
67	JAJANG	05				22.07621	82.9134E	822	A	6.7	0.13	0.6	276	7.0784	279.552	1.12	33.08	43.7	1.16
1	BASIN PARA	02	19			22.08958N	82.49174E	976	A	5.7	0.06	0.3	100	7.62	291	10.6	34.8	11.0	1.5
2	BASIN PARA	02	79			22.08456N	82.49556	988	A	6.1	0.10	0.4	125	7.17	387	2.2	33.4	8.9	0.7
3	BASIN PARA	02	57			22.0899N	82.49279	981	A	5.5	0.06	0.4	113	4.30	256	8.3	481	16.4	0.6
4	BASIN PARA	02	42			22.08478N	82.49672E	987	A	5.8	0.06	0.4	138	5.38	322	6.5	40.6	17.3	1.2
11	JUGDALLA	04	424			22.05849N	82.56123E	812	A	5.4	0.05	0.6	201	5.11	264	1.3	7.4	30.1	0.38
12	JUGDALLA	04	410			22.05780N	82.55349E	823	A	5.8	0.15	0.6	226	6.18	259	1.0	11.3	29.2	0.48
13	JUGDALLA	04	447			22.05670N	82.55456E	824	A	6.6	0.16	0.5	188	9.68	267	1.1	101	33.6	0.26
14	JUGDALLA	04	444			22.05937N	82.55655	815	A	6.4	0.19	0.5	151	12.81	253	1.1	8.1	22.0	1.30
5	SUNDARELI	01	93/1			22.05360	83.43499	863	A	5.7	0.11	0.5	251	3.67	159	0.9	34.0	20.6	0.68
9	SUNDARELI	01	65	Helram	Puari lai	22.05373	83.45139	862	A	5.8	0.13	0.4	176	2.51	201	1.0	35.7	26.0	0.24
10	SUNDARELI	01	60/1	Chhedulal	Mahetar	22.04789	83.95928	872	A	5.6	0.14	0.4	163	2.51	215	0.8	36.4	14.3	0.46
11	SUNDARELI	01	48/1	Moharsay	Kodha ram	22.04792	83.95912	877	A	5.4	0.09	0.5	301	2.15	326	1.1	39.4	23.0	1.50
12	SUNDARELI	01	56	Budharam	Anand ram	22.04811	83.95899	875	A	5.6	0.1	0.4	213	3.14	156	1.3	33.4	19.2	1.08
13	SUNDARELI	01	420/1	Panch ram	Dhani ram	22.04803	83.95893	870	A	5.7	0.03	0.4	188	2.69	128	0.8	26.8	4.7	0.66
17	SUNDARELI	01	28/2	Jwahar lai	Puna ram	22.04859	83.95801	867	A	5.6	0.1	0.6	251	8.96	139	1.3	25.3	27.0	0.24
18	SUNDARELI	01	22			22.04843	83.95821	869	A	5.5	0.07	0.5	163	4.03	185	0.9	28.6	23.1	0.46
19	SUNDARELI	01	431	Aajuram	Dayaram	22.04897	83.45781	863	A	5.6	0.15	0.6	226	15.5	492.8	2.54	33.3	56.0	0.78
20	SUNDARELI	01	413	Pitar bai	Dhirpal	22.04973	83.45803	863	A	5.6	0.20	0.6	251	6.9	485.408	2.3	29.7	57.6	0.84

21	SUNDARELI	01	468	Hetram	Pyari Lal	22.04.989	83.45.783	861	A	6.0	0.11	0.5	176	12.3	369.376	3.12	20.5	61.3	1.00
22	SUNDARELI	01	401	Narayan	Baiga ranat	22.04.982	83.45.801	865	A	6.2	0.16	0.4	138	12.7	466.816	3.18	8.4	41.3	1.12
23	SUNDARELI	01	477	Sumitra bai	Samme singh	22.04.971	83.45.829	861	A	6.2	0.10	0.6	213	7.4	416.752	2.28	16.0	55.5	0.72
24	SUNDARELI	01	482	Tiratha ram	Bineesay	22.04.978	83.45.823	863	A	5.5	0.08	0.6	263	7.9	324.888	3.86	25.2	48.6	1.34
25	SUNDARELI	01	459	Hetram	Pyari Lal	22.04.987	83.45.814	861	A	5.8	0.12	0.5	213	12.4	374.08	2.2	15.2	57.0	0.74
26	SUNDARELI	01	496/1	Purusottam	Manharan	22.04.591	83.45.801	863	A	6.3	0.13	0.5	176	15.4	406.224	2.64	11.1	60.8	0.86
27	SUNDARELI	01	395	Udal	Budgaa	22.04.974	83.45.811	876	A	5.8	0.09	0.6	301	13.3	485.968	2.9	12.3	57.8	1.18
28	SUNDARELI	01	360	Mohan	Ram singh	22.05.366	83.45.649	863	A	5.4	0.09	0.54	201	12.1856	466.816	2.28	11.28	50	0.90
8	JUGDALI	07	10			22.04980N	83.55.345	806	A	6.5	0.19	0.5	163	13.17	502	3.4	8.4	21.9	0.86
9	JUGDALI	07	12			22.05389N	83.55706E	813	A	5.4	0.07	0.6	238	7.97	408	2.7	7.1	23.7	0.72
10	JUGDALI	07	159			22.05678N	83.55936E	798	A	6.1	0.11	0.4	201	8.24	397	3.1	5.9	39.1	0.64
11	JUGDALI	07	143			22.05043N	83.54986E	805	A	6.6	0.16	0.3	188	7.35	370	2.0	4.9	39.2	0.88
12	JUGDALI	07	189			22.05536N	83.55450E	802	A	6.7	0.21	0.3	151	9.95	349	2.3	5.3	41.1	0.70
13	JUGDALI	07	331			22.05539N	83.55456E	803	A	6.3	0.16	0.5	201	5.47	383	2.6	6.5	40.8	0.84
14	JUGDALI	07	392			22.05294N	83.55265E	799	A	6.6	0.16	0.5	188	8.60	320	2.5	5.4	36.9	0.66
15	AMALDIH	06	235			22.03055N	83.01085E	803	A	5.5	0.06	0.3	138	10.57	232	1.1	37.5	38.0	0.64
19	AMALDIH	06	253			22.02762N	83.02124E	914	A	5.4	0.03	0.5	201	12.28	189	1.2	36.1	38.3	0.50
23	AMALDIH	06	552			22.03178N	83.01023E	918	A	5.5	0.03	0.3	151	5.73	191	1.4	26.2	20.7	0.48
24	AMALDIH	06	402			22.02769N	83.01896E	925	A	5.6	0.07	0.4	188	8.69	205	0.9	37.6	28.3	0.42
25	AMALDIH	06	594/2			22.02986N	83.02765E	924	A	5.8	0.06	0.4	151	11.1	139	1.3	35.9	31.1	0.78
26	AMALDIH	06	597			22.02964N	83.01685E	922	A	5.7	0.06	0.5	201	11.74	115	1.1	39.5	31.8	0.72
27	AMALDIH	06	606			22.03016N	83.0465E	926	A	6.2	0.07	0.4	226	13.17	128	1.5	26.3	33.7	0.40
28	AMALDIH	06	577			22.03236N	83.01206E	915	A	5.5	0.06	0.6	138	9.50	121	0.9	30.3	30.5	0.58
29	AMALDIH	06	561			22.03128N	83.01257E	920	A	5.4	0.06	0.6	263	12.36	123	1.7	37.2	29.1	0.56
30	AMALDIH	06	571			22.03099N	83.01107E	929	A	5.6	0.06	0.5	163	5.47	200	0.8	38.7	31.7	0.50
6	MASANIYA KALA	06	617	Maakulal	Deveharan	22.03972	82.01279	958	A	6.5	0.14	0.6	213	10.04	319	3.5	33.4	24.6	0.98
9	MASANIYA KALA	06	35	Jugdesh Prasad	Ramfal	22.03999	82.00269	929	A	6.3	0.11	0.3	151	16.04	247	5.2	23.6	18.5	0.86
10	MASANIYA KALA	06	38	Shobha ram	Bhokla goud	22.03938	82.00251	935	A	6.5	0.2	0.2	138	11.02	337	5.1	28.0	25.6	1.44
16	MASANIYA KALA	06	428	N.K. Verma	Bhawani Lal Verma	22.03947	82.00179	258	A	5.6	0.08	0.4	213	8.33	249	6.2	37.4	20.5	0.60
37	MASANIYA KALA	06	740	Ghashnin bai	Ret ram	22.03919	82.59914	253	A	5.7	0.15	0.5	238	11.38	432	4.2	24.4	15.8	0.36

38	MASANIYA KALA	06	817		Makardhwaj	Bhuneshwar	22.03918	82.59916	254	A	5.7	0.09	0.5	188	12.36	241	2.5	26.2	5.6	1.40
39	MASANIYA KALA	06	847		Bhairavram	Mukut ram	22.03915	82.59918	254	A	6.6	0.16	0.4	151	17.47	380	1.1	8.6	9.7	0.94
1	DHOLNARA	04	14/3				22.07198N	82.92620E	864	A	5.5	0.07	0.3	125	9.05	230	0.9	6.5	66.5	2.0
2	DHOLNARA	04	37				22.07198N	82.9220E	867	A	5.5	0.06	0.3	100	7.08	220	0.3	10.7	55.6	1.3
3	DHOLNARA	04	51				22.07200N	82.92142E	860	A	5.3	0.08	0.3	151	7.08	274	0.8	5.6	55.6	0.7
4	DHOLNARA	04	67				22.07230N	82.92145E	862	A	5.4	0.06	0.5	188	7.53	250	1.5	8.0	60.2	1.7
5	DHOLNARA	04	115				22.0720N	82.9221E	858	A	5.6	0.09	0.6	213	12.63	259	0.8	6.9	53.6	0.6
6	DHOLNARA	04	163				22.07420N	82.92421E	862	A	5.6	0.06	0.3	113	4.39	286	0.4	7.8	50.7	1.3
7	DHOLNARA	04	136/1				22.07222N	82.92321E	868	A	5.5	0.05	0.4	163	4.93	208	0.7	4.8	45.3	1.6
8	DHOLNARA	04	171				22.07322N	82.9241E	872	A	5.7	0.06	0.5	251	8.96	220	0.8	4.3	44.4	1.3
9	DHOLNARA	04	172/3				22.0741N	82.9231E	875	A	5.4	0.07	0.4	163	4.48	297	0.7	5.3	63.8	1.1
10	DHOLNARA	04	224				22.07369N	82.9242E	865	A	5.5	0.04	0.2	100	7.71	319	0.9	6.8	55.3	0.9
	DHOLNARA						22.07452N	82.92534E	854	A	5.7	0.08	0.6	326	3.67	238	0.4	4.8	38.2	1.1
2	UPKA CHUVA	02	27				22.06849	82.53250	892	A	6.2	0.15	0.5	263	8.42	159	8.0	44.8	12.9	1.30
3	UPKA CHUVA	02	41				22.06859	82.53623	891	A	6.3	0.16	0.6	276	16.8	199	5.5	48.6	19.9	0.98
4	UPKA CHUVA	02	209/1				22.06863	82.53622	812	A	5.8	0.10	0.2	138	4.7	178	6.0	61.7	11.1	0.70
5	UPKA CHUVA	02	48				22.06802	82.53619	894	A	5.6	0.09	0.2	151	11.0	291	6.0	57.3	12.7	1.48
6	UPKA CHUVA	02	250				22.06802	82.53602	892	A	5.7	0.10	0.2	100	17.0	294	4.7	37.9	16.4	1.42
7	UPKA CHUVA	02	227				22.06792	82.53628	892	A	6.1	0.10	0.3	138	12.4	301	6.9	35.3	13.4	1.00
8	UPKA CHUVA	02	234				22.06811	82.5359N	892	A	6.6	0.14	0.2	125	3.23	194	5.7	37.1	16.7	1.18
9	UPKA CHUVA	02	112				22.06795	82.53627	196	A	5.6	0.08	0.4	163	9.68	130	4.0	40.0	7.0	1.74
5	BHURSIDIH	15					82.86955	22.02169	791	A	5.7	0.08	0.4	188	7.53	294	1.8	26.4	39.6	0.74
6	BHURSIDIH	15					82.86937	22.02033	792	A	5.4	0.07	0.3	138	6.63	463	1.5	18.8	39.9	0.54
7	BHURSIDIH	15					82.86987	22.02548	769	A	5.6	0.05	0.4	125	7.62	119	2.0	36.2	51.6	0.78
8	BHURSIDIH	15					82.86542	22.0224	782	A	5.4	0.04	0.5	201	9.50	460	1.8	15.6	53.5	0.54
9	BHURSIDIH	15					82.86321	22.02132	765	A	5.6	0.08	0.4	188	8.33	380	2.3	49.0	48.4	0.92
10	BHURSIDIH	15					82.86281	22.02584	789	A	5.8	0.05	0.2	113	8.42	242	0.9	10.4	33.2	0.80
11	BHURSIDIH	15					82.86325	22.02431	782	A	6.1	0.12	0.2	125	15.59	182	2.7	5.7	27.7	0.44
5	GHARIN MUDA	02	119				22.07567N	82.52234E	998	A	6.4	0.11	0.6	276	2.87	421	0.9	42.2	32.4	1.06
6	GHARIN MUDA	02	145				22.07459N	82.51764E	977	A	5.9	0.12	0.6	364	4.57	465	1.4	46.0	30.4	1.18

7	GHARIN MUDA	02	222				22.06843N	82.51836E	973	A	5.5	0.13	0.4	163	12.19	481	1.0	46.0	37.2	1.26
8	GHARIN MUDA	02	168				22.069870N	82.51224E	993	A	5.4	0.11	0.3	151	13.71	444	1.2	37.6	30.3	1.20
9	GHARIN MUDA	02	254				22.07945N	82.52049E	986	A	5.6	0.14	0.4	163	3.67	472	0.9	38.7	40.6	1.34
1	BUDANPUR	02	211	Chamar singh			22.06673N	82.5033E	899	A	6	0.09	0.5	276	4.30	606	1.6	30.8	40.0	1.00
2	BUDANPUR	02	224				22.0673N	82.5043E	925	A	6.1	0.11	0.3	201	4.66	472	0.6	26.9	37.6	1.56
3	BUDANPUR	02	234	Bimla bai		Munaram Patel	22.0665N	82.5014E	905	A	5.9	0.08	0.3	163	4.93	594	1.0	18.6	59.0	0.82
4	BUDANPUR	02	242	Kamlesh kumar		Dhananjay Kumar	22.0679N	82.5035E	875	A	6	0.09	0.4	188	5.56	480	0.7	37.9	57.5	0.88
5	BUDANPUR	02	10	Bensidhar		Bodhram	22.0683N	82.5063E	866	A	6.1	0.1	0.4	201	4.93	446	0.9	27.0	44.8	0.98
6	BUDANPUR	02	69				22.0639N	82.5023E	873	A	6.6	0.1	0.2	138	6.72	484	0.7	33.0	55.0	0.90
7	BUDANPUR	02	18	Bhagirathi		Dayal	22.0650N	82.5060E	887	A	6.3	0.1	0.3	163	10.48	450	0.8	27.2	58.5	0.70
8	BUDANPUR	02	63	Chudamani		Dharam singh	22.0663N	82.5030E	880	A	5.9	0.12	0.4	163	5.56	439	0.7	39.8	41.4	0.96
9	BUDANPUR	02	81	Khir bai		Chamar singh	22.0679N	82.5033E	883	A	6.2	0.09	0.4	201	6.18	521	0.8	29.6	45.2	1.78
10	BUDANPUR	02	118				22.0689N	82.5063E	872	A	6.1	0.08	0.4	188	4.03	444	0.7	31.6	47.3	0.80
11	BUDANPUR	02	10016	Bhagirathi		Dayal	22.0639N	82.5070E	865	A	6.2	0.08	0.3	138	4.84	541	0.7	18.3	56.2	0.68
12	BUDANPUR	02	108	Chamar singh		Thandaram Patel	22.0653N	82.5083E	860	A	6.1	0.1	0.4	151	3.67	440	0.8	36.5	42.9	0.84
13	BUDANPUR	02	154	Nohar singh			22.0693N	82.51906E	861	A	6	0.09	0.3	138	2.24	341	0.7	24.2	44.3	0.30
14	BUDANPUR	02	50				22.0682N	82.5063E	870	A	6.1	0.08	0.5	213	4.84	432	0.7	18.3	56.2	1.00
11	KURDA	03	624				22.0545	82.4988	907	A	6.4	0.12	0.4	188	7.53	419	0.5	24.3	46.3	0.5
12	KURDA	03	653				22.0555	82.4998	902	A	6.7	0.16	0.3	163	12.10	417	0.4	36.5	49.0	0.5
13	KURDA	03	644				22.0545	82.4988	911	A	5.8	0.1	0.4	226	10.39	381	0.9	27.8	42.8	0.4
14	KURDA	03	668				22.0560	82.4973	901	A	5.9	0.17	0.3	201	16.31	453	0.8	33.6	43.5	0.3
15	KURDA	03	660				22.0570	82.4953	900	A	6.3	0.13	0.4	201	9.68	415	1.2	35.1	54.3	1.2
25	KURDA	03	219				22.0580	82.4943	873	A	5.8	0.1	0.3	176	6.99	339	1.2	29.8	56.2	0.7
31	KURDA	03	505				22.05354N	82.49605E	859	A	5.7	0.19	0.4	201	3.85	441	1.4	51.0	51.7	0.3
32	KURDA	03	462				22.05303N	82.49607E	864	A	5.9	0.19	0.3	188	5.73	294	0.5	38.5	21.3	0.2
33	KURDA	03	437				22.05153N	82.49336E	857	A	5.7	0.18	0.4	188	5.82	374	2.0	27.2	41.0	0.1
34	KURDA	03	416				22.05375N	82.49715E	878	A	5.7	0.12	0.4	201	9.77	405	2.0	30.0	53.2	0.6
35	KURDA	03	420				22.05017N	82.4914E	911	A	6.3	0.1	0.5	213	12.10	359	0.5	20.1	36.8	0.1
36	KURDA	03	400				22.05504N	82.49914E	871	A	6.4	0.12	0.4	163	11.38	342	1.3	43.8	23.3	0.1
44	KURDA	03	5/6				22.05388	82.49659	983	A	6.7	0.19	0.3	163	6.63	355	1.0	35.4	51.8	1.2

8	NAVAGAON	02	169		Mangal singh	Guruvaar singh	22.07845N	82.50760E	983	A	5.4	0.07	0.6	276	6.99	376	0.6	30.0	26.7	0.68
9	NAVAGAON	02	238		sadhuram	Shivcharan	22.07626N	82.51442E	982	A	5.5	0.08	0.6	251	16.93	365	0.6	25.7	37.8	0.98
10	NAVAGAON	02	213		Sukhiram		22.07786N	82.50636E	982	A	5.7	0.12	0.5	238	17.20	428	1.2	34.5	35.6	1.16
11	NAVAGAON	02	84		Bhudhar prasad		22.09652N	82.49542E	976	A	5.6	0.08	0.6	276	4.75	444	0.9	28.8	30.0	0.88
9	NAGARDA	03	103				22.0525	82.4937	913	A	6.8	0.22	0.3	138	9.50	358	2.0	7.1	37.0	0.5
10	NAGARDA	03	98				22.0535	82.4922	907	A	5.9	0.19	0.2	163	3.14	420	2.0	10.9	42.3	0.7
11	NAGARDA	03	19				22.0515	82.4942	904	A	5.7	0.12	0.3	213	7.53	402	1.2	8.6	28.5	0.6
12	NAGARDA	03	32				22.0525	82.4932	914	A	6.0	0.13	0.5	226	10.75	398	2.1	9.1	38.5	0.6
13	NAGARDA	03	50				22.0505	82.4952	917	A	6.7	0.18	0.3	188	7.44	421	2.3	13.6	43.1	0.8
14	NAGARDA	03	44/1				22.0520	82.4937	919	A	5.4	0.12	0.4	213	6.18	393	1.7	8.9	35.8	0.6
15	NAGARDA	03	38				22.0530	82.4927	914	A	5.8	0.1	0.4	188	2.78	327	1.5	7.0	36.7	0.7
16	NAGARDA	03	106				22.0530	82.4907	906	A	5.7	0.19	0.5	201	5.47	329	1.4	4.6	32.6	0.7
17	NAGARDA	03	118				22.0540	82.4917	909	A	5.8	0.11	0.5	188	2.87	348	2.4	16.0	38.6	0.4
18	NAGARDA	03	122				22.0530	82.4927	912	A	6.2	0.13	0.3	176	5.11	327	2.5	4.7	35.7	0.9
19	NAGARDA	03	280				22.0545	82.4912	908	A	6.4	0.14	0.3	163	4.30	280	2.0	4.9	31.2	1.3
20	NAGARDA	03	305				22.0525	82.4932	915	A	5.8	0.1	0.4	188	5.56	303	2.3	19.9	39.1	0.8
21	NAGARDA	03	329				22.0535	82.4922	917	A	5.6	0.2	0.4	163	3.94	324	2.4	4.0	24.0	0.5
22	NAGARDA	03	141				22.0545	82.4912	912	A	5.5	0.16	0.3	151	4.30	314	2.2	12.9	25.1	0.7
23	NAGARDA	03	147				22.0525	82.4932	907	A	5.7	0.18	0.4	176	4.93	285	0.4	24.4	31.4	0.8
24	NAGARDA	03	360				22.0540	82.4917	913	A	5.9	0.18	0.4	201	5.56	317	1.9	5.2	36.4	0.7
71	NAGARDA	03	184				22.0538	82.4277	902	A	6.9	0.22	0.6	276	9.14	182	2.1	25.8	34.9	0.8
72	NAGARDA	03	176/1				22.0533	82.4279	904	A	5.6	0.09	0.6	314	10.48	254	2.4	29.2	34.5	0.6
73	NAGARDA	03	170				22.0538	82.4275	908	A	5.8	0.17	0.3	163	12.54	193	2.9	26.3	35.4	0.3
74	NAGARDA	03	173				22.0583	82.4219	902	A	6.3	0.14	0.4	188	9.68	205	2.1	32.9	32.1	0.7
75	NAGARDA	03	1				22.0537	82.4293	906	A	5.8	0.12	0.5	201	8.60	178	2.2	30.0	32.0	1.3
1	CHINDMUDA	02	23				22.06974	82.52056	992	A	6.2	0.11	0.6	238	3.32	137.872	1.1	24.1	18.2	0.6
2	CHINDMUDA	02	45/3				22.06878N	82.52186E	980	A	6.2	0.10	0.7	401	5.73	150.752	1.0	25.4	15.0	0.7
3	CHINDMUDA	02	59				22.06747N	82.52234E	990	A	6.2	0.09	0.6	389	5.73	104.944	1.6	22.0	36.2	0.6
4	CHINDMUDA	02	263				22.06425N	82.52346E	980	A	6.0	0.16	0.6	314	6.45	113.344	1.6	32.2	27.6	0.8
5	CHINDMUDA	02	36/1				22.06545N	82.51847E	981	A	6.3	0.18	0.6	251	6.63	162.176	2.8	14.5	20.8	0.8

6	CHINDMUDA	02	74				22.06328N	82.52648E	993	A	5.8	0.17	0.5	188	1.61	148.848	1.9	31.6	28.5	0.7
7	CHINDMUDA	02	83				22.06976N	82.51468E	987	A	5.8	0.15	0.6	263	7.71	158.48	1.9	17.3	39.2	0.7
8	CHINDMUDA	02	233/2				22.05948N	82.52849E	987	A	6.3	0.13	0.5	201	5.56	172.256	0.7	14.3	32.5	0.5
9	CHINDMUDA	02	250				22.07234N	82.52849E	994	A	5.8	0.1	0.5	163	8.42	281	1.1	28.5	50.7	0.8
10	CHINDMUDA	02	18/2				22.07231N	82.51846E	996	A	6.5	0.12	0.5	151	9.50	317	1.0	16.6	25.3	0.6
11	CHINDMUDA	02	229				22.07457N	82.52276E	981	A	5.6	0.04	0.6	213	6.90	219	0.8	35.6	53.0	0.8
12	CHINDMUDA	02	133				22.06167N	82.52967E	983	A	5.7	0.08	0.6	276	6.09	262	1.6	26.9	48.1	0.9
13	CHINDMUDA	02	157				22.07146N	82.53846E	970	A	5.6	0.06	0.5	188	8.24	313	0.8	25.7	50.0	0.9
14	CHINDMUDA	02	307/2				22.05978N	82.52559E	977	A	5.5	0.07	0.5	263	4.93	229	0.6	35.0	49.5	1.0
1	GUOWA	02	8				22.07401	83.49611	935	A	6.8	0.34	0.5	238	10.39	501	2.1	7.1	28.2	0.80
2	GUOWA	02	52				22.07392	83.49602	932	A	5.63	0.2	0.6	326	1.25	494	0.6	9.7	24.5	0.92
3	GUOWA	02	72/1				22.0761N	83.4842E	889	A	5.7	0.13	0.5	176	5.56	377	0.3	7.2	20.2	0.72
4	GUOWA	02	254				22.0765N	83.4839	878	A	5.6	0.2	0.6	201	5.29	448	2.2	9.6	22.0	0.90
5	GUOWA	02	106/4				22.0733N	83.4843E	892	A	6.9	0.23	0.5	201	4.84	445	2.1	25.7	31.5	0.72
6	GUOWA	02	222/1				22.0752N	83.4839E	903	A	5.81	0.14	0.6	251	6.36	439	0.5	6.6	26.0	1.06
7	GUOWA	02	150				22.0760N	83.4807E	952	A	7.1	0.3	0.6	444	9.50	399	0.8	7.6	41.9	0.60
8	GUOWA	02	216/1				22.0763N	83.4835E	932	A	6.9	0.23	0.6	376	5.38	442	0.6	9.7	22.3	0.76
9	GUOWA	02	762				22.0742N	83.4873E	935	A	5.8	0.12	0.5	276	9.68	409	0.6	9.9	36.3	0.64
10	GUOWA	02	205				22.0739N	83.4863E	945	A	5.7	0.16	0.5	238	5.29	411	0.6	6.8	24.8	0.76
11	GUOWA	02	179/2				22.07378	83.49632	934	A	5.9	0.15	0.6	213	6.45	257	1.3	15.5	37.1	0.86
12	GUOWA	02	200/2				22.07372	83.49531	939	A	5.8	0.13	0.5	176	7.44	274	1.1	53.6	21.0	0.70
13	GUOWA	02	273/1				22.07369	83.49487	934	A	6.8	0.2	0.4	151	5.73	311	1.1	57.5	20.8	0.92
14	GUOWA	02	268/2				22.07309	83.49589	937	A	5.7	0.17	0.5	176	10.66	363	1.0	52.5	36.9	0.92
15	GUOWA	02	261/13				22.07301	83.49597	938	A	5.8	0.19	0.6	276	4.93	417	1.1	12.9	32.4	0.70
16	GUOWA	02	290/2				22.07298	83.48687	939	A	6.6	0.17	0.6	251	7.35	422	1.1	16.6	20.0	0.90
17	GUOWA	02	317/2				22.07283	83.48683	934	A	5.7	0.26	0.6	238	7.35	309	1.6	49.6	32.7	0.58
18	GUOWA	02	336/1				22.07283	83.48691	939	A	5.64	0.19	0.5	176	6.09	398	1.1	43.7	23.0	0.64
19	GUOWA	02	323				22.07279	83.48696	935	A	5.4	0.06	0.5	176	5.11	436	1.0	6.5	37.2	0.84
1	JUNWANI	03	176				22.09821N	82.91121E	856	A	6.8	0.26	0.6	263	6.63	275	4.7	9.3	12.0	0.96
2	JUNWANI	03	151				22.09322N	82.92211E	840	A	6.9	0.28	0.3	125	6.54	179	8.6	4.2	14.4	0.84

3	JUNWANI	03	141/1			22.09524N	82.9211E	850	A	7.2	0.32	0.4	151	148.7	140	5.1	5.2	12.7	0.46
4	JUNWANI	03	107			22.09811N	82.9212E	860	A	7.1	0.24	0.6	213	7.80	142	6.9	5.2	6.9	1.52
5	JUNWANI	03	213			22.09812N	82.9112	860	A	6.9	0.17	0.4	163	5.47	246	7.1	6.9	6.6	1.60
6	JUNWANI	03	230			22.09611N	82.9212	862	A	7.2	0.29	0.3	188	8.42	292	9.8	5.8	13.4	1.40
7	JUNWANI	03	85			22.09521N	82.9611	853	A	7.2	0.25	0.4	276	6.63	180	6.6	9.5	16.0	0.54
8	JUNWANI	03	271			22.09311N	82.911	862	A	7.1	0.30	0.4	163	8.06	164	4.7	4.8	20.7	1.58
9	JUNWANI	03	30			22.09211	82.9121	834	A	6.9	0.28	0.3	125	9.32	287	4.2	5.3	14.6	1.34
10	JUNWANI	03	60			22.09621N	82.9421E	840	A	7.2	0.26	0.4	201	6.27	231	3.9	9.5	9.2	1.40
5	GATWA	01	40			22.04621N	82.4587E	833	A	5.7	0.1	0.5	226	3.85	425	1.5	21.5	16.8	0.22
8	GATWA	01	53			22.0449N	82.4539E	837	A	6.2	0.17	0.5	213	10.66	539	1.8	24.8	21.8	0.30
17	GATWA	01	111			22.04205N	82.4590E	818	A	5.9	0.06	0.5	163	6.90	434	1.2	25.8	23.3	0.44
7	TOHILADIH	05	264			22.0362N	82.5542E	813	A	6.4	0.10	0.5	201	6.54	281	2.4	39.8	27.1	1.44
8	TOHILADIH	05	302			22.0358N	82.5533E	798	A	6.5	0.10	0.4	138	9.14	379	4.4	49.1	32.5	1.46
9	TOHILADIH	05	371/1			22.0363N	82.5563E	792	A	6.6	0.18	0.5	163	8.51	432	4.2	55.8	34.5	1.02
10	TOHILADIH	05	429			22.0331	82.5527	808	A	6.6	0.20	0.6	238	5.91	473	1.7	43.7	29.8	1.46
11	TOHILADIH	05	515			22.0339	82.5522	807	A	6.2	0.18	0.4	138	8.87	445	4.6	53.6	30.4	1.16
12	TOHILADIH	05	568			22.0339N	82.5568E	809	A	5.9	0.23	0.5	188	7.53	345	1.8	50.8	30.8	1.20
13	TOHILADIH	05	585			22.0339	82.5533	815	A	6.9	0.15	0.4	125	5.73	312	4.3	46.5	30.6	1.28
14	TOHILADIH	05	523			22.0329	82.5534	815	A	6.7	0.17	0.4	151	11.38	342	6.8	46.8	30.5	1.34
15	TOHILADIH	05	602			22.0324	82.5548	812	A	6.1	0.17	0.4	125	12.01	381	1.1	53.6	32.8	1.10
1	TENOUTOLA	06	26			22.0391N	82.5736E	773	A	7.1	0.13	0.5	213	8.87	314	6.4	25.9	9.1	0.52
2	TENOUTOLA	06	124/2			22.0368N	82.5730E	778	A	6.8	0.19	0.6	289	3.23	298	9.3	30.6	6.7	0.30
3	TENOUTOLA	06	289			22.0383N	82.5769E	763	A	6.9	0.17	0.6	238	3.32	319	2.4	24.2	10.3	0.20
4	TENOUTOLA	06	78			22.0388N	82.5796E	765	A	6.6	0.11	0.6	201	6.36	305	0.6	38.3	14.9	0.56
5	TENOUTOLA	06	281			22.0380N	82.5789E	760	A	6.9	0.21	0.5	163	6.54	343	0.9	24.2	6.0	0.06
6	TENOUTOLA	06	328/2			22.0369N	82.5770E	781	A	6.5	0.19	0.5	201	4.57	308	6.9	29.1	7.9	0.48
7	TENOUTOLA	06	117			22.0365N	82.5780E	783	A	6.7	0.16	0.6	263	7.62	290	2.0	31.6	11.9	0.32
8	TENOUTOLA	06	66			22.0355N	82.5766E	786	A	7.2	0.22	0.5	238	12.28	279	6.9	6.9	8.1	0.06
9	TENOUTOLA	06	90			22.0395N	82.5787E	770	A	6.7	0.16	0.5	188	4.39	333	2.5	24.2	9.3	0.36
10	TENOUTOLA	06	342			22.0358N	82.5770E	782	A	6.6	0.14	0.6	226	2.96	292	1.5	29.0	7.0	0.32

II	TENDOUTOLA	06	94/2-3				22.0369N	82.5780E	771	A	6.6	0.18	0.4	176	8.15	301	7.0	20.3	10.1	0.14
12	TENDOUTOLA	06	111				22.0398N	82.5763E	789	A	6.5	0.16	0.5	188	7.17	213	4.3	25.9	17.2	0.26
13	TENDOUTOLA	06	361				22.0363N	82.5769E	783	A	6.9	0.19	0.5	201	4.66	309	4.6	27.6	9.2	0.16
4	MASANIYA KHURO	06	130/2				22.04345N	82.59842E	994	A	5.8	0.12	##	201	4.93	380.416	2.4	41.7	35.64	0.40
8	MASANIYA KHURO	06	33/1				22.04838N	82.601040E	933	A	5.7	0.08	0.51	201	8.24	516.32	1.82	18.0	46.8	0.84
9	MASANIYA KHURO	06	48				22.04421N	82.59425E	948	A	5.5	0.14	##	151	6.27	502.88	1.2	22.7	55.2	1.14
1	MANIKPUR	02	78				22.0639N	82.4903E	865	A	5.8	0.13	0.3	125	7.08	269	2.7	67.4	40.9	1.30
2	MANIKPUR	02	39				22.0620N	82.4912E	855	A	5.5	0.09	0.2	138	5.20	230	3.2	22.8	42.3	1.70
3	MANIKPUR	02	25				22.0619N	82.4935E	885	A	5.6	0.08	0.4	213	4.75	254	2.6	54.0	48.9	1.46
4	MANIKPUR	02	57				22.0620N	82.4945E	856	A	5.9	0.12	0.3	151	6.36	246	2.6	57.8	49.2	0.08
5	MANIKPUR	02	18/3				22.0632N	82.4935E	843	A	5.4	0.06	0.4	151	6.27	247	2.7	67.3	49.3	1.46
6	MANIKPUR	02	11				22.0615N	82.4983E	843	A	5.5	0.16	0.5	201	9.05	260	3.4	33.3	55.6	1.24
5	BAHERA	01	213				22.06334N	82.46305E	895	A	5.8	0.12	0.4	125	14.60	444	3.7	41.1	39.2	1.50
10	BAHERA	01	378/2				22.06273N	82.46219E	898	A	6.4	0.12	0.5	163	7.26	476	3.4	15.5	27.9	0.86
11	BAHERA	01	176				22.06248N	82.46199E	887	A	5.7	0.14	0.4	138	11.47	422	3.1	38.8	33.6	1.26
16	BAHERA	01	8				22.0685N	82.4643E	860	A	6.5	0.15	0.5	188	10.04	453	3.5	43.4	33.8	1.16
22	BAHERA	01	350				22.0688N	82.4636E	890	A	5.8	0.07	0.4	138	12.01	318	3.7	50.9	29.7	1.02
20	JUDAGA	04	43				22.09320N	82.92430E	875	A	5.4	0.1	0.5	238	3.14	177	0.4	41.0	65.7	1.04
21	JUDAGA	04	286				22.09925N	82.92440E	890	A	6.1	0.11	0.5	251	11.29	214	1.6	38.9	57.5	0.36
22	JUDAGA	04	325				22.09940N	82.92420E	880	A	5.9	0.11	0.5	151	8.33	182	0.5	35.7	34.4	0.60
23	JUDAGA	04	351				22.09890N	82.92440E	892	A	5.4	0.12	0.4	138	6.63	189	0.7	26.3	73.4	0.70
24	JUDAGA	04	468				22.09840N	82.92440E	820	A	5.9	0.1	0.4	201	9.32	264	0.8	48.9	64.4	0.76
25	JUDAGA	04	310				22.09821N	82.92420E	885	A	6.2	0.1	0.5	176	6.81	224	2.1	40.4	48.0	0.66
26	JUDAGA	04	277				22.09841N	82.92400E	875	A	6.3	0.13	0.5	176	3.94	224	0.7	35.5	57.9	0.62
27	JUDAGA	04	21				22.09831N	82.92427E	886	A	6.5	0.11	0.4	163	6.18	232	0.9	33.8	36.2	0.64
28	JUDAGA	04	73				22.09811N	82.92390E	872	A	5.8	0.1	0.6	201	8.06	292	1.2	46.9	45.2	0.64
29	JUDAGA	04	273				22.09856N	82.92290E	856	A	5.5	0.09	0.4	188	13.98	248	0.9	39.9	60.1	0.98
30	JUDAGA	04	627				22.09674N	82.93043E	846	A	5.9	0.1	0.6	226	8.33	240	1.1	53.7	47.8	0.72
31	JUDAGA	04	635				22.09940N	82.92520E	876	A	6.5	0.15	0.4	151	7.08	240	1.1	45.5	62.1	0.70
14	BARPAU KALA	02	549				22.07485	82.5199	890	A	6.2	0.21	0.5	188	11.02	401	1.5	8.06	27.92	0.82

15	BARPALI KALA	02	576						22.07/475	82.51170	880	A	6.3	0.20	0.4	138	2.51	384	2.22	16.14	24.96	0.50
16	BARPALI KALA	02	186/1						22.07/460	82.5186	871	A	6.0	0.16	0.4	163	4.75	440	1.58	9.14	29.7	0.84
17	BARPALI KALA	02	51-52						22.07/445	82.51270	861	A	5.8	0.24	0.5	188	3.23	453	1.88	17.34	42.58	0.84
18	BARPALI KALA	02	206/1						22.07/425	82.51230	860	A	6.3	0.16	0.5	151	6.09	477	2.3	16.22	44.44	1.14
19	BARPALI KALA	02	200						22.07/415	82.51260	850	A	5.9	0.13	0.4	263	4.84	336	2.88	6.24	27.1	0.86
20	BARPALI KALA	02	141/1						22.07/404	82.51248	808	A	6.8	0.15	0.4	176	6.45	347	1.06	15.02	29.06	0.68
21	BARPALI KALA	02	61						22.07/659	82.51286	845	A	5.6	0.09	0.3	138	9.41	327	1.2	6.14	36.72	0.70
22	BARPALI KALA	02	593						22.07/782	82.5168E	914	A	5.7	0.07	0.5	201	3.67	332	2.26	13.66	36.4	0.68
23	BARPALI KALA	02	584						22.07/478	82.51255	815	A	5.7	0.07	0.3	151	4.39	340	1.68	13.96	27.88	0.78
16	JARWE	01	576						22.04/972	82.46593	859	A	5.7	0.11	##	163	19.80	286	3.6	12.9	65.8	0.4
26	JARWE	01	638						22.04/723	82.46498	858	A	6.2	0.14	##	301	16.93	357	3.5	11.5	49.8	0.3
27	JARWE	01	632/2						22.04/732	82.46483	862	A	6.3	0.09	##	401	15.32	258	3.0	6.0	59.5	0.3
28	JARWE	01	568						22.04/731	82.46492	861	A	5.6	0.14	##	201	11.83	249	2.7	7.7	61.5	0.3
33	JARWE	01	499						22.04/582	82.463869	862	A	6.2	0.18	##	201	16.40	382	3.2	6.2	59.9	0.4
36	JARWE	01	263						22.05/063	82.46344	861	A	6.1	0.13	##	138	19.35	355	3.3	6.1	37.3	0.4
43	JARWE	01	57/1						22.05/0623	82.263417	259	A	6	0.18	0.57	301	13.26	271	3.6	11.3	61.5	0.6
44	JARWE	01	103						22.05/0603	82.263429	263	A	6.3	0.13	##	138	15.05	247	2.5	5.7	32.8	0.2
45	JARWE	01	109/1						22.05/063	82.263409	261	A	6.3	0.17	##	151	7.88	170	2.7	22.5	62.7	1.0
46	JARWE	01	181						22.05/42N	82.46714E	892	A	5.9	0.16	##	125	7.08	136	1.6	25.8	67.6	0.4
47	JARWE	01	844						22.05546N	82.46502E	872	A	6	0.09	##	201	4.66	180	2.8	24.2	62.1	0.7
48	JARWE	01	64						22.05394N	82.46513E	861	A	5.4	0.08	##	251	7.35	123	2.6	31.1	51.1	0.6
49	JARWE	01	87						22.05338N	82.46304E	919	A	5.5	0.07	##	213	4.48	183	1.0	36.7	50.0	0.8
62	JARWE	01	616						22.05333N	82.46709E	879	A	6	0.12	##	163	4.93	127	2.2	31.2	60.7	0.8
12	GUGHARA	02	460						22.05403	82.51605	844	A	6.3	0.1	0.2	151	8.51	514	2.0	52.4	40.2	0.62
13	GUGHARA	02	334						22.05445	82.51648	854	A	5.5	0.09	0.6	251	4.03	383	2.1	51.2	35.6	1.42
14	GUGHARA	02	449						22.05651	82.51815	869	A	5.5	0.07	0.5	238	8.33	236	3.7	59.3	52.9	1.22
15	GUGHARA	02	489/2						22.05688	82.51821	869	A	6.4	0.19	0.6	289	8.69	384	4.0	51.0	34.4	1.60
16	GUGHARA	02	362						22.05719	82.51829	868	A	6.7	0.15	0.5	226	10.39	406	1.5	44.8	28.8	1.38
17	GUGHARA	02	551/1						22.05743	82.51854	874	A	5.6	0.08	0.6	251	10.48	270	0.7	67.1	49.4	1.26
18	GUGHARA	02	540						22.05723	82.51873	873	A	5.9	0.13	0.4	138	3.85	263	4.1	49.0	32.7	1.52

19	GOGHARA	02	567				22.05702	82.51904	874	A	5.8	0.07	0.6	251	10.48	473	1.3	41.7	39.7	0.94
20	GOGHARA	02					22.05685	82.51909	875	A	5.9	0.15	0.3	151	5.02	358	1.6	41.6	26.7	1.08
21	GOGHARA	02	543/3				22.05671	82.51888	874	A	5.6	0.11	0.5	188	7.71	433	1.5	42.8	39.9	1.04
22	GOGHARA	02	511				22.05631	82.51886	874	A	6.3	0.16	0.4	176	10.75	383	2.2	55.1	29.0	0.54
23	GOGHARA	02	517/4				22.05607	82.51879	863	A	5.6	0.09	0.2	125	6.00	425	1.3	47.6	31.1	0.94
24	GOGHARA	02	522				22.05344	82.51647	847	A	5.6	0.06	0.5	188	10.57	435	2.0	54.0	50.6	1.22
19	DHANPUR	01	687/1				22.06632N	82.47512E	879	A	6.6	0.1	0.4	201	6.72	377	2.9	45.5	36.9	0.7
20	DHANPUR	01	736				22.06470N	82.47428E	892	A	7.0	0.23	0.6	226	6.18	421	2.2	33.7	27.7	0.7
21	DHANPUR	01	785/1				22.0679N	82.47614E	904	A	6.9	0.18	0.6	326	3.32	355	3.0	46.6	32.6	0.5
22	DHANPUR	01	931				22.06420N	82.47303E	862	A	5.8	0.11	0.6	439	4.66	387	2.9	57.7	33.7	0.5
23	DHANPUR	01	789				22.06340N	82.47295E	889	A	6.5	0.21	0.5	176	6.36	385	2.4	38.5	34.7	0.4
24	DHANPUR	01	152/1				22.06320N	82.47804E	868	A	6.9	0.32	0.5	188	5.91	407	2.9	51.6	32.7	1.1
25	DHANPUR	01	169				22.06370N	82.47264E	891	A	7.2	0.31	0.5	251	5.38	344	2.3	44.5	37.4	0.6
26	DHANPUR	01	348				22.0655N	82.47438E	914	A	6.4	0.15	0.5	188	5.38	480	3.1	68.1	26.8	0.9
27	DHANPUR	01	180/2				22.06725N	82.47829E	815	A	5.9	0.19	0.5	226	5.91	334	1.8	37.2	32.9	0.5
3	KUTHARI TAR	01	30/1				22.06510N	82.47340E	887	A	6.3	0.15	0.6	213	12.10	457	1.4	5.2	20.7	1.2
6	KUTHARI TAR	01	125				22.0635N	82.4756E	889	A	6.4	0.16	0.4	113	5.82	431	1.3	7.7	36.3	1.0
10	KUTHARI TAR	01	211				22.0655N	82.4728E	892	A	6.0	0.16	0.6	263	10.30	480	1.9	12.5	30.7	1.2
20	PATERAPALI KALA	02	162			Goga singh	22.0931N	82.96441E	830	A	5.8	0.09	0.4	213	8.96	257	0.5	14.9	25.1	0.2
21	PATERAPALI KALA	02	128		Natwar	Sankult	22.09300N	82.96321E	840	A	5.9	0.1	0.5	213	8.06	210	1.1	13.4	23.6	1.1
22	PATERAPALI KALA	02	65/3		Santosh	Sahabial	22.0939N	82.96421E	##	A	5.8	0.06	0.4	163	6.72	208	0.6	9.7	38.7	0.3
23	PATERAPALI KALA	02	72		Sarhuram		22.0934N	82.96321E	786	A	5.9	0.08	0.4	151	6.72	209	0.5	12.2	24.7	0.5
24	PATERAPALI KALA	02	95		Parsan		22.09334N	82.96421E	789	A	5.5	0.09	0.3	176	12.63	256	0.9	12.3	31.1	0.6
25	PATERAPALI KALA	02	34				22.09344N	82.96421E	792	A	5.9	0.1	0.5	213	11.47	222	0.8	13.5	22.4	0.2
26	PATERAPALI KALA	02	64		Shrimili	Chirkiram	22.09342N	82.96321E	784	A	5.9	0.05	0.6	226	3.23	264	0.4	15.5	37.6	0.9
27	PATERAPALI KALA	02	7/2		Sushila bai	Goverdhan	22.09333N	82.96340E	794	A	5.8	0.09	0.5	263	12.72	291	0.5	17.9	27.3	0.4
28	PATERAPALI KALA	02	22		Sarhuram		22.09422N	82.96421E	780	A	5.9	0.11	0.3	163	12.36	183	0.5	10.5	27.3	0.2
29	PATERAPALI KALA	02	28				22.09522N	82.90521E	795	A	5.7	0.11	0.6	301	9.41	199	0.5	13.6	26.8	0.1
30	PATERAPALI KALA	02	610/2		Punidas	Heera das	22.09566N	82.9061E	800	A	5.4	0.08	0.4	188	14.87	263	2.1	17.4	30.9	0.6
31	PATERAPALI KALA	02	617		Dhaniram		22.09322N	82.91266E	999	A	5.5	0.07	0.5	188	8.15	208	0.9	27.4	36.0	0.6

32	PA TERAPALI KALA	02	601/1	Nathuram	Bhog singh	22.0953221N	82.906666E	792	A	5.4	0.07	0.5	201	6.72	221	0.4	24.8	33.5	0.7
19	DEWAR BHAL	04	533/2			22.08611N	82.90241E	910	A	6.7	0.22	0.6	213	7.17	201	3.0	28.5	33.5	0.72
20	DEWAR BHAL	04	61			22.08626N	82.90321E	909	A	5.9	0.12	0.7	439	7.80	371	3.9	31.7	27.2	1.7
21	DEWAR BHAL	04	64			22.03426N	82.90360E	904	A	6	0.14	0.5	276	3.23	149	2.6	29.6	43.1	0.64
23	DEWAR BHAL	04	527			22.04631N	82.90631E	865	A	6	0.19	0.6	301	5.02	289	1.3	30.9	30.8	0.62
24	DEWAR BHAL	04	461			22.04311N	82.90321E	860	A	6	0.19	0.4	151	1.43	223	1.6	32.8	40.1	0.8
25	DEWAR BHAL	04	431			22.03333N	82.90431E	865	A	6	0.16	0.5	176	2.42	354	3.1	25.0	27.0	0.82
26	DEWAR BHAL	04	96			22.03631N	82.90331E	856	A	6.1	0.23	0.6	263	2.69	287	3.1	31.4	41.0	0.42
27	DEWAR BHAL	04	547			22.03311N	82.90431E	840	A	5.7	0.12	0.4	125	4.30	199	2.8	23.7	39.7	0.8
28	DEWAR BHAL	04	447			22.03221N	82.90421E	892	A	5.8	0.15	0.5	188	6.27	123	3.6	29.6	41.5	0.58
29	DEWAR BHAL	04	201			22.03611N	82.90221E	885	A	5.9	0.16	0.4	163	5.02	138	2.9	43.7	22.9	0.7
30	DEWAR BHAL	04	242/2			22.03341N	82.90311E	899	A	5.9	0.10	0.2	151	13.53	132	4.1	45.7	31.2	1.48
31	DEWAR BHAL	04	261/2			22.04321N	82.42121E	831	A	6.0	0.17	0.4	163	14.16	213	3.7	30.1	30.2	1.2
32	DEWAR BHAL	04	151			22.04368N	82.4121E	862	A	6.1	0.23	0.4	188	14.87	193	3.9	38.6	28.6	1.3
33	DEWAR BHAL	04	122			22.04361N	82.41261E	888	A	6.8	0.2	0.4	163	7.97	212	2.1	42.9	24.0	1.28
34	DEWAR BHAL	04	166			22.04368N	82.4121E	898	A	6.1	0.22	0.4	125	7.08	187	3.8	29.7	30.7	0.54
35	DEWAR BHAL	04	666			22.04312N	82.4061E	865	A	6.2	0.13	0.3	125	2.24	163	2.4	36.9	25.1	0.78
36	DEWAR BHAL	04	604/1			22.04600N	82.4011E	863	A	6.8	0.13	0.5	188	1.43	174	3.1	38.9	38.4	0.5
37	DEWAR BHAL	04	263			22.0462N	82.40121E	862	A	6.4	0.13	0.2	138	7.53	482	3.7	37.1	15.7	0.8
38	DEWAR BHAL	04	347			22.04621N	82.4040-111E	863	A	6.2	0.15	0.4	201	6.00	358	3.6	42.0	27.1	1.12
39	DEWAR BHAL	04	268/1			22.04441N	82.4061E	831	A	6.1	0.14	0.4	176	5.38	287	3.8	41.0	22.0	0.7
40	DEWAR BHAL	04	303/1			22.04331N	82.40631E	841	A	6.7	0.15	0.5	251	1.70	208	2.7	43.0	34.7	0.8
41	DEWAR BHAL	04	320/1			22.04640N	82.40630E	864	A	6.8	0.21	0.5	238	8.78	200	2.5	35.4	27.1	0.56
8	DEWARI	02	435			22.06163N	82.54058E	866	A	5.8	0.10	0.5	163	19.98	316	4.0	27.4	11.7	1.08
9	DEWARI	02	105			22.06097N	82.54070E	909	A	5.9	0.11	0.5	188	15.86	256	2.0	48.8	11.4	1.06
10	DEWARI	02	91			22.06800N	82.54437E	904	A	5.5	0.11	0.5	238	16.93	296	4.9	43.6	15.3	2.02
11	DEWARI	02	81			22.06051N	82.54017E	862	A	5.6	0.08	0.5	201	8.42	174	4.4	23.4	4.6	1.8
12	DEWARI	02	339			22.06228N	82.54078E	854	A	5.4	0.08	0.6	213	15.14	194	4.7	43.4	11.8	1.14
13	DEWARI	02	355			22.06167N	82.53510E	910	A	6.3	0.10	0.3	138	14.16	215	2.4	40.8	15.0	1.02
14	DEWARI	02	352			22.06275N	82.53711E	858	A	5.8	0.09	0.3	113	7.53	251	3.0	44.0	6.4	1.44

15	DEWARI	02	367			22.06113N	82.53706E	902	A	5.5	0.09	0.5	238	13.08	242	2.7	36.8	7.0	1.54
16	DEWARI	02	322			22.0690N	82.54031E	856	A	6.4	0.12	0.3	188	7.53	226	3.4	32.6	7.1	1.08
17	DEWARI	02	331			22.06612N	82.53317E	934	A	6.4	0.19	0.5	226	5.47	227	2.6	37.0	9.0	1
18	DEWARI	02	377			22.06163N	82.54092E	847	A	5.8	0.13	0.5	263	15.77	207	4.0	39.1	7.6	1.5
19	DEWARI	02	378			22.06094N	82.54033E	917	A	5.6	0.12	0.5	151	7.53	245	2.4	31.2	5.7	1.74
20	DEWARI	02	399			22.06853N	82.54300E	852	A	6.3	0.11	0.5	163	11.47	291	2.9	33.8	15.4	1.8
21	DEWARI	02	269			22.06283N	82.54074E	877	A	6.2	0.11	0.5	213	10.39	233	4.0	31.4	5.4	1.26
22	DEWARI	02	381			22.06240N	82.53705E	890	A	5.8	0.10	0.6	226	15.23	240	5.5	38.6	8.2	1.58
23	DEWARI	02	17			22.06304N	82.53715E	913	A	5.5	0.10	0.4	151	14.25	223	2.5	47.0	14.1	1.78
34	DEWARI	02	226			22.06059N	82.54003E	857	A	6.1	0.12	0.5	238	11.1	219	4.2	38.0	12.2	1.16
35	DEWARI	02	295			22.06308N	82.5406E	854	A	5.4	0.09	0.5	276	10.75	241	5.0	42.8	7.0	1.42
9	CHAMARA BARPALI	13	321			22.0335	82.5134	859	A	6.1	0.13	0.5	138	6.2	190	2.32	32.48	62.12	0.82
10	CHAMARA BARPALI	13	279			22.0365	82.5104	869	A	5.9	0.11	0.5	100	7.9	170	1	21.26	13.56	0.38
11	CHAMARA BARPALI	13	26			22.0345	82.5124	872	A	5.7	0.14	0.6	251	7.0	216	2.8	29.06	60.94	0.8
12	CHAMARA BARPALI	13	64/1			22.0335	82.5134	878	A	5.7	0.13	0.5	276	8.9	357	3.46	24.04	25.12	0.72
13	CHAMARA BARPALI	13	65			22.0342	82.5119	875	A	6.1	0.12	0.5	163	5.3	215	0.56	42.26	25.14	0.44
14	CHAMARA BARPALI	13	117/2			22.0350	82.5109	870	A	6.1	0.12	0.6	376	7.5	215	0.46	42.26	25.14	0.44
15	CHAMARA BARPALI	13	109			22.0345	82.5125	809	A	6	0.14	0.6	301	8.2	179	3.44	19.26	51.44	0.86
16	CHAMARA BARPALI	13	214			22.0348	82.5127	809	A	5.8	0.14	0.6	401	3.1	238	0.5	43.56	58.9	0.74
23	CHAMARA BARPALI	13	408		Suklal	22.0339	82.5128	808	A	5.5	0.06	0.6	351	6.6	258	8.28	48.06	16.44	0.58
24	CHAMARA BARPALI	13	325		Malik ram	22.0341	82.5124	808	A	5.6	0.06	0.6	351	7.7	324	4.9	40.6	17.28	1.18
25	CHAMARA BARPALI	13	417		Sukdas	22.0342	82.5120	808	A	5.5	0.07	0.4	113	9.8	260	5.2	24.14	15.12	0.94
26	CHAMARA BARPALI	13	166		Bisahu ram	22.0344	82.5118	808	A	5.6	0.07	0.5	151	6.4	318	6.46	40.24	12.56	1.1
27	CHAMARA BARPALI	13	204		Laxman das	22.0346	82.5114	808	A	5.5	0.08	0.5	238	5.6	337	0.76	28.36	7.36	0.34
28	CHAMARA BARPALI	13	141		Bhoka ram	22.0348	82.5102	809	A	5.5	0.05	0.6	389	10.1	313	7.94	25.32	12.48	0.46
9	KIRARI	13	707			22.0246	82.5167	812	A	5.8	0.12	0.6	276	3.58	500	3.4	14.4	61.0	0.2
14	KIRARI	13	662			22.0210	82.5160	819	A	6.2	0.10	0.3	151	8.24	398	3.1	27.4	62.2	0.2
20	KIRARI	13	225			22.0261	82.5155	832	A	5.6	0.09	0.3	163	6.00	379	3.1	26.5	62.7	0.3
21	KIRARI	13	230			22.0259	82.5157	832	A	5.7	0.06	0.3	188	8.69	355	4.2	21.1	61.7	0.2
22	KIRARI	13	162			22.0255	82.5159	832	A	5.5	0.07	0.5	176	17.20	418	3.7	20.9	62.3	0.4

21	SAKTI	08	274	Sundar pradhan	Mangal pradhan	22.01892	82.57952	783	A	6.0	0.17	0.4	176	278	278	38.4	33.7	0.4
22	SAKTI	08	1160/	Trilokiram	Ganpatram jaiswal	22.01836	82.57946	779	A	5.9	0.11	0.3	163	450	18.64	31.0	59.2	0.4
23	SAKTI	08	1163/	Santosh lal	Ganpat ram	22.01944	82.57914	775	A	6.6	0.14	0.5	213	442	4.39	38.4	34.4	0.8
24	SAKTI	08	954/2	Vinod lal	Heeralal	22.01971	82.57864	774	A	6.8	0.22	0.4	188	358	6.09	50.5	30.8	1.0
25	SAKTI	08	405	Shyam singh	Heera sindh	22.02003	82.57876	768	A	6.0	0.20	0.5	251	424	8.96	28.3	62.9	0.5
26	SAKTI	08	441/	Basant ram	Heeralal	22.02025	82.57908	772	A	5.7	0.12	0.5	238	487	7.62	36.5	64.3	0.5
27	SAKTI	08	1110/2	Sushil ram	Heeralal	22.02000	82.57947	775	A	6.8	0.13	0.3	188	279	11.20	22.7	62.4	0.7
1	DURPA	16	16			22.0211	82.499	885	A	6.9	0.11	0.5	176	313	6.99	32.8	67.8	0.8
15	DURPA	16	264			22.01830	82.4990	863	A	6.0	0.12	0.6	201	245	6.27	20.6	19.8	0.7
16	DURPA	16	143			22.0145	82.4975	868	A	6.5	0.23	0.5	263	326	11.74	32.8	51.7	0.8
17	DURPA	16	126			22.0155	82.4965	869	A	6.9	0.17	0.5	213	370	8.33	60.1	65.1	0.9
18	DURPA	16	161			22.0184	82.4921	880	A	6.9	0.16	0.5	151	373	11.38	44.6	51.3	1.0
19	DURPA	16	119			22.0285	82.4920	887	A	6.6	0.17	0.6	276	399	11.02	37.4	60.3	0.9
20	DURPA	16	172			22.0232	82.4972	886	A	6.0	0.21	0.5	201	378	3.94	29.8	20.7	0.8
21	DURPA	16	193			22.0218	82.4993	886	A	6.5	0.10	0.4	176	333	9.14	38.3	51.0	0.9
22	DURPA	16	269			22.0232	82.4948	882	A	6.9	0.25	0.4	163	315	11.02	33.7	62.6	1.0
23	DURPA	16	227			22.0230	82.4843	887	A	6.3	0.16	0.5	151	301	9.59	26.4	57.9	1.3
24	DURPA	16	214			22.0227	82.4831	881	A	6.8	0.18	0.4	138	318	9.23	34.3	50.3	1.1
25	DURPA	16	56			22.0219	82.4992	885	A	6.9	0.15	0.6	289	364	14.25	45.3	57.5	0.7
37	DURPA	16	984/2			22.0158	82.4852	873	A	6.2	0.16	0.6	289	185	7.17	35.0	48.9	1.2
38	DURPA	16	104			22.0178	82.4832	869	A	6.7	0.10	0.4	113	205	9.95	19.6	59.8	1.1
7	LAHANGA	14	119	Sadhan	Bodhan	22.0179	82.4871	845	A	5.5	0.08	0.5	176	270	3.40	16.5	41.1	1.5
14	LAHANGA	14	445/1	Kanhaiya sahu	Punuram	22.0198	82.4847	850	A	5.6	0.09	0.6	213	285	6.90	54.8	47.9	0.3
15	LAHANGA	14	489/1	Ghasi ram		22.0191	82.4843	850	A	5.9	0.12	0.6	263	286	4.12	49.9	45.3	0.9
16	LAHANGA	14	218	Sadhan	Dukhiram	22.0199	82.4838	845	A	6.3	0.21	0.4	176	262	4.30	46.2	47.2	1.3
17	LAHANGA	14	196	Farman	Matiram	22.0192	82.4843	845	A	5.7	0.11	0.5	188	257	4.30	65.6	49.1	1.2
18	LAHANGA	14	63	Kashiram	Amol say	22.0191	82.4854	821	A	5.9	0.14	0.3	163	348	5.38	33.3	25.3	1.2
19	LAHANGA	14	298/1	Dayaram	Chhatiram	22.0186	82.4868	826	A	5.9	0.06	0.5	201	405	3.76	11.0	29.5	1.3
20	LAHANGA	14	310	Milan singh	Nanki	22.0197	82.4882	920	A	5.5	0.13	0.5	213	426	4.66	29.7	42.2	1.2
7	REDA	13	22/1			22.0247	82.5058	867	A	5.9	0.10	0.6	276	409	14.78	30.2	44.2	0.7

8	REDA	13	57				22.0228	82.5067	871	A	6.7	0.16	0.5	226	851	438	0.6	20.9	51.6	0.3
9	REDA	13	13				22.0247	82.5048	876	A	5.6	0.11	0.6	444	12.36	336	1.2	32.8	43.7	0.8
10	REDA	13	10				22.0257	82.5038	866	A	5.9	0.08	0.6	238	13.62	402	0.7	28.1	46.6	0.7
11	REDA	13	6				22.0237	82.5068	851	A	6.1	0.13	0.5	201	8.78	399	2.1	36.8	30.9	0.9
12	REDA	13	103				22.0257	82.5048	859	A	5.8	0.10	0.6	276	7.53	364	0.4	36.6	25.1	0.6
13	REDA	13	101				22.0262	82.5038	865	A	6.1	0.08	0.5	201	12.28	385	0.8	32.1	36.5	1.2
14	REDA	13	92				22.0258	82.5047	866	A	6.6	0.10	0.5	263	6.63	496	2.2	30.3	41.0	0.7
15	REDA	13	108				22.0278	82.5038	868	A	5.4	0.07	0.5	163	15.86	425	2.2	49.1	60.0	0.6
16	REDA	13	136				22.0275	82.5046	871	A	6.3	0.09	0.5	188	17.29	390	0.8	30.0	28.7	0.6
17	REDA	13	88				22.0295	82.5056	865	A	6.2	0.14	0.5	213	14.60	490	2.1	29.1	52.5	0.8
18	REDA	13	245				22.0275	82.5076	867	A	6.8	0.13	0.5	238	11.20	456	1.3	43.2	48.0	0.7
19	REDA	13	240				22.0255	82.5096	861	A	5.4	0.12	0.5	176	10.12	347	0.9	29.6	55.8	0.7
20	REDA	13	283				22.0265	82.5086	868	A	6.5	0.18	0.4	163	14.25	422	0.7	31.6	31.8	0.6
21	REDA	13	79				22.0275	82.5076	873	A	6.3	0.1	0.4	163	11.74	407	0.7	31.5	54.9	0.6
22	REDA	13	81				22.0276	82.5063	852	A	5.7	0.16	0.5	188	18.37	591	2.4	46.3	28.9	0.5
23	REDA	13	84				22.0278	82.5065	851	A	5.7	0.08	0.5	301	18.91	667	3.7	32.5	28.4	1.3
24	REDA	13	217				22.0280	82.5067	852	A	5.6	0.09	0.5	201	12.36	551	2.8	59.5	27.6	1.0
25	REDA	13	721/1				22.0282	82.5069	852	A	5.7	0.10	0.4	289	23.83	514	6.4	48.5	37.3	0.8
26	REDA	13	150				22.0284	82.5071	852	A	6.5	0.13	0.4	151	10.75	558	2.2	48.3	26.4	1.0
6	SOTHI	08			Ahasabbudin khan	Farajnuddin khan	22.01277	82.96490	797	A	6.3	0.06	0.5	188	9.14	448	1.66	7.02	38.76	1
7	SOTHI	08			Sadharam Sahu	Puranlal sahu	22.01260	82.96489	785	A	6.1	0.07	0.5	201	10.84	341	2.64	20.82	33.98	1.04
8	SOTHI	08			Ganesh ram sahu	Sunder lal	22.01215	82.96480	802	A	6.8	0.21	0.6	251	3.14	334	3.2	4.9	57.4	0.44
9	SOTHI	08			Ramadhar	Ghasiya ram	22.01198	82.96491	797	A	5.8	0.14	0.5	188	16.22	575	2.0	9.4	57.9	0.34
10	SOTHI	08			Jagdish	Panik ram	22.0129	82.96546	804	A	6.9	0.23	0.5	238	8.15	391	2.1	7.7	57.5	0.48
11	SOTHI	08			Anil	Sampat	22.0129	82.96548	815	A	5.6	0.06	0.5	201	12.63	423	3.6	26.9	58.3	0.24
12	SOTHI	08			Sahabhlal	Jagdish patel	22.0108	82.96495	793	A	5.5	0.12	0.4	151	12.36	406	2.0	16.7	55.8	0.22
13	SOTHI	08			Durgesh lal	Nohar say	22.01100	82.96471	798	A	6.8	0.21	0.4	163	6.99	380	3.3	9.1	47.3	0.12
14	SOTHI	08			Fasal mahant	Dhanaram mahant	22.01005	82.96381	787	A	5.8	0.15	0.5	201	6.81	381	3.2	7.6	45.4	0.42
3	SARHAR	16	932				22.0163	82.4755	926	A	5.8	0.13	0.4	125	8.33	494	1.9	13.7	32.9	0.7
4	SARHAR	16	912				22.0173	82.4745	929	A	6.1	0.18	0.4	125	3.94	549	2.3	11.8	44.3	0.5

5	SARHAR	16	958/5				22.0188	82.4730	921	A	6.9	0.23	0.5	163	5.91	349	2.0	47.8	16.6	1.8
6	SARHAR	16	899				22.0175N	82.4730	925	A	5.9	0.14	0.5	201	8.87	373	1.2	27.1	14.7	1.8
7	SARHAR	16	164				22.0173N	82.4787E	952	A	6	0.14	0.3	113	6.90	522	2.0	13.5	34.1	0.7
8	SARHAR	16	302				22.0169N	82.4763E	917	A	5.4	0.07	0.3	163	3.40	431	2.1	32.9	43.4	0.6
9	SARHAR	16	142				22.0173N	82.4757E	918	A	6	0.14	0.4	125	7.53	595	2.1	28.9	27.6	0.6
10	SARHAR	16	168				22.0182N	82.4762E	927	A	5.8	0.11	0.3	188	5.47	534	1.7	10.5	37.0	0.7
11	SARHAR	16	131/2				22.0173N	82.4753E	926	A	6.3	0.15	0.5	176	10.04	569	1.7	34.4	35.0	0.6
12	SARHAR	16	174				22.0182N	82.4750E	917	A	5.6	0.08	0.4	176	8.60	483	2.1	10.5	38.7	0.6
13	SARHAR	16	179				22.0180N	82.4739E	930	A	5.5	0.06	0.3	176	6.72	339	4.7	25.1	17.9	1.9
14	SARHAR	16	198/2				22.0180N	82.4757E	932	A	5.6	0.14	0.4	125	7.62	566	2.1	33.1	29.3	0.7
15	SARHAR	16	239/4				22.0183N	82.4753E	937	A	5.8	0.12	0.4	151	3.76	415	2.4	15.2	36.1	0.8
30	SARHAR	16	1003/2				22.0189	82.4731	930	A	5.7	0.14	0.5	176	3.85	389	1.2	21.7	40.2	0.8
36	SARHAR	16	1119/2				22.0183	82.4739	926	A	5.9	0.13	0.4	138	6.72	529	2.1	23.9	38.3	0.5
42	SARHAR	16	1021/16				22.0152	82.4765	923	A	5.6	0.13	0.4	188	7.44	458	1.3	17.8	38.4	0.5
43	SARHAR	16	956				22.0158	82.4761	923	A	6.1	0.24	0.4	188	5.47	460	1.6	24.7	40.7	0.7
44	SARHAR	16	1035				22.0153	82.4769	922	A	5.9	0.20	0.5	201	10.48	310	4.1	39.9	13.4	1.9
45	SARHAR	16	953/2				22.0148	82.4762	923	A	5.5	0.08	0.6	263	6.45	393	8.9	37.4	18.2	1.6
46	SARHAR	16	970/5				22.0143	82.4758	923	A	5.6	0.1	0.5	163	12.54	386	6.3	24.4	15.3	1.5
47	SARHAR	16	967/1				22.0139	82.4763	920	A	6.8	0.26	0.5	201	5.56	446	2.7	45.1	12.1	1.3
48	SARHAR	16	965				22.0133	82.4761	920	A	5.7	0.13	0.5	176	11.83	406	10.3	22.7	15.1	1.3
49	SARHAR	16	1058				22.0130	82.4772	922	A	5.5	0.09	0.4	176	9.23	386	7.4	31.3	18.0	1.2
50	SARHAR	16	1051/2-3				22.0123	82.4778	922	A	5.9	0.15	0.2	138	6.45	321	5.1	29.8	8.0	1.8
51	SARHAR	16	1044/4				22.0120	82.4782	923	A	5.8	0.12	0.3	163	5.73	326	0.9	37.9	12.3	1.5
52	SARHAR	16	1102/1				22.0122	82.4784	923	A	6.1	0.19	0.5	188	6.54	350	1.0	32.2	12.5	0.7
53	SARHAR	16	1112				22.0112	82.4790	923	A	6.9	0.22	0.6	213	13.98	401	2.0	20.5	13.5	1.2
54	SARHAR	16	338/2				22.0119	82.4798	920	A	5.9	0.12	0.1	151	9.14	293	4.9	25.4	13.4	1.7
55	SARHAR	16	1147				22.0101	82.4790	923	A	5.6	0.08	0.5	188	3.94	351	7.1	25.7	12.6	1.8
4	DERADARH	18	507/20				22.24675	82.37876	834	A	5.8	0.14	0.4	113	9.856	391.664	1.92	53.98	13.1	1.5
5	DERADARH	18	491/8				22.24624	82.37862	827	A	5.8	0.11	0.4	100	5.1072	327.824	9.92	49.74	17.3	1.8
6	DERADARH	18	362				22.24634	82.37856	832	A	5.9	0.17	0.4	100	5.9136	415.52	7.2	53.6	16.8	1.0

7	DERAGARH	18	256/2						22.24623	82.37860	821	A	5.6	0.13	0.3	125	8.8704	333.648	6.72	50.44	19.0	0.6
8	DERAGARH	18	245						22.24631	82.37855	825	A	5.2	0.14	0.5	176	9.7664	274.288	5.26	52.68	4.2	1.6
9	DERAGARH	18	452						22.24639	82.37851	823	A	5.7	0.15	0.5	188	7.7952	316.848	8.7	51.92	9.8	1.7
10	DERAGARH	18	2543						22.24632	82.37850	836	A	5.5	0.15	0.6	263	7.616	357.952	0.58	47.86	12.0	1.3
11	DERAGARH	18	504						22.24641	82.37861	831	A	5.8	0.12	0.5	176	8.8704	542.976	2.78	51.38	10.9	1.0
12	DERAGARH	18	399						22.24655	82.37853	845	A	6.3	0.18	0.3	125	6.0032	387.52	3.94	52.24	5.2	1.6
13	DERAGARH	18	32/1						22.24643	82.37845	834	A	5.7	0.14	0.2	113	6.5408	277.984	5.3	52.94	5.6	1.2
14	DERAGARH	18	5661						22.24633	82.37835	821	A	5.8	0.13	0.4	201	4.3008	373.408	4.02	53.54	16.3	1.2
15	DERAGARH	18	525						22.24653	82.37844	826	A	6.5	0.16	0.5	201	4.032	318.752	6.54	51.84	9.7	1.3
16	DERAGARH	18	476/3						22.24645	82.37839	843	A	6.2	0.18	0.3	176	9.9456	280.56	6.42	53.64	23.1	1.1
7	BORADA	8	967						22.24767	82.37675	787	A	7.0	0.34	0.2	188	5.376	401.408	3.92	4.72	10.7	1.0
8	BORADA	8	576						22.24758	82.37665	782	A	6.9	0.24	0.5	301	17.024	397.488	2.42	4.88	11.4	0.8
9	BORADA	8	668						22.24678	82.37643	754	A	6.6	0.13	0.3	113	15.412	310.56	6.84	4.22	8.9	0.7
11	BORADA	8	956						22.24654	82.37634	734	A	6.9	0.22	0.6	301	14.336	293.664	6.66	5.84	4.5	1.6
12	BORADA	8	928						22.24673	82.37655	743	A	7.1	0.24	0.4	188	8.3328	139.776	4.5	5.36	5.6	0.9
14	BORADA	8	441						22.24765	82.37845	754	A	7.1	0.21	0.6	389	5.1968	323.914	2.4	7.06	10.9	1.6
15	BORADA	8	666						22.24745	82.37678	745	A	6.1	0.12	0.6	289	12.0064	301.504	3.66	6.96	14.1	0.7
16	BORADA	8	245						22.24755	82.37863	735	A	6.8	0.19	0.5	226	11.648	369.152	2.5	5.16	20.6	1.0
18	BORADA	8	378						22.24675	82.37846	752	A	6.7	0.23	0.4	176	15.3216	310.896	6.54	5.92	6.9	0.7
19	BORADA	8	461						22.24653	82.37768	765	A	6.9	0.25	0.5	201	11.4688	220.304	4.5	5.96	6.0	1.5
20	BORADA	8	527						22.24734	82.37564	787	A	6.0	0.16	0.5	176	13.6192	284.032	6.62	6.12	7.3	1.1
21	BORADA	8	552						22.24754	82.37525	725	A	6.8	0.21	0.5	226	6.6304	218.736	2.96	5.36	8.3	0.7
22	BORADA	8	905						22.24734	82.37867	768	A	6.9	0.22	0.5	188	9.2288	339.472	4.72	5.18	8.7	0.4
1	TENOUTOLA	06	26						22.0391N	82.5736E	773	V	7.7	0.34	0.5	213	8.87	314	2.46	25.9	9.1	0.5
2	TENOUTOLA	06	124/2						22.0368N	82.5730E	778	V	7.6	0.43	0.6	238	3.23	298	4.24	30.6	6.7	0.3
3	TENOUTOLA	06	289						22.0383N	82.5769E	763	V	7.7	0.31	0.6	289	3.32	319	2.44	24.22	10.3	0.2
4	TENOUTOLA	06	78						22.0388N	82.5796E	765	V	7.6	0.37	0.4	201	6.36	305	2.78	38.28	14.9	0.6
5	TENOUTOLA	06	281						22.0380N	82.5789E	760	V	7.6	0.21	0.5	314	6.54	343	0.92	24.22	6.0	0.1
6	TENOUTOLA	06	328/2						22.0369N	82.5770E	781	V	7.5	0.26	0.5	201	4.57	308	8.64	29.12	7.9	0.5
7	TENOUTOLA	06	117						22.0365N	82.5780E	783	V	7.4	0.41	0.6	188	7.62	290	2	31.56	11.9	0.3

8	TENDUTOLA	06	66					22.0355N	82.5766E	786	V	7.6	0.22	0.6	444	12.28	279	2.24	4.26	8.1	0.1
9	TENDUTOLA	06	90					22.0395N	82.5787E	770	V	7.8	0.24	0.5	188	4.39	333	2.48	24.22	9.3	0.4
10	TENDUTOLA	06	342					22.0358N	82.5770E	782	V	7.6	0.42	0.6	226	2.96	292	1.48	28.96	7.0	0.3
11	TENDUTOLA	06	94/2-3					22.0369N	82.5780E	771	V	7.8	0.24	0.5	238	8.15	301	6.98	20.34	10.1	0.1
12	TENDUTOLA	06	111					22.0398N	82.5763E	789	V	7.7	0.23	0.5	188	7.17	213	4.9	25.86	17.2	0.3
13	TENDUTOLA	06	361					22.0363N	82.5769E	783	V	7.8	0.26	0.5	289	4.66	309	10.54	27.62	9.2	0.2
3	HARETHI				heera lal	Seharam		22.23168	82.39065	810	A	5.6	0.08	0.6	426	9.32	216	2.4	16.6	15.4	0.2
4	HARETHI				Ranjeet	Bansilal		22.23156	82.39056	823	A	5.5	0.15	0.4	176	14.69	467	2.2	17.6	23.0	1.3
5	HARETHI				Sharavan kumar	Ptamber patel		22.23146	82.39045	832	A	5.6	0.10	0.4	201	10.93	177	1.9	13.8	16.9	0.3
6	HARETHI				Yadav prasad	Manbodh		22.23132	82.39035	835	A	5.7	0.11	0.7	176	9.32	261	1.7	13.2	16.1	0.4
7	HARETHI				Santosh patel	Tulsi		22.23145	82.39034	834	A	5.4	0.09	0.3	176	12.19	153	1.8	7.8	15.5	0.7
8	HARETHI				Ramaiya lal	Bhawar singh		22.23153	82.39054	831	A	5.6	0.07	0.6	188	6.72	284	1.9	20.2	33.5	0.5
3	SARVANI	05	139/4					22.0166	82.4959	804	A	5.7	0.13	0.2	163	12.19	249	2.2	23.2	45.7	0.7
4	SARVANI	05	126					22.0164	82.4961	823	A	5.7	0.14	0.5	213	16.58	167	2.2	33.6	40.0	0.6
5	SARVANI	05	568					22.0128	82.4964	840	A	5.4	0.12	0.6	401	13.62	250	1.6	31.3	43.8	0.8
6	SARVANI	05	556					22.0130	82.4962	797	A	6.2	0.28	0.4	213	16.22	134	1.2	17.6	43.0	0.5
7	SARVANI	05	203/1					22.0162	82.4960	785	A	6.1	0.19	0.3	151	10.12	177	2.1	37.8	47.8	0.9
8	SARVANI	05	207/1					22.0134	82.4958	802	A	6	0.16	0.5	201	8.69	222	2.2	29.7	45.3	0.9
12	SARWANI	14	479					22.04320N	82.4540E	788	A	5.4	0.08	0.4	213	7.17	438	1.1	36.1	48.4	1.0
13	SARWANI	14	728					22.04300N	82.45380E	785	A	6.6	0.12	0.4	188	3.94	539	1.2	19.5	56.8	0.3
14	SARWANI	14	724					22.04290N	82.45240E	770	A	5.7	0.09	0.6	289	7.17	219	1.7	8.8	43.3	0.5
15	SARWANI	14	722		Mahesh singh			22.04240N	82.45353E	767	A	6.3	0.07	0.4	176	5.47	600	1.8	24.4	57.1	0.8
16	SARWANI	14	19					22.04353N	82.45432E	763	A	5.9	0.12	0.3	138	10.75	261	1.5	12.9	41.3	0.4
17	SARWANI	14	16		Manharan			22.04490N	82.45442E	787	A	6.2	0.11	0.3	188	10.12	177	1.8	14.6	46.9	0.4
18	SARWANI	14	36/1					22.04423N	82.45300E	767	A	5.4	0.07	0.5	201	16.22	163	1.7	11.8	44.9	0.5
19	SARWANI	14	36/2					22.04285N	82.45330E	760	A	6.2	0.13	0.5	176	6.99	249	1.0	5.8	26.5	0.4
20	SARWANI	14	46/1		Milan	Budhan		22.04232N	82.45231E	786	A	5.9	0.12	0.3	188	4.21	429	1.1	31.7	35.2	0.4
21	SARWANI	14	148					22.04192N	82.4513E	775	A	5.7	0.13	0.4	163	7.80	113	1.1	4.5	23.0	0.5
22	SARWANI	14	84/1		Bairagi			22.04150N	82.45121	779	A	5.6	0.15	0.5	176	7.26	129	1.2	29.1	21.1	0.5
23	SARWANI	14	117		Mahadev	Bhulau ram		22.04123N	82.45222E	782	A	5.9	0.11	0.4	138	9.32	504	1.0	34.3	41.2	0.9

24	SARWANI	14	80/1	Asharam	Hegam ram	22.0422IN	82.4536E	784	A	5.8	0.1	0.3	138	6.36	317	5.6	55.3	62.2	1.1
25	SARWANI	14	308/1	Redmani		22.04224N	82.45380	781	A	5.9	0.08	0.4	151	14.96	230	0.5	22.2	22.5	0.6
6	SAKRELI KALA	5	711			22.03.49	82.5669	839	A	6.1	0.10	0.6	238	15.32	315	2.1	33.4	55.1	1.4
12	SAKRELI KALA	5	1174			22.03.07	82.5687	834	A	5.6	0.10	0.4	226	12.01	218	2.8	35.6	62.6	1.12
17	SAKRELI KALA	5	1094/3			22.03.27	82.5658	809	A	6.0	0.11	0.6	314	15.86	248	2.2	25.6	55.1	0.52
18	SAKRELI KALA	5	1086			22.03.21	82.5663	808	A	5.9	0.10	0.4	201	13.53	244	2.0	28.0	57.6	0.48
19	SAKRELI KALA	5	1,073			22.03.29	82.5657	809	A	5.8	0.09	0.3	163	5.91	241	2.2	29.8	57.6	0.6
20	SAKRELI KALA	5	991			22.03.11	82.5679	810	A	5.7	0.08	0.5	238	10.39	234	2.3	31.9	65.5	0.5
21	SAKRELI KALA	5	472			22.03.19	82.5676	811	A	5.8	0.13	0.4	176	10.48	249	1.9	21.9	57.1	1.68
22	SAKRELI KALA	5	380			22.03.53	82.5623	807	A	5.7	0.11	0.6	439	10.93	212	3.1	36.7	49.3	0.44
23	SAKRELI KALA	5	501			22.03.69	82.5607	810	A	5.7	0.10	0.4	176	12.81	250	2.8	32.1	48.2	0.46
24	SAKRELI KALA	5	370			22.03.59	82.5602	811	A	5.7	0.13	0.6	314	8.06	257	1.9	34.3	61	0.66
25	SAKRELI KALA	5	256			22.03.43	82.5609	809	A	5.9	0.10	0.5	213	9.50	232	2.5	45.6	47.3	1.44
26	SAKRELI KALA	5	117			22.03.35	82.5613	811	A	5.4	0.11	0.5	226	9.14	238	2.2	37.9	49.1	1.3
27	SAKRELI KALA	5	110			22.03.23	82.5629	810	A	5.8	0.09	0.5	226	7.44	242	2.3	21.1	59.4	0.42
28	SAKRELI KALA	5	217			22.03.38	82.5614	809	A	5.7	0.11	0.5	301	13.44	243	2.3	30.9	43.2	0.54
5	SAKRELI	14	1187/1			22.0582	82.4713	836	A	5.4	0.06	0.6	426	14.34	301	1.1	17.1	19.5	0.9
10	SAKRELI	14	1135/1			22.0542	82.4753	855	A	6.0	0.13	0.6	276	15.14	253	1.1	14.7	22.8	0.7
47	SAKRELI	14	1240/1			22.0561N	82.4739E	876	A	5.9	0.12	0.4	213	8.33	104	1.8	30.7	64.4	0.8
48	SAKRELI	14	89			22.05663N	82.4757	865	A	5.9	0.13	0.3	138	8.33	139	0.8	24.9	63.0	0.5
49	SAKRELI	14	116/1			22.0582N	82.4739E	882	A	5.5	0.09	0.5	188	7.35	189	2.1	25.5	37.7	0.8
50	SAKRELI	14	196/1			22.0565N	82.47730	876	A	6.8	0.27	0.3	113	5.02	150	2.1	21.3	62.7	0.7
51	SAKRELI	14	120/1			22.0536N	82.4707	866	A	5.8	0.17	0.2	151	18.55	172	1.9	34.7	68.0	0.6
52	SAKRELI	14	216			22.0568N	82.4760E	905	A	5.4	0.09	0.3	201	8.78	139	1.8	23.6	69.6	0.6
53	SAKRELI	14	841			22.0562N	82.4706E	879	A	6.9	0.21	0.5	289	10.21	136	1.7	34.0	68.4	0.8
54	SAKRELI	14	171/1			22.0569N	82.4757E	873	A	6.4	0.17	0.4	163	5.73	200	3.7	23.8	42.1	1.0
55	SAKRELI	14	233/1			22.0568N	82.4797E	874	A	6.8	0.21	0.5	163	4.75	106	0.9	28.7	60.7	0.6
56	SAKRELI	14	169/1			22.0558N	82.4739E	862	A	5.6	0.15	0.4	151	6.90	162	0.6	41.5	21.6	0.5
57	SAKRELI	14	159/1			22.0575N	82.4787	859	A	5.8	0.16	0.6	289	9.86	140	0.8	41.4	49.4	0.4
58	SAKRELI	14	155/1			22.0563N	82.4767	873	A	5.7	0.17	0.5	263	5.02	579	3.1	14.0	53.7	0.7

59	SAKRELI	14	290				22.0579N	82.4760E	909	A	5.8	0.14	0.2	176	10.84	393	3.1	9.9	30.6	1.3
60	SAKRELI	14	294/1				22.0579N	82.4739	921	A	6.7	0.13	0.5	238	9.41	139	1.5	39.1	56.8	0.6
61	SAKRELI	14	335/1				22.0531	82.4697	869	A	5.5	0.14	0.5	201	7.44	262	5.8	52.1	65.1	0.5
62	SAKRELI	14	347/1				22.0551	82.4677	871	A	5.9	0.17	0.4	188	6.45	239	2.8	39.7	64.4	0.6
63	SAKRELI	14	472				22.0541	82.4687	865	A	6.3	0.17	0.4	163	5.73	200	3.7	23.8	42.1	1.0
64	SAKRELI	14	348				22.0556	82.4672	875	A	6.8	0.27	0.4	138	7.44	207	0.6	28.6	48.8	0.5
65	SAKRELI	14	327/1				22.0578	82.4660	859	A	5.4	0.25	0.3	113	9.59	160	2.0	27.4	66.5	0.9
66	SAKRELI	14	296/1				22.0589	82.4649	851	A	5.8	0.13	0.4	138	7.88	166	2.1	43.0	68.4	0.4
67	SAKRELI	14	305/1				22.0579	82.4659	855	A	5.5	0.15	0.4	163	9.77	170	1.1	32.1	68.4	0.5
86	SAKRELI	14	1511/1				22.0585N	82.4683E	865	A	5.6	0.13	0.4	151	6.90	136	0.9	41.5	21.6	0.5
87	SAKRELI	14	1537/1				22.0563N	82.4635E	857	A	5.4	0.07	0.5	238	6.00	217	2.5	15.3	30.2	0.8
88	SAKRELI	14	1511/2				22.0563N	82.4636E	829	A	5.5	0.05	0.5	226	6.72	175	0.9	19.0	34.1	0.9
89	SAKRELI	14	1544				22.0575N	82.4636E	861	A	5.4	0.1	0.5	113	11.29	128	2.1	54.1	67.0	0.6
91	SAKRELI	14	1504				22.0582N	82.4636E	842	A	5.6	0.05	0.5	151	4.12	317	2.2	14.3	38.3	1.0
92	SAKRELI	14	1628/1				22.0569N	82.4609E	876	A	5.5	0.03	0.4	138	6.72	321	2.1	18.6	20.3	1.0
93	SAKRELI	14	1608/1				22.0563N	82.4613E	905	A	6.2	0.15	0.5	176	6.54	326	0.7	18.5	22.4	0.8
94	SAKRELI	14	109/1				22.0570N	82.4632E	868	A	6.2	0.21	0.5	201	7.80	234	3.3	34.7	39.1	0.7
95	SAKRELI	14	99				22.0589N	82.4643E	923	A	5.6	0.13	0.3	188	4.30	278	1.2	9.7	36.8	0.8
96	SAKRELI	14	92/1				22.0565N	82.4636E	858	A	5.5	0.03	0.6	213	9.23	250	2.0	12.4	32.3	0.7
97	SAKRELI	14	72				22.0553N	82.4633E	913	A	5.6	0.05	0.5	176	8.96	323	0.7	19.6	20.6	0.9