Report on Soil Fertility Survey and Mapping of Parbat District

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Crop Development Directorate
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Report on Soil Fertility Survey and Mapping of Parbat District

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Introduction

Soil fertility survey program has started very recently from2053/54. In the first year FY 2053/54 soil reaction maps of northeastern part of Jhapa and Northern part of Bhaktapur and soil fertility map of Kanchanpur districts were prepared manually. FY 2054/55 Nuwakot, Bardiya and Kailali districts' fertility maps were produced. From FY 2055/56 the section have been using GIS technology for producing maps and in the same year soil fertility maps of Sunsari district were produced. In FY 2056/57 the fertility maps showing soil reaction, OM, Phosphorus and Potash level of Parbat district were prepared. Parbat is a small district having 53687 hecter of land. Among total land, cultivable land is 28925 ha. This district is elongated from north to south having Shyanja and Kaski in east, Gulmi and Baglung in west, Myagdi and Kaski in north and Shyanja and Gulmi in south. The height variation of Parbat is 533 m to 3292 m. Parbat lies between $27^0$58' to $28^0$39' north latitude and 83^0 34' to 83^0 59 east longitude

Natural resources utilization:

- Kali gandaki, Modi, Malyangdi, Lamage, Chirdi, Lasti, Jahare, Painyu khola are major river of the district.
- Land utilization situation : By managing the marginal land and other lands, the soil fertility status can be improved. Parbat district has highest unused land followed by Bariland.

Table 1. Land utilization situation (ha.)

Total land	Cultivable land	Cultivated land	Khetland	Bariland	River, steep sloppy, Grazing land
53687	28592	28697	3702	14995	24292

Source DADO Parbat.

Table 2. Land holding situation (%)

<10 Ropani	10-20 Ropani	>20 Ropani
56	26.5	17.5

Source : DADO, Parbat.

Land System :

According to LRMP land system classification most of the cultivated lands of Huwas, Tribeni, Taklak, Ranipani, Bachha VDC of the district are fall under non-dissected ancient river terrace, where as cultivated areas of Pangran, Balakot and Likhudeorali VDC are moderately to steeply sloping mountanous terrain. Similarly cultivated areas surrounding Dhariring, Chitre, Kyang and Deorali are found steeply to very steeply sloping mountainous terrain. Area under cultivation of Kurgha and Katuwa Chaupari found alluvial plain and alluvial fan respectively, where at Banskhark and Salija have steep to very steep past glaciated mountainous terrain.

Irrigation facility:

1040 ha land is irrigated by the various irrigation's projects. Irrigation facility is very low (3.6%). Most of the cultivation depends on rain.

Rainfall:

The rainfall is distributed from Jesth to Ashwin (May to September).

Road facility:

Paved road is 20km from Pokhara to Baglung and rough road Beni to Kushma. Similarly Waling to Huwas, Naudanda to Karkineta and other road are going to be constructed .

Major crops of Parbat district:

Cereals , legumes, vegetables and fruits are major crops growing in Parbat district. Vegetable seed growing is also an economic source for Parbat farmers. Major crops growing in the district are shown in table no. 3

Table 3 : Major crops of Parbat district

Cereals	Legume	Vegetable	Fruits	Vegetable seed
Maize, Paddy, Wheat, Finger millet, Barley	Cowpea, bean, Rice bean, Black gram, Pea, Horse-grams,	Radish, Rayo, Cabbage, Cauliflower, Sponge guard, Bottle guard, Pumpkin, Potato	Citrus, Pear, Banana, Litchi, Mango, Peach, Plum,	Rayo, Radish, Carrot, Cucumber, Tomato, Jukuni, Cauliflower, Cress.

Cropping pattern :

The following cropping patterns are the major ones, which are followed by the farmers of Parbat.

Khetland	**Bariland**
Paddy – Wheat - Paddy	Maize - Millet - fallow
Paddy – Wheat - Maize	Maize- - Buck wheat - Potato
Paddy – Wheat - Fallow	Maize- - Toria - fallow
Paddy – Potato - Maize	Maize- - Millet - wheat
Paddy - Vegetable - Maize	Maize- - Millet - Vegetable
Paddy - Mustard – Maize	Vegetable -Vegetable - fallow.
Paddy - fallow - fallow	

Pocket Area of Parbat

Pocket on commercial fruits growing:

Citrus: Mallage (7 ha.), Deupur (3 ha.).

Seed production :

A. Potato: Bhoksingh (1ha.), Saliza (1ha.),

B. Vegetable seed production (5 ha) Kholakhet, Saliza, Deupur.

C. Cereals seed production (4 ha), Shankar pokhari, Huwas,

D. Vegetable production: Shivalaya.

E. Intensive crop cultivation pocket area 240ha., in Dhairing, Phalewas, and Pipaltari.

Crops in pocket area :

Paddy, wheat, maize, Toria, Chaite dhan (spring paddy) main season paddy, potato, Lentil, Vegetable

Preparation of a soil fertility map for Parbat district

Methodology

Source map use :

LRMP land system maps of 1:50,000 scale and Arial photos of 1:50,000 scale were used as a source maps. Points for sampling area were identified. Samples from each VDC including each land system were collected from DADO as well as from the survey teams. Three groups of technicians were involved in soil survey and soil sample collection in the leadership of soil scientist and assistant soil scientist. A total of 247 samples were collected. Routine analysis of soil samples were done for pH, OM, Available P_2O_5, available K_2O. The results were plotted in land system maps to identify the status of major plant nutrients in different mapping unit. Soil fertility maps (showing soil reaction, Organic matter level, Available phosphorus level and available potassium level) were prepared by using GIS. The fertility status of Parbat district is as follows :

Table 4. Fertility status of district area (%)

Elements	Analysis methodology	Very low	Low	Medium	High
Organic matter	Wakley, Black titration	2.0	10	66	22
Available K_2O	Neutral ammonium acetate extraction.	2.4	10.3	45.3	42
Available P_2O_5	Bray 2 method	-	19	51	30

Table 5. Soil reaction status of Parbat district (%)

pH	Alkaline	Nearly neutral	Slightly acidic	Mode. acidic	Strongly acidic
%	1	5	54	21	19

Result :

pH of the soil

Almost all of the soil analysis report revealed that the soil reaction of Parbat district is strongly acidic to slightly acidic . pH range varies from 4.0 to7.40 only one sample from Bachha below to road or near Gandaki has found pH 7.4 (theoretically alkaline soil not practically). Strongly acidic to moderately acidic soils areas are Arther, Pipal tari, Khaula, Katuwa chaupari, Thuli pokhari, Thana maula, Kurgha, Khanigaun, Deupur, Limithana, Mudikuwa, Kyang , Bajung, Bhuka, Tilahar, Chitre, Deurali, Bara chure, Majh phant, Dhairing , Lekha phant, Karki neta , Thapathana, Shanker pokhari, Lunkhu, Phalamkhani, Pakuwa, Siwalaya, Saligram. Where majority of soil samples have found < 5.9 pH . Some samples were in moderately acidic to nearly neutral range also but majority of the soils are very acidic which need amendment. Slightly acidic areas are Taklak, Huwas, Balakot, Lunkhui Deurali, Panrang, Bachha, Triveni, Beulibash, Uram.

Other moderately Acidic areas are Dhairing Danda kharka, Ramja , Mallaj, Banskharka, Salija, Chitre Please look the soil fertility maps for detailed .

Recommendation : Agricultural lime application is highly recommended to the strongly and moderately acidic area. Recommended dose of the lime is given in annex no 1.

Phosphorus content :

51% of district soils contain medium level of available followed by high level of 31%. The variation of phosphorus content in the soil is very wide (below 1 kg/ha to 295kg/ha). Taklak, Triveni, Huwas, Bachha Siwalaya, Dada Kharka have low phosphorus content in many places, the available phosphorus is low where pH range is very acidic.

Potassium content :

The available potassium content of Parbat soil is Medium (45.3%) to high (42%). Available potassium variation is 33.8 kg/ha. (Banskhark) to 1019 kg/ha (Bachha). Table no. 6 provides the VDC wise available potassium content of the soils of Parbat. Detailed may be seen in map also.

Organic matter content in soils :

The organic matter status of Parbat soil is medium (66%) followed by high level

.22%). The lowest organic matter level found 0.08 %. In Majhpnant VDC. ward no. 7 and highest (6.06%) in Kyang VDC, ward no. 8. Details are shown in table 6.

Recommendation of manure and fertilizer :

The fertilizer and manure recommendations for various crops are given in annex no.2. The organic matter content of the majority Parbat soil is medium but intensive cropping system and inadequate use of manure and fertilizer might causes the fall down of OM level. So, the regular use of organic manures (FYM/compost) and green manuring along with chemical fertilizer is recommended.

Table 6. Soil fertility status (VDC wise)

VDC Name	Soil pH			Soil Nitrogen			Soil organic matter			Available phosphorus			Available potassium		
	Ac	N	Alk	L	M	H	L	M	H	L	M	H	L	M	H
Barah Chaur	2	2	-	1	2	1	1	2	1	3	1	-	-	3	1
Ohaki	3	1	-	1	3	1	1	3	1	5	2	-	-	3	1
Ranipani	4	3	-	2	4	-	2	4	-	5	1	-	2	3	1
Saligram	6	5	-	3	8	-	4	7	-	10	1	-	2	5	3
Lekphant	4	-	-	1	2	1	1	2	1	1	2	1	1	1	2
Banskhark	7	-	-	1	5	1	2	4	1	4	1	2	2	2	3
Saliza	4	-	-	1	2	1	1	3	-	-	1	3	-	1	3
Durlung	5	-	-	1	3	1	1	4	-	2	2	1	2	2	1
Devisthan	9	-	-	6	3	-	6	3	-	6	3	2	3	4	-
Majphat	6	-	-	2	3	-	2	3	-	2	-	3	1	2	2
Bachha	3	3	1	-	7	-	1	6	-	6	-	1	-	1	6
Dhairing	3	1	-	-	3	1	-	3	1	-	-	3	1	-	3
Nanglibang	4	-	-	1	2	1	2	1	1	1	1	2	2	-	2
Pang	7	1	-	5	2	1	6	1	1	5	1	2	-	5	3
Khurkot	3	-	-	-	1	2	-	2	-	2	2	-	2	-	1
Banau	1	-	-	-	1	-	-	1	-	-	-	1	-	-	1
Thapathana	4	-	-	-	2	2	-	3	1	2	1	1	1	2	1
Karkineta	4	-	-	-	2	2	-	3	1	3	-	1	-	1	3
Shankerpokhari	3	-	-	-	2	1	-	3	-	2	1	-	-	2	1
Kratnar	3	-	-	-	3	2	-	4	-	2	1	2	-	4	1

Pipaltari	5	-	-	3	2	-	4	1	-	1	1	3	1	3	1
Khaula	3	-	-	1	2	-	2	1	-	-	-	3	-	3	-
Katuwachaupari	5	-	-	5	-	-	5	-	-	1	-	4	1	3	1
Thulipokhari	5	-	-	1	3	1	1	3	1	1	1	3	1	2	2
Thanamaula	4	-	-	-	4	-	-	4	-	2	-	2	2	2	-
Kurgha	3	-	-	1	1	1	1	1	1	2	-	1	-	3	-
Khanigaun	4	-	-	2	2	-	2	2	-	2	1	1	-	2	2
Deupur	3	1	-	-	3	1	3	-	1	-	1	3	-	1	3
Limithana	4	-	-	1	3	-	1	3	-	3	-	1	-	3	1
Mudikuwa	4	-	-	3	1	-	2	2	-	1	2	1	1	2	1
Kyang	4	-	-	1	-	3	1	-	3	-	-	4	-	-	4
Bajhung	12	-	-	5	6	1	5	6	1	1	1	8	1	4	5
Mohoria	1	-	-	-	-	1	-	-	1	-	1	-	-	-	1
Tilahar	5	-	-	-	4	1	-	4	1	-	1	4	-	1	4
Deurali	4	-	-	-	4	-	-	4	-	-	1	3	1	2	1
Chitre	4	-	-	1	2	1	2	1	1	1	1	-	1	2	1
Bhuka	1	-	-	-	-	1	-	-	1	-	-	1	-	-	1
Bhangara	4	-	-	-	4	-	2	2	-	3	-	1	-	2	2
Balakot	4	-	-	-	3	1	-	3	1	2	2	-	-	3	1
Pakhapani	3	1	-	-	3	1	-	2	1	3	2	-	-	3	1
Lunkhudeurali	4	1	-	-	2	3	-	2	3	3	2	-	-	2	3
Bhorle	3	1	-	-	1	3	-	1	3	3	1	-	1	1	2
Phalamkhani	4	-	-	-	-	4	-	2	2	-	4	-	-	1	3
Bhoksing	2	1	-	-	1	2	-	3	-	3	-	-	-	2	1
Horsandi	2	1	-	-	-	3	-	3	-	1	2	-	-	2	1
Sibalaya	4	-	-	-	4	-	-	4	-	4	-	-	-	-	4
Ramja	2	-	-	-	2	-	-	2	-	2	-	-	-	1	1
Pakuwa	4	-	-	-	4	-	-	4	-	4	-	-	-	3	1
Chuwa	3	1	-	1	3	-	1	3	-	4	-	-	-	1	3
Trebeni	2	2	-	-	4	-	1	3	-	2	1	1	1	2	-
Pangrang	2	--	-	-	2	-	-	2	-	1	1	-	-	2	-

Note : Ac = acidic N= Neutral Al = Alkaline L= Low M= Medium H= High

Details are given in maps.

Parbat District
Organic Matter level

Legend

- Sample sites ~~showing OM level~~
- Text Settlement
- Settlement
- Roads
- Rivers and drainage

OM level

- High (OM>5%)
- Medium(OM2.5-5%)
- Low (OM 1-2.5%)
- Very low (OM<1%)

Prepared by
S.N. Mandal

Parbat District
Phosphorus Level

Legend

- Text Settlement
- Settlement
- Sample sites
- Road
- River

Phosphorus level

- Low (<35 kg P2O5/ha)
- Medium (35-105 kg P2O5/ha)
- High (>105 kg P2O5/ha)

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STSS

Parbat District
Soil Reaction Map

N
W E
S

Legend

Text Settlement
Settlement
Sampsite
Roads
Rivers and drainage
Soil Reaction
Strongly acidic (pH<5.2)
Moderately acidic (pH 5.3-5.9)
Slightly acidic (pH6-6.50
Nearly neutral (pH6.6-7)

5 0 5 Kilometers

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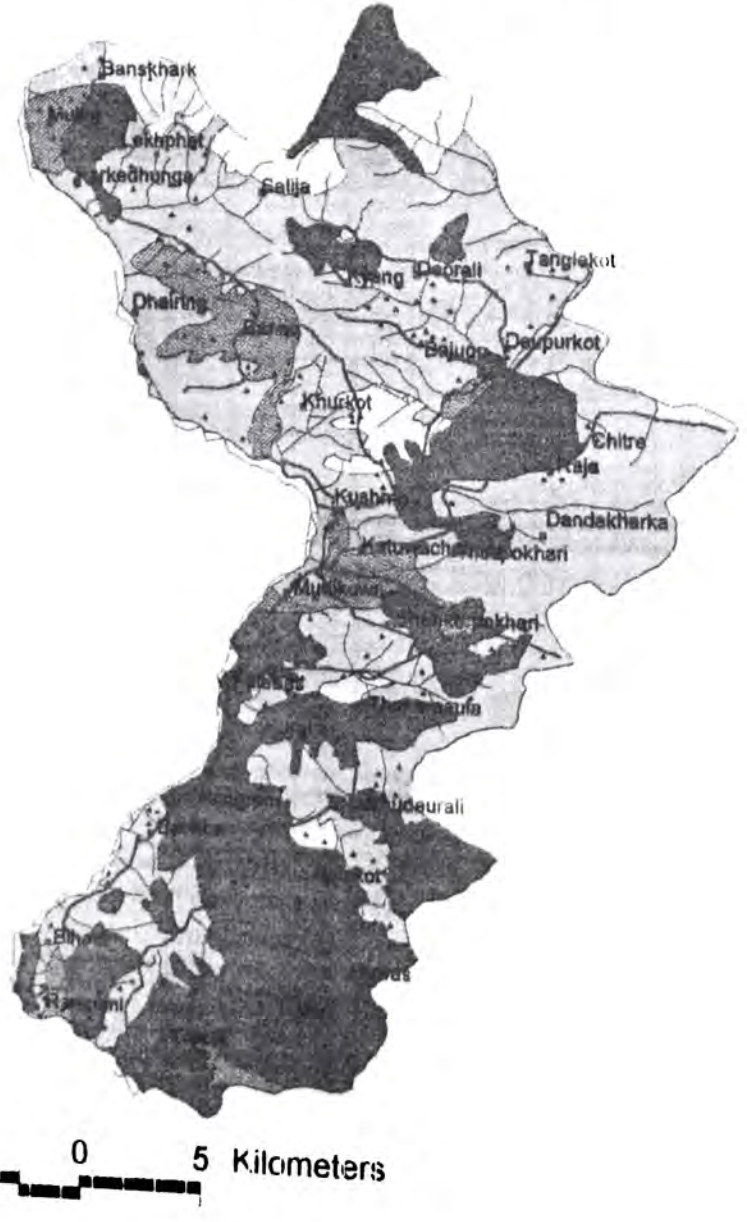
S.P.Marasini
Stats

Parbat District
Potash level



Legend

Text Settlement
Settlement
Sample sites
Roads
Rivers and drainage
Potash level
Very low (<55 kg/ha)
Low (55 - 110 kg/ha)
Medium (110 - 280 kg/ha)
High (>280 kg/ha)

Prepared by
S.N.Mandal
STSS

Recommendation of agricultural lime for different pH level, for different soils texture

pH	Recommended dose of Agri lime (Kg/ ropani)					
	Hills			Terai		
	Sandy loam	Loam	Clay loam	Sandy loam	Loam	Clay loam
6.4	15	20	24	8	14	22
6.3	29	40	48	15	24	44
6.2	43	60	72	23	34	64
6.1	58	78	98	30	44	86
6.0	71	92	120	38	52	106
5.9	85	110	146	45	62	128
5.8	97	128	166	52	72	146
5.7	108	142	188	58	82	166
5.6	119	158	208	64	90	184
5.5	130	170	230	70	100	200
5.5	140	188	252	76	110	220
5.3	150	204	274	81	118	238
5.2	160	218	294	86	126	254
5.1	169	228	314	91	136	270
5.0	176	240	334	96	142	286
4.9	184	252	354	101	150	302
4.8	191	262	374	106	158	316
4.7	199	272	390	111	166	330
4.6	205	280	406	115	174	340
4.5	210	290	420	120	180	350

Note :

- Test your soil before applying lime.
- Use agricultural lime 2-3 weeks before plantation or sowing the seed.
- If high dose of lime is recommended, use in splited dose of twice.
- If pH is less than 4.5, apply agricultural lime recommended for pH 4.5 and application should be repeated as required after checking the soil pH.
- It is not advised to raise the soil pH by more that one unit at a time or a season.

Fertilizer Recommendation Sheet based on Soil Annual Analysis

To,
Mr/Mrs ... ... Dist : ... ... VDC : ... ... Ward No. : ... ...

The analysis result of your soil sample is given below. Your soil is acidic / neutral alkaline. So use ... ... Kg lime / Gypsum / ha with abundant amount of any one organic manure (FYM, compost, sheep or goat dung, poultry manure, green manure, Azola, oil seed cake etc.)

Soil test result :

pH			Nitrogen %			Phosphorus Kg/ha			Potassium Kg/ha			Organic matter %			Texture	Remark
Acidic	Neutral	Alkaline	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		

General Recommendation of Fertilizer and manure Kg/ha (20 Ropani or 30 Kattha)

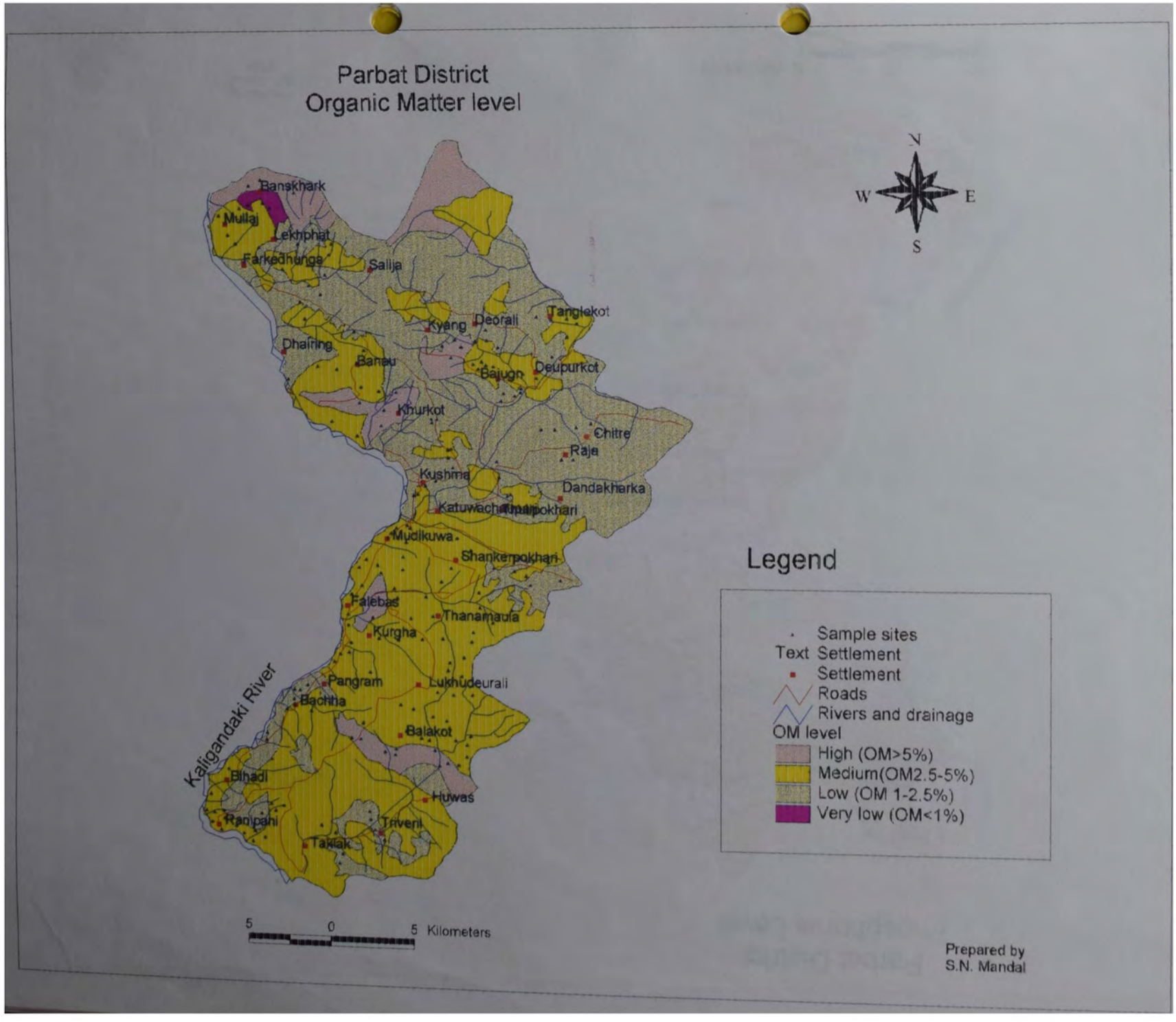
Crop	Nitrogen (Kg/ha)			Phosphorus (Kg/ha)			Potash (Kg/ha)			FYM (t/ha)	Remarks
Paddy irrigated	100	50	25	30	15	8	30	15	8	6 ton/ha (240 Doko)	1 Kg Nitrogen = 4.8 KG Ammonium Sulphate = 2.2 Kg Urea 1 Kg Phoshpros = 6.25 Kg Sing Super Phosphate = 3.12 Kg Double Super Phosphate = 2.1 Kg Triple Super Phosphate 1 Kg Potash = 1.67 Kg Muriate of Potash
Paddy unirrigated	60	30	15	20	10	5	20	10	5	,,	
Wheat irrigated	100	50	25	50	25	13	25	12	6	,,	
Wheat unirrigated	50	25	13	50	25	13	20	10	5	,,	
Maize (summer + winter)	60	30	15	30	15	8	30	15	8	,,	
Barley + naked barley	30	15	7.5	20	10	5	10	5	2.5	,,	
Millet	20	10	5	10	5	2.5	10	5	2.5	,,	
Sugarcane ratoon	150	75	37.5	60	30	15	40	20	10	,,	
Sugarcane (main)	120	60	30	60	30	15	40	20	10	10 ton/ha (200 Doko)	
Buck wheat	30	15	7.5	20	10	5	10	5	2.5	6 ton/ha (240 Doko)	
Ginger	30	15	7.5	30	15	7.5	60	30	15	24 ton/ha	
Potato	70	35	17.5	50	25	12.5	40	20	10	30 ton/ha	

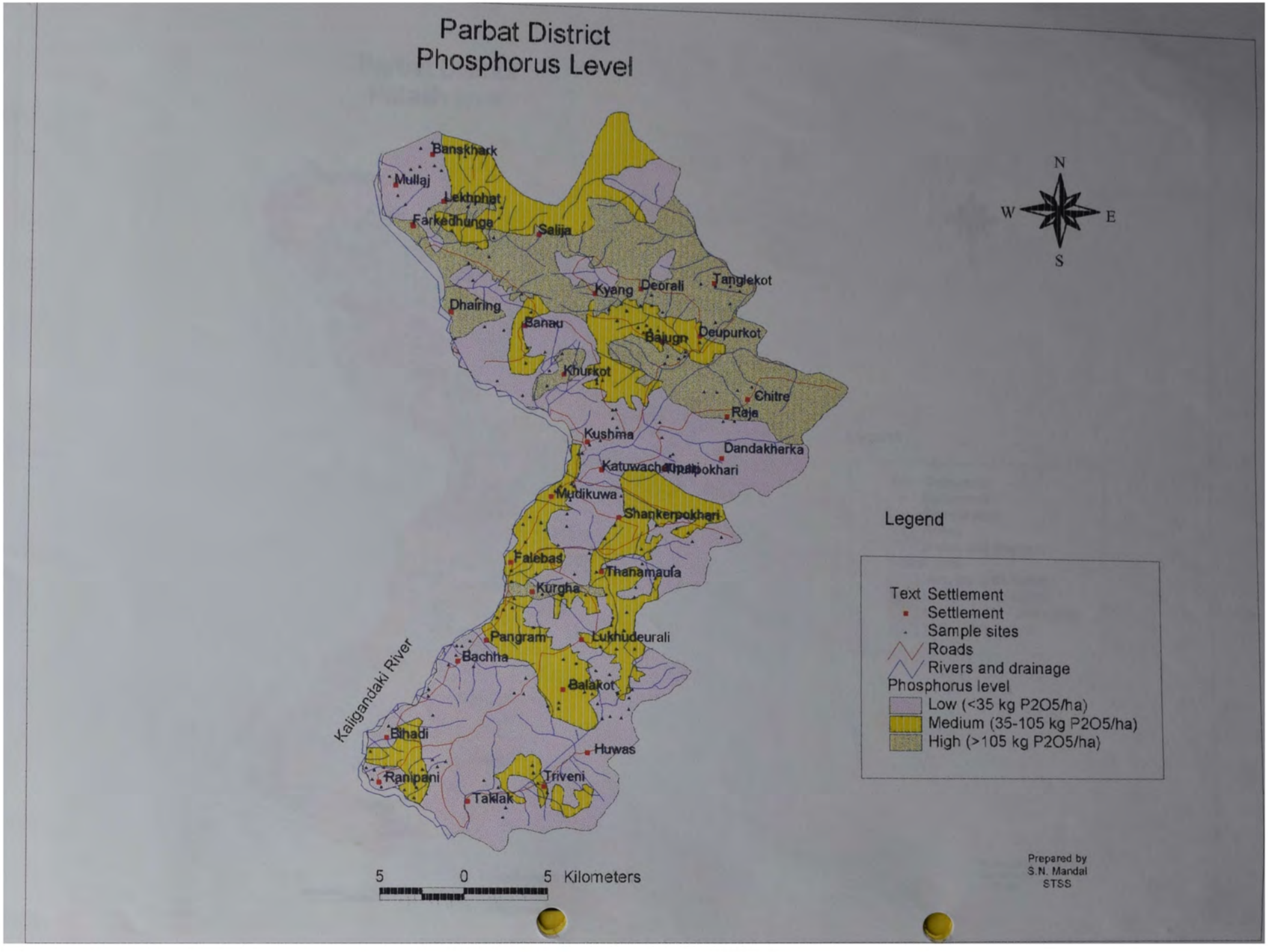
Tobacco	35	17.5	[illegible].75	23	11.5	5.75	60	[illegible]0	15	10 ton/ha
Mustard	60	30	15	40	20	10	20	10	5	6 ton/ha
Sunflower	60	30	15	40	20	10	20	10	5	6 ton/ha
Vegetable crop	70	35	17.5	50	25	12.5	40	20	10	32 ton/ha
Lentil, Black gram, Green gram	20	10	5	20	10	5	20	10	5	4-6 ton/ha
Cowpea, Pigeon pea	20	10	5	40	20	10	30	15	7.5	
Chick pea	20	10	5	40	20	10	20	10	5	,,
Pea	15	7.5	3.75	40	20	10	10	5	2.5	,,
Soybean	10	5	2.5	40	20	10	30	15	7.5	,,
Ground nut	40	20	10	60	30	15	20	10	5	6 ton/ha
Mulberry Terai unirrigated	300	150	75	140	70	35	180	90	45	
Mulberry Terai irrigated	150	75	37.5	70	35	17.5	90	45	22.5	
Mulberry Hill irrigated	200	100	50	80	40	20	120	60	30	
Mulberry Hill unirrigated	100	50	25	40	20	10	60	30	15	

L = Low, M = Medium, H = High

Fertilizer Recommendation for Fruit Crops :

Age	1	2	3	4	5	6	7	8 and above
1. FYM (Kg/tree)	25	30	40	50	60	60-100	60-100	60-100
2. Nitrogen N (g/tree)	–	100	125	150	200	300	400	500
3. Phosphorus P_2O_5 (g/tree)	–	50	75	100	150	200	200	200
4. Potash K_2O (g/tree)	–	20	30	40	50	5	100	100


Parbat District
Organic Matter level
N
W
E
S
Banskhark
Mullaj
Lekhphat
Farkedhunga
Salija
Kyang
Deorali
Tanglekot
Dhairing
Baneu
Bajugn
Deupurkot
Khurkot
Chitre
Raja
Kushma
Dandakharka
Katuwachaur
Tharpokhari
Mudikuwa
Shankerpokhari
Falebas
Thanamaula
Kurgha
Pangram
Lukhudeurali
Bachha
Balakot
Kaligandaki River
Bihadi
Huwas
Ranipahi
Triveni
Taklak
5 0 5 Kilometers
Legend
Sample sites
Text Settlement
Settlement
Roads
Rivers and drainage
OM level
High (OM>5%)
Medium(OM2.5-5%)
Low (OM 1-2.5%)
Very low (OM<1%)
Prepared by
S.N. Mandal


Parbat District
Phosphorus Level
Banskhark
Mullaj
Lekhphat
Farkedhunga
Salija
Kyang
Deorali
Tanglekot
Dhairing
Banau
Bajugn
Deupurkot
Khurkot
Chitre
Raja
Kushma
Dandakharka
Katuwachaur
Upalpokhari
Mudikuwa
Shankerpokhari
Falebas
Thanamaula
Kurgha
Pangram
Lukhudeurali
Bachha
Balakot
Kaligandaki River
Bihadi
Huwas
Ranipani
Triveni
Taklak
N
W
E
S
Legend
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Roads
Rivers and drainage
Phosphorus level
Low (<35 kg P2O5/ha)
Medium (35-105 kg P2O5/ha)
High (>105 kg P2O5/ha)
5 0 5 Kilometers
Prepared by
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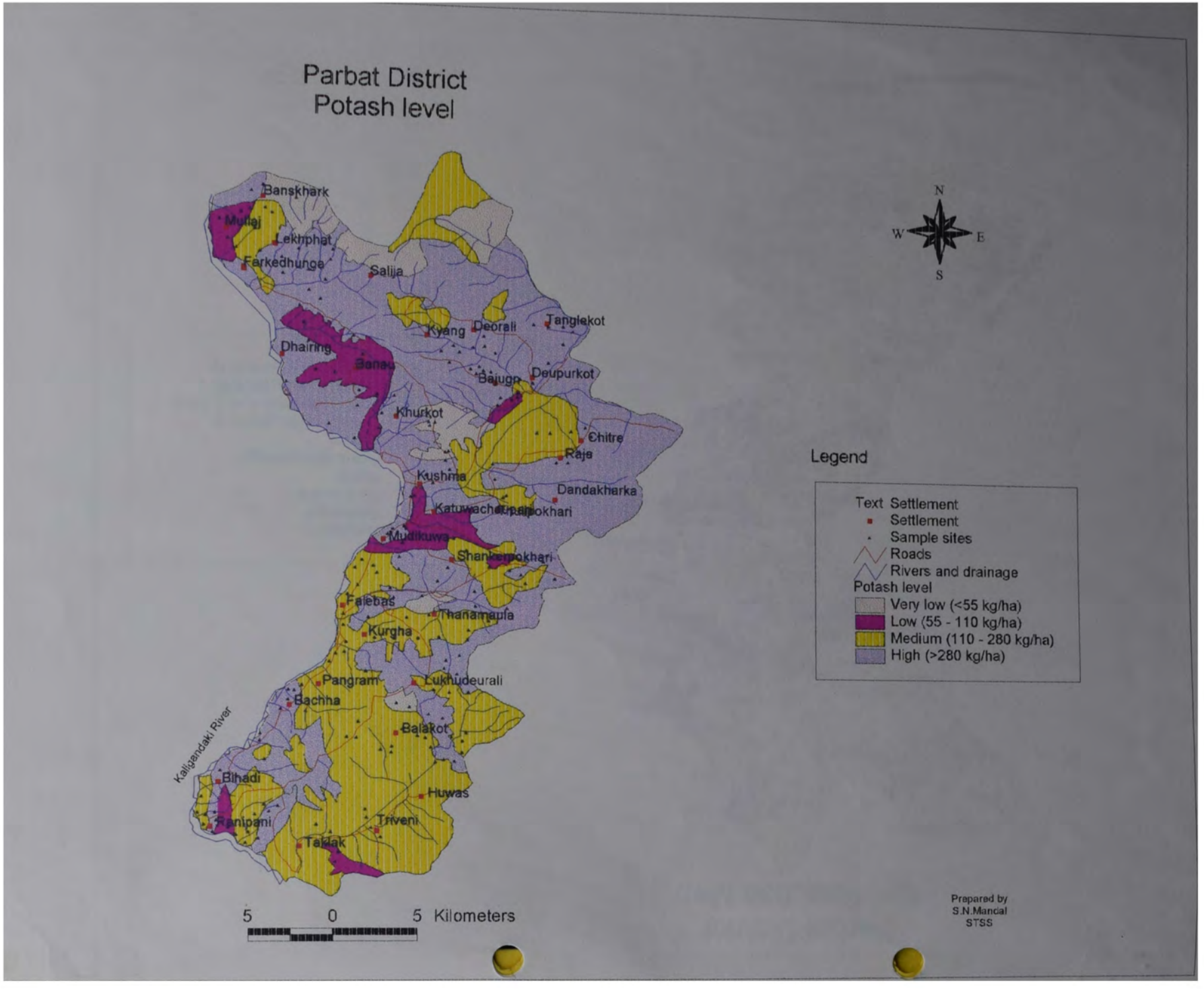
STSS


Parbat District
Potash level
Banskhark
Mudlej
Lekhphat
Farkedhunga
Salija
Kyang
Deorali
Tanglekot
Dhairing
Bajugo
Deupurkot
Khurkot
Chitre
Raja
Kushma
Dandakharka
Mudikuwa
Shankarpokhari
Falebas
Thanamanta
Kurgha
Pangram
Lukhudeurali
Bachha
Balakot
Kaligandaki River
Bihadi
Huwas
Ranipani
Triveni
Talkak
5 0 5 Kilometers
N
W
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Legend
Text Settlement
Settlement
Sample sites
Roads
Rivers and drainage
Potash level
Very low (<55 kg/ha)
Low (55 - 110 kg/ha)
Medium (110 - 280 kg/ha)
High (>280 kg/ha)
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Parbat District
Soil Reaction Map