Soil Fertility Status and Fertilizer Recommendation Atlas for Tigray Regional State, Ethiopia

July 2014

Ministry of Agriculture

Ethiopian ATA
Agricultural Transformation Agency
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Soil Fertility Status and Fertilizer Recommendation Atlas for Tigray Regional State, Ethiopia

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July 2014, Addis Ababa, Ethiopia.

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Acronyms

AfSIS:	African Soil Information Services
AGP:	Agricultural Growth Program
ATA:	Ethiopian Agricultural Transformation Agency
BART:	Bayesian Additive Regression Tree.
CASCAPE:	Capacity building for scaling up of evidence-based best practices in agricultural production in Ethiopia
CSA:	Central Statistical Agency
DSM:	Digital Soil Mapping
ESSP-IFPRI:	Ethiopian Strategy Support Program - International Food Policy Research Institute
EthioSIS:	Ethiopian Soil Information System
FAO:	Food and Agriculture Organization of the United Nations
ICL Africa:	Israel Chemicals Limited Africa
ICP:	Inductively Coupled Plasma
LAEA:	Lambert Azimuthal Equal Area projection
MoA:	Ministry of Agriculture of Federal Democratic Republic of Ethiopia
MODIS:	Moderate-resolution Imaging Spectroradiometer
NSTC:	National Soil Testing Center
RBO:	Regional Bureaus of Agriculture
OCP:	Office Chérifien des Phosphates (Morocco Phosphate Company)
UNDP:	United Nations Development Programme

Ministry of Agriculture of the Federal Democratic Republic of Ethiopia

Ethiopia's Ministry of Agriculture is a century old institution engaged in advancing the agriculture sector. After being established in 1991, the Government of the Federal Democratic Republic of Ethiopia designed a new agricultural policy and strategy that focused on Agricultural Development Led Industrialization (ADLI) and aimed at transforming the country's economy. Since then, the Ministry along with its regional partners has prioritized and implemented key interventions that helped consistently increase agricultural production and productivity for nearly a decade and half.

Among the key strategies that were identified to help increase agricultural production and productivity in the GTP period was the soil fertility mapping of the country's agricultural lands and based on the information generated, revising the fertilizer advisory service to farmers. The Ministry believes agricultural transformation has yet to take place at higher levels through scaling up the use of improved technologies and farming practices by farmers to the extent that the country produces in huge quantities for the market and industry. The necessity to transform this sector is unquestionable. That is why the government has demonstrated a strong commitment to the agriculture sector through allocating more than 15 per cent of the county's total budget consistently.

Agricultural Transformation Agency

The ATA is a time-bound government agency whose mandate is to address the systematic bottlenecks in the agricultural sector by supporting and enhancing the capacity of the Ministry of agriculture and other public, private and non-governmental implementing partners in 2 key ways;

1) Support agriculture sector stakeholders in developing and implementing solutions to systemic bottlenecks in order to transform the agriculture sector;

   We work together with our partners to identify, develop, and support the implementation of long-term interventions that remove the systemic bottlenecks that are impeding the development of the Ethiopian agriculture sector

2) Support the implementation of a targeted set of integrated interventions that will make immediate impact for a large number of women, men and youth smallholder farmers in Ethiopia.

We work together with our partners to identify and implement targeted near-term opportunities to increase men, women and youth smallholder farmer productivity and income for specific crops and geographies.

Foreword by H.E. Minister of Agriculture

The Ministry of Agriculture of the Federal Democratic Republic of Ethiopia takes this opportunity to congratulate federal and regional institutions, experts and development agents for acquiring a strong tool that will help them in their day to day service to rural farmers, and increase agricultural productivity at higher level. Although strengthening the knowledge base about our country's soil fertility status has been the concern of our soil scientists and experts for many years, it remained as unattended agenda for many decades in the past. Thanks to our government, this is no more an issue, and the efforts of generating the information has now started to b ear fruits. In addition, as a country we have established a soil resource information database and processing capacity in the Ministry.

The soil fertility atlas that is completed for Tigray region is the beginning of the series of regional atlases that are expected to be published in the next 1-2 years. With these, the Ministry, Regional Bureaus of Agriculture, and other partners can refine the types of fertilizers to be distributed to farmers by woreda. As most of the recommended new fertilizers are blended fertilizer types, efforts will be made to expand the number of fertilizer blending plants in strategic locations in the country.

We believe this approach will help us in realizing our agricultural transformation agenda.

The milestone we are witnessing today could not have come had it not been due to the big efforts of the project staff, federal and regional partners, and the donor community. We are happy to witness that this noble agenda has brought together a large pool of actors who stand for the same cause. At the same time, the Agricultural Transformation Agency's important role in housing and implementing the project is invaluable. From the Ministry side, we promise to make sure that the project attains its goal of completing the soil fertility atlas of the country's agricultural land.

Tefera Derbew

Ministry of Agriculture

Foreword by the Ethiopian ATA CEO

The Agricultural Transformation Agency of Ethiopia administered, managed and supervized the EthioSIS project in collaboration and involvement of its key partners. This included the Ministry of Agriculture and the regional bureaus of agriculture. Historical soil information collection in Ethiopia was fragmented, uncoordinated and did not answer the question of status and lack of nutrients at the national level. Recommendation of specific fertilizers to increase yield and productivity to Ethiopian farmers was not adequately based on knowledge about nutrient status of the agricultural soils.
To this effect, EthioSIS was launched to provide information on the status of soil fertility of the agricultural lands in addition to mapping Ethiopian's land resources through state of the art technology. Currently, The EthioSIS project has collected soil samples from 247 woredas of which 180 woreda soil samples have been analyzed and nutrient status and fertilizer recommendation have been developed for these woredas. The EthioSIS project has also collected soil samples from 59 confluence points to be used for land resource characterization and mapping purposes.

The EthioSIS project has also been involved in capacity building of the National Soil Testing Center and five regional laboratories (Mekele, Hawassa, Bahir Dar, Nekemte, Dessie laboratories and Jima research center) through providing highly needed training, building soil achieving centers (Shades) and providing small ware and equipment.

Capacity building in geo-statistics was a central part of EthioSIS project and the contribution of our international partner such as AfSIS, Wageningen University and FAO was critical

The EthioSIS project has completed soil fertility mapping and fertilizer recommendation for all 35 woredas in Tigray. This information has been presented to stakeholders comprised of Tigray RBO, Tigray Agricultural Research Institute and a representative of Mekele University. The findings and recommendations have been discussed with them and this has also helped the Bureau to identify the types of fertilizer ingredients it will need to purchase for the 2007 cropping season.

Given the complexities of soil fertility mapping, it is important to note the valuable contributions of various institutions that have made this work successful. Many thanks go to our non-government partners, OCP group, Allana Potash, CASCAPE and ICL Africa for their financial support. Recognition also goes to the World Bank, AGP and UNDP for their continuing support.

Khalid Bomba

Chief Executive Officer

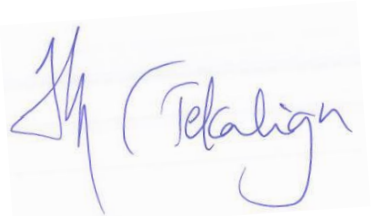
Ethiopian Agricultural Transformation Agency

About the Atlas

This atlas presents the status of key soil fertility parameters of 35 woredas of Tigray Regional State. In addition, it demonstrates the recommended fertilizers by woreda. All nutrients were extracted in Mehlich III method except pH, which was determined in water, and calcium carbonate that was measured using calciminer. Nutrient contents in the extracts were read using ICP in internationally accredited laboratories and classified using critical levels adopted from international sources (Appendix 2). Woreda level nutrient predictions were computed using the Regression Kriging and Bayesian Additive Regression Tree (BART) models. The soil fertility status comprises two forms: those soil properties that indicate the soil chemical status, and soil nutrients. Each woreda is represented by two pages of maps that show soil fertility status and recommended blended. While this atlas presents the current soil fertility status in the region, it should be recognized that it is a living document that needs to be updated on regular basis taking into consideration level of soil management and cropping intensity. In particular, periodic checks should be made for nutrients such as boron that have narrow deficiency and sufficiency range. By so doing, it is possible to witness that the status of some nutrients might change, thus requiring the modification of the recommended fertilizers in those areas. However, the maps are only valid for agricultural land.

There are six chapters in this atlas. The first chapter shows the maps showing the general soil fertility status, specifically, that of 17 types of soil fertility parameters and major blended fertilizer types recommended region-wise. In addition, woredas in zone one (North Western Tigray) are part of this chapter. The second chapter presents both soil fertility status and recommended blended fertilizer maps for woredas found in Zone two (Central Tigray Zone). Eastern Tigray Zone is represented in the third chapter. The fourth chapter contains the soil fertility status and recommended blended fertilizer maps for woredas found in Zone four (South Tigray). The fifth and six chapters present the similar types of maps of woredas found in Zone five (Western Tigray) and Zone six (Mekele special Zone particularly Quiha Kebele), respectively. The last pages have appendixes for additional information used during the course of this work. By taking into consideration the diverse agro-ecology and landscape variability, woredas may need many blended fertilizer types but here again, to make it more practical, between 2 and 4 major types of blended fertilizers are recommended after making scientifically acceptable approximations.

Finally, it should be noted that, other than indicating the soil fertility status and recommending the most appropriate fertilizers for each woreda, the atlas doesn't contain information about recommended fertilizer application rates. This and other related issues that need follow-up have been itemized and shared with the federal and regional research institutes.



Tekalign Mamo (Prof.)

State Minister (Minister's Advisor), and

EthioSIS Program Leader

Acknowledgements

Our acknowledgement extends to different institutions and individuals who took part at every stage of the project. First and foremost, we thank the architects of the project who have made immense contribution in terms of formulating, guiding, directing and managing the project from its commencement till today. Among these people, we would like to mention H.E. Tefera Derbew (Minister of Agriculture), H.E. Prof Tekalign Mamo (State Minister and Advisor to the Minister of Agriculture) and Khalid Bomba (Ethiopian ATA - CEO) for their significant role and inputs. We would also like to extend our great appreciation to Dr. Samuel Gameda (former Director of Soil Health and Fertility of ATA), Sara Platt, Sid Kamath, Eric Couper and Eden Getachew for their excellent contribution.

We also would like to thank those who have taken part in the daily routine activities. This includes field data collection, laboratory analysis and processing. This group contributed towards a major and most challenging part of the project. We had more than 50 field surveyors who were led by Behailu Kassahun, and who all deserve appreciation. Dr. Zebene Mikru and Fikire Mekuria are acknowledged for laboratory operations and management including soil sub-sampling and shipment of samples to different laboratories for wet chemistry and spectral analysis.

Hezekiel Tasse has managed the project to great achievement and deserves special thanks. Amanuel Tadesse has coordinated the soil processing, archiving, and procurement of facilities. Dr. Erik Karltun has played a significant role of verifying laboratory data, and interpreting them into fertilizer recommendations in addition to his role as trainer of the laboratory technicians. Staff of the Soil Health and Fertility Program of ATA, namely Dr. Taye Bekele, Dr Selamyihun Kidanu, Mulugeta Demiss and Tegbaru Bellete, have made invaluable contribution on soil related advice as well as technical support and we appreciate their unreserved continuous support.

The GIS team led by Hailu Shiferaw, in which Kiflu Gudeta and Melakbirhan Adugna are members has handled with diligence and efficiency the soil fertility predictions and atlas production. They deserve many thanks and a special place in the project team.

The contributions of federal, regional government offices and international development partners are immense, and we extend our thanks to them. Federal and Regional Agriculture offices, Research Institutes, INSA, CSA, National Soil Testing Center, regional laboratory centers (Mekelle, Dese, Bahir Dar, Nekempte, Jima and Hawassa labs); and international development partners (UNDP, World Bank, IFPRI, AfSIS, FAO, OCP, Allana Potash, ICL Africa, CASCAPE, Wageningen University, BMGF) among others, have helped in the execution of project activities in one way or another and we thank them. We are deeply grateful to Dr. Markus Walsh and Dr. Jiehua Chen of AfSIS for geostatistical capacity building and technical backstopping – their prediction model development has been very valuable, and we always cherish their efforts. In addition, the staff of Wageningen University (Dr. Dick Brus and Dr. Dennis Walvoort) through CASCAPE project (Mr Arie and Dr. Eyasu Elias), have also assisted in the same way, and we extend our deepest gratitude to them.

Last and not least, the assistance and cooperation of the Ethiopia ATA Administration, logistics, communications and procurement staff is not something we can easily forget and we thank them with deep respect due to all; without their speedy support and action, the project would have not reached this stage.

Key terms

Agricultural land: In this context, agricultural land is defined as land that contains both currently cultivated areas (cropped land) and areas which have potentials for future cultivation (cultivable/arable land).

BART: it is one of the regression types of model used to predicted soil nutrients. It is a non-linear approach for predicting soil nutrients in relation to other covariates. BART stands for Bayesian Additive Regression Tree.

Blended fertilizer: a fertilizer product made by physically blending three or more fertilizer ingredients in a factory to provide several nutrients.

Composite sampling: consists of taking nine sub samples that represent the soil variability within the sampling plot and are homogenized to form a single sample.

Covariates: these are secondary datasets which can explain the respective soil parameters besides nutrient content in the soil. It is believed that non-surveyed areas can be confidently predicted from surveyed plots by using these covariates (explanatory variables). About 22 different types of covariates were used for this analysis. Different covariates can explain different soil nutrients depending on their relationship with the given ecosystems (agro-ecology). These covariates are grouped into four major types: climatic factors, reflectance, topographic and vegetation indices for the last 12 years average (see the details at the end of the atlas-Appendix 2).

Critical level: The critical level is the soil test level of soil fertility parameters below which a crop response to a nutrient application may be expected. For some parameters, at very high soil test levels, crop yield may decrease due to toxicity (Appendix 1).

DSM: digital soil mapping, which is the state of the art of using geo-statistical prediction approach by modeling the relevant variables (covariates) with respect to soil nutrients from laboratory test results.

Lambert Azimuthal Equal Area (LAEA): one of the projection types for Africa with 20 degree of Longitude and 5 degree of Latitude as a centroid.

Legacy data: these are secondary datasets collected from different sources and used as covariates.

MODIS: The Moderate-resolution Imaging Spectroradiometer (MODIS) is a payload scientific instrument launched into Earth orbit by NASA in 1999 on board the Terra Satellite, and in 2002 on board the Aqua satellite. The 250 m resolutions of MODIS's products were used as covariates after passing many preprocessing stages.

Regression-kriging (RK) is a spatial prediction technique that combines a regression of the dependent variable on auxiliary variables (such as parameters derived from digital elevation modelling, remote sensing/imagery, and thematic maps) with kriging of the regression residuals

Sample plot: a geo-referenced pre-identified circular sampling block of land from which composite soil samples were taken.

Satellite image: is a photographic representation of an object that was taken using a satellite. Usually, these are images of the whole or part of the earth and they are taken using artificial satellites.

Spatial prediction/ spatial statistics: the field of study concerning statistical methods that use space and spatial relationships (such as distance, area, volume, length, height, orientation, centrality and/or other spatial characteristics of data) directly in their mathematical computations

Soil nutrients: are elements that are useful for the growth of plants and animals. They are classified in to three, namely, macro (major)-, secondary and micro-nutrients, depending upon their volume of requirement by plants and animals. The nutrients removed from soils must be put back into the soil in equivalent amounts in order to mail good soil fertility status; otherwise, crop yield will be compromised

Topsoil: is the top 20cm depth of the soil profile which was considered for soil fertility mapping of agricultural land. Sometimes, for perennial crops like coffee, sugarcane, samples were collected up to 50 cm depth.

Introduction

Ethiopia's economy is based on agriculture, which accounts for 46% of the gross domestic product (GDP) and 85% of the employment (MoA, 2011). However, the sector is characterized by low productivity, mainly caused by low soil fertility and absence of efficient, sustainable and site specific soil fertility management practices (Abush *et al*., 2011), among others. One major impediment to increase fertilizer use efficiency in the country has been lack of information about the fertility status of the agricultural land. Currently, the problem has been recognized by the government and a national land resource and soil fertility mapping work is underway by the EthioSIS project of the Agricultural Transformation Agency. This initiative has been conducted throughout the country to assess the soil fertility status so that fertilizer recommendations can be based on soil test results. So far, soil fertility survey has been completed in 250 woredas, of which, 35 woredas are from Tigray region. This atlas presents the detailed results of the 35 woredas in the region.

Two sampling strategies were followed during soil sampling: randomized and gridded over agricultural land where sampling points were spaced 2-3km from each other. Predefined sampling plots were identified and used to take samples following the field guideline. More than 4,200 soil samples were collected from the 35 rural woredas of the region (on the average, 120 composite samples per woreda). Soil samples were collected from 0-20cm depth (topsoil) and composited to make one homogenized sample.

In the lab, different soil fertility parameters were determined; for the various nutrients, the Mehlich III extraction method was employed. The contents of most nutrients are expressed in mg/kg (or parts per million - ppm). More than 17 soil fertility parameters were analyzed and mapped. The maps on each page were developed using the analysis results of those soil parameters in relation to other satellite imageries. About 23 types of explanatory variables called covariates were used during prediction of the status of each soil fertility parameter.

The pixel sizes of the map outputs are 250m resolution, which is the highest resolution soil fertility map and it is one of the few soil fertility products in the globe. Soil organic matter is generally low in Tigray soils. Soil pH, measured in water, is found to be alkaline (high pH), particularly in western and southern parts of the region. Hence, the Region's soils are found to have either high pH or are neutral. Looking at electrical conductivity (EC), it was found that the soils are salt free (do not have any effect on crop growth). In addition to specific soil management recommendations, customized fertilizers are required to address the deficiencies of major and micro-nutrients.

In the region, seven soil nutrients (N, P, K, S, Fe, Zn and B) are found to be deficient in the soils. Perhaps, what is unique is the fact that Fe was only found to be deficient in the Region compared to the 180 plus woredas surveyed so far in the other regions. Other than these, the rest of the nutrients were found to be normal.

By considering the extent of deficiency of the 7 soil nutrients, it was found that Tigray soils require about 113 fertilizer types. However, with the prevailing resource limitations to prepare and distribute these many fertilizers (most of them for few number of farmers), it was deemed necessary to prioritize the types of new fertilizers to use in the region without compromising the nutrient requirement of the particular areas. By so doing, 11 types of blended fertilizers are recommended for agricultural land in the region.

Recommended nutrient combinations of fertilizer blends for Tigray Region

So far, 12 types of fertilizers were identified and formulae were developed from soil analysis conducted in over 180 woredas. The first 6 blend types are commonly identified for other regions. However, the last 5 blends (highlighted in the table below) are identified for Tigray soil.

Table 1. Fertilizers required for 180 woredas

Standard Formula No.	Fertilizer Type	Percent coverage for Tigray	Remarks
1	NPS		
2	NPSB	7.3	
3	NPKSB	10.2	
4	NPSZnB	6.8	Also recommended for other Regions
5	NPKSZnB	28.6	
6	NPSZn	1.5	
7	NPKSZn	1.5	
8	NPSFeZn	8	
9	NPSFeZnB	3	So far, recommended for Tigray Region
10	NPKSFeZn	1.9	
11	NPKSFeZnB	28.4	
12	NPKS	0.7	

Blended fertilizer sources and formulations

The nutrient formulation of each fertilizer blend is presented below.

Formula 1: NPS: 19 N – 38P_2O_5 +7S

Formula 2: NPSB: 18 N – 36 P_2O_5 + 7S + 0.71B

Formula 3: NPKSB: 13.7 N – 27.4 P_2O_5 – 14.4 K_2O + 5.1S + 0.54B

Formula 4: NPSZnB: 17 N – 34 P_2O_5 + 7S + 2.2Zn + 0.67B

Formula 5: NPKSZnB: 13.0 N –26.1 P_2O_5 –13.7K_2O +5.6S+1.7Zn +0.5B

Formula 6: NPSZn: 17.7 N – 35.3 P_2O_5 + 6.5S + 2.5 Zn

Formula 7: NPKSZn: 15 N – 31 P_2O_5 – 8K_2O + 7 S+ 2.2 Zn

Formula 8: NPSFeZn: 17 N – 35 P_2O_5 + 8S+ 0.3 Fe+ 2.2Zn

Formula 9: NPSZnFeB: 17 N – 33 P_2O_5 + 7S+ 2.2 Zn+ 0.3 Fe+ 0.5 B

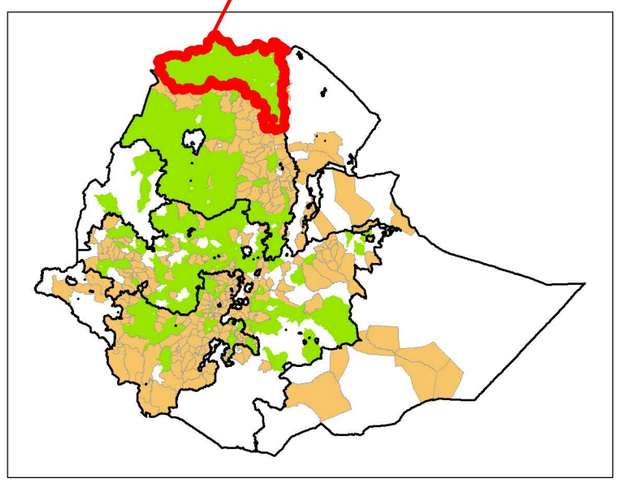
Formula 10: NPKSFeZn: 15 N–30 P_2O_5– 8K_2O+7.0 S+0.3 Fe-chelate+2.2Zn

Formula 11: NPKSFeZnB: 17 N–20 P_2O_5–8K_2O+11 S+2.2 Zn+0.3 Fe+0.5B

Formula 12: NPKS: 15 N – 29P_2O_5 – 8K_2O + 10S

Soil sampling points in Tigray region

Tahitay Adiyabo
Laelay Adiabo
Mereb Leha
Ahiferom
Gulo Mekeda
Erob
Saesi Tsadamba
Qafta Humera
Asegede Tsimbila
Medebay Zana
Nader Adet
Adwa
Wereilehi
Hawzen
Kilte Awlalo
Atsbi Wonberta
Welqayet
Kola Temben
Degua Temben
Tselemt
Tsegede
Enderta
Tanqua Abergele
Saharti Samre
Hintalo Wajirat
Ambalage
Endamehone
Raya Azebo
Ofla
Alamata



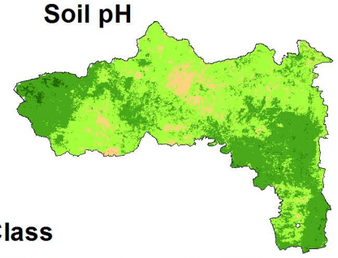
Legend

- Soil sampling points
- Completed (250 woredas)
- In progress (250 2014-2015)

Source: The Administrative boundaries in this atlas are taken from CSA (2007) that were used for Population and Housing Census.

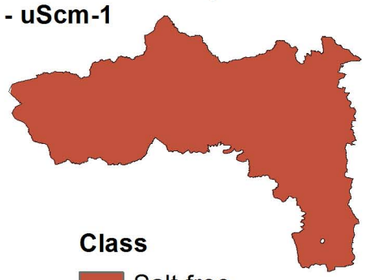
Soil fertility status of Tigray Region

Soil pH



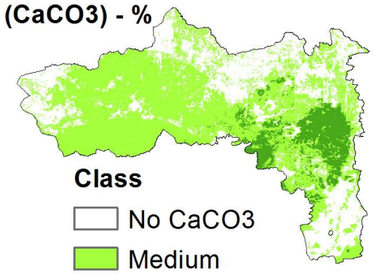
Class
- Strongly acidic
- Mod. alkaline
- Mod. acidic
- Strongly alkaline
- Neutral

Electrical Conductivity (EC) - uScm-1



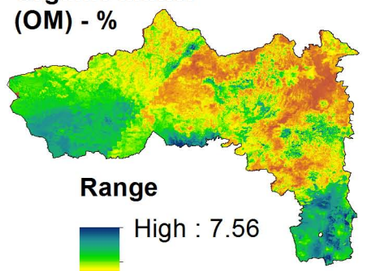
Class
- Salt free

Calcium Carbonate (CaCO3) - %



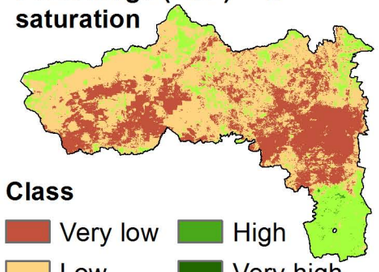
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



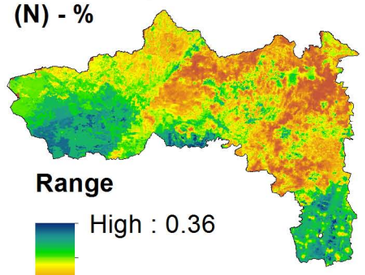
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



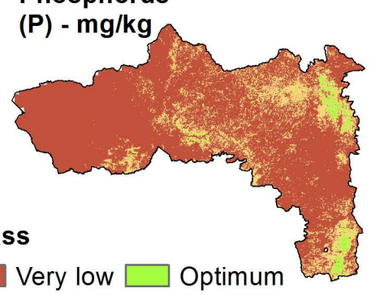
Class
- Very low
- High
- Low
- Very high
- Optimum

Total Nitrogen (N) - %



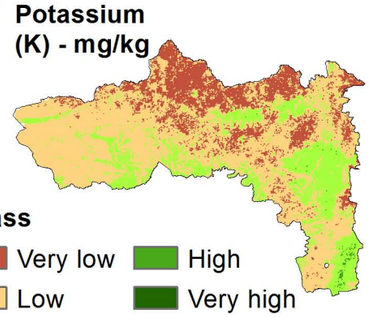
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



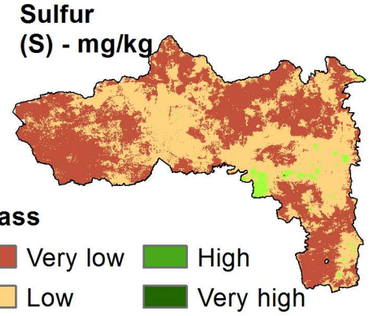
Class
- Very low
- Optimum
- Low
- High

Potassium (K) - mg/kg



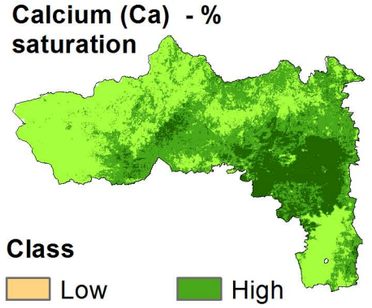
Class
- Very low
- High
- Low
- Very high
- Optimum

Sulfur (S) - mg/kg



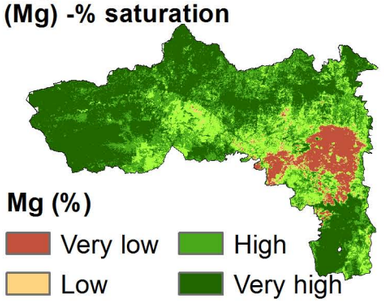
Class
- Very low
- High
- Low
- Very high
- Optimum

Calcium (Ca) - % saturation



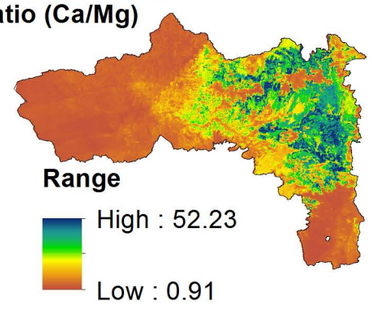
Class
- Low
- High
- Optimum
- Very high

Magnesium (Mg) -% saturation



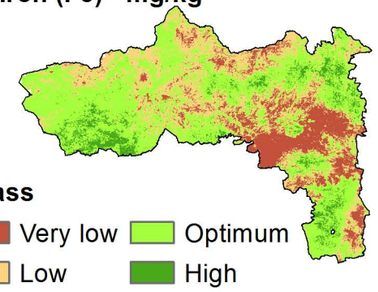
Mg (%)
- Very low
- High
- Low
- Very high
- Optimum

Calcium to Magnesium ratio (Ca/Mg)



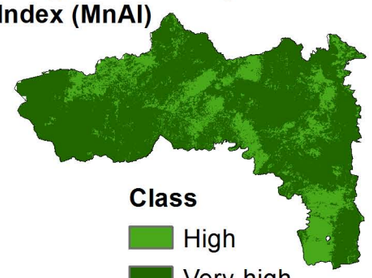
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



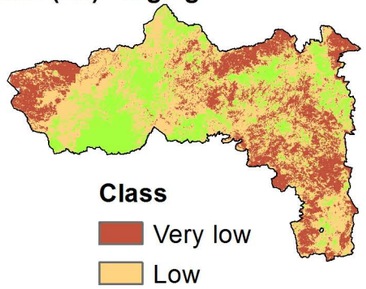
Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)



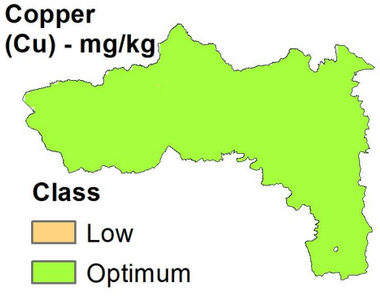
Class
- High
- Very high

Zinc (Zn) - mg/kg



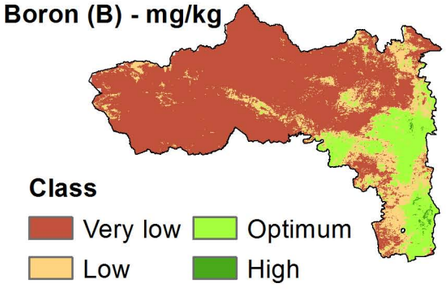
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



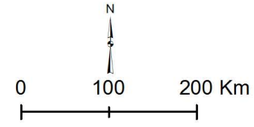
Class
- Low
- Optimum

Boron (B) - mg/kg



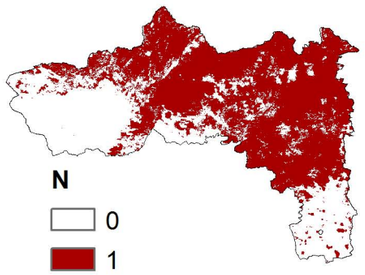
Class
- Very low
- Optimum
- Low
- High

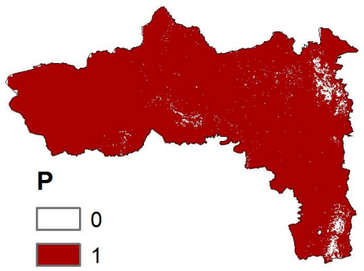
Although 17 soil fertility parameters were analyzed, 7 soil nutrients were found to be deficient in the region. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

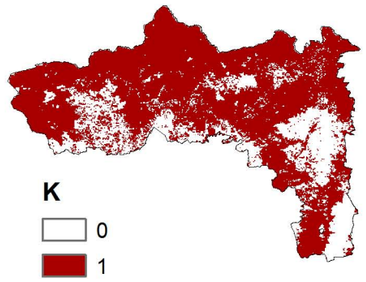


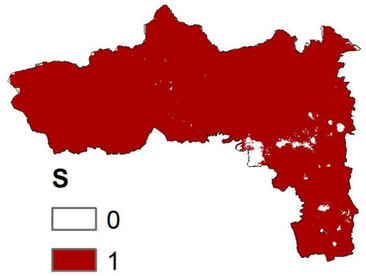
Source: The administrative boundaries in this atlas are taken from CSA (2007) that was used for Population and Housing Census.

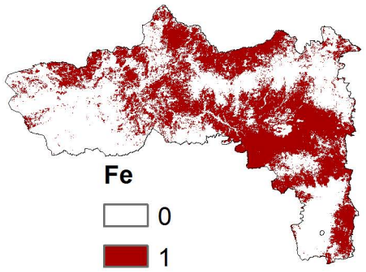
Fertilizer Type Requirement of Tigray Region

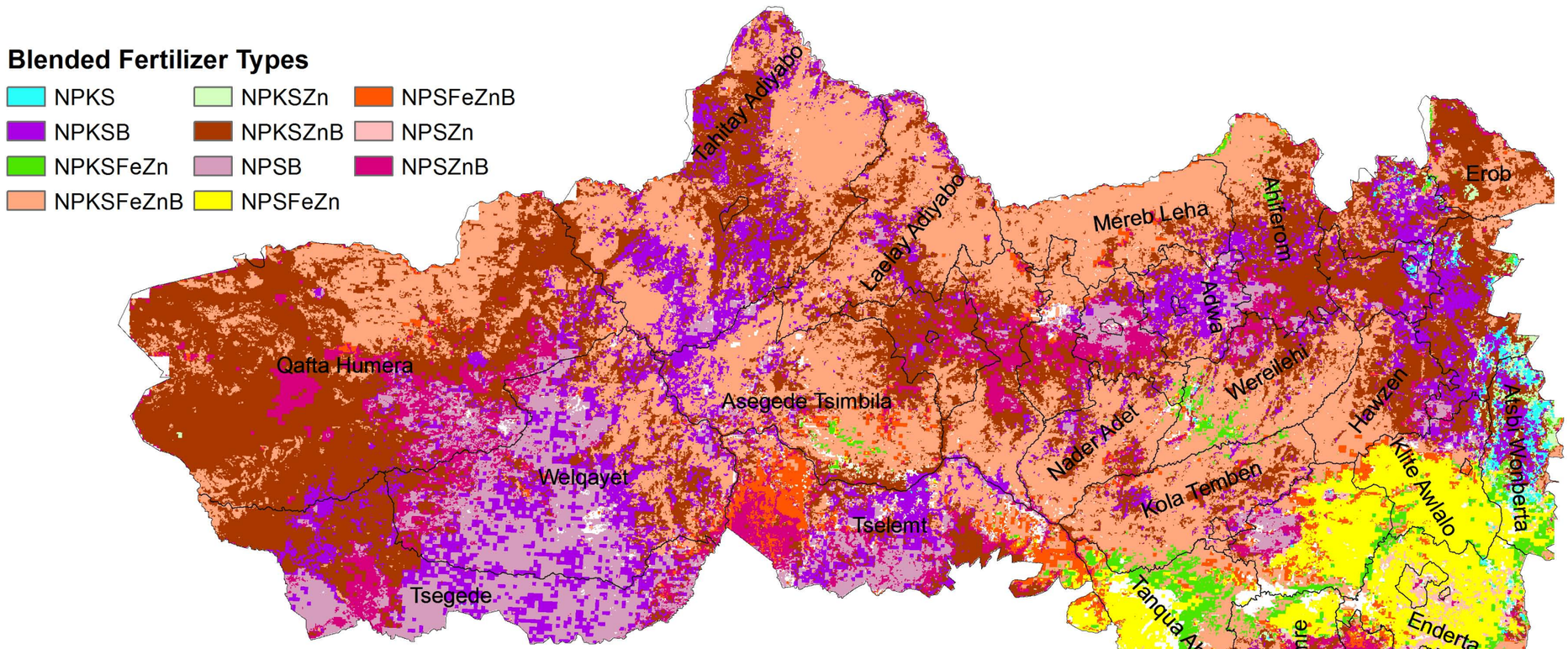


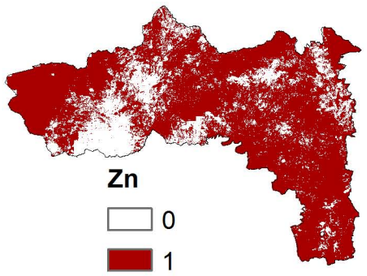


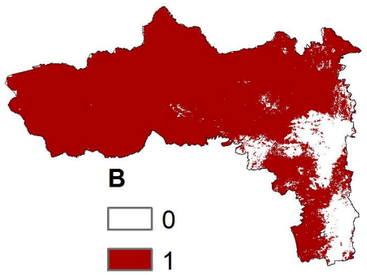




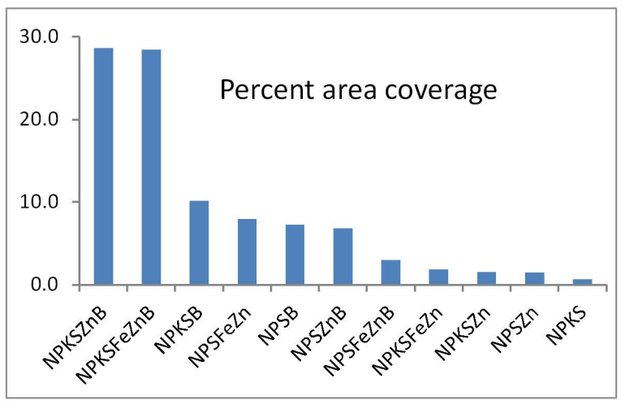




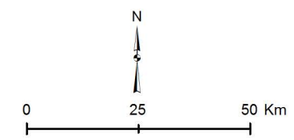




Very low and low nutrient levels were considered as deficient *. In order to tackle soil nutrient deficiency for agricultural soils in the region, 11 types of blended fertilizers are recommended; their area coverage is: NPKSZnB (29%), NPKSFeZnB (28%), NPKSB (10%), NPSFeZn (8%), NPSB (7.4%) and NPSZnB (6.8%), etc.

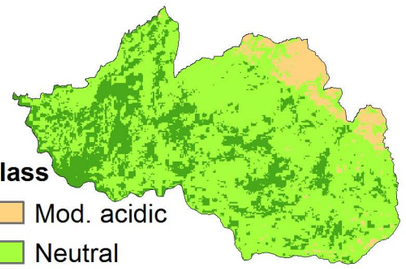


* 0 represents non-deficient areas and 1 represnts deficient areas for seven selected soil parameter (shown above).



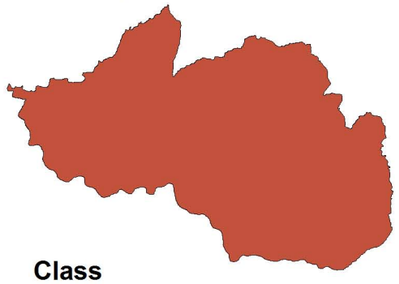
Soil Fertility Status of Asegede Tsimbila Woreda

Soil pH



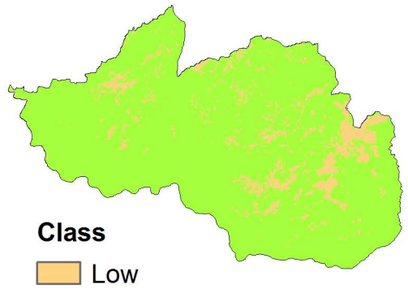
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



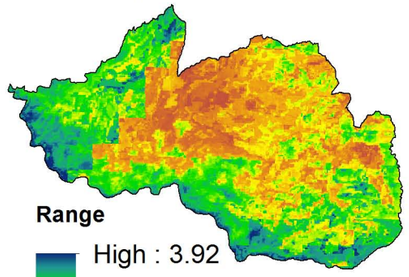
Class
- Salt free

Calsium Carbonate (CaCO3) - %



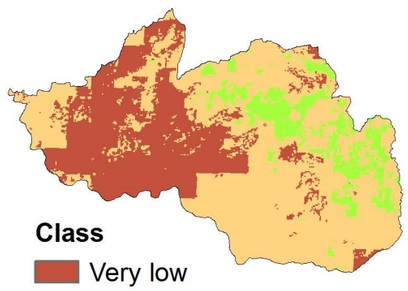
Class
- Low
- Medium

Organic Matter (OM) - %



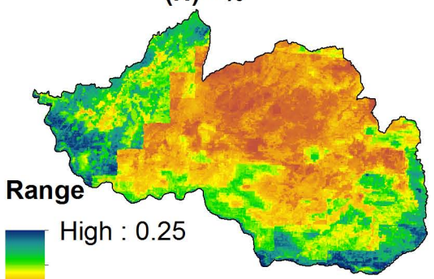
Range
- High : 3.92
- Low : 0.60

Exchangeable Sodium Percentage (ESP) - % saturation



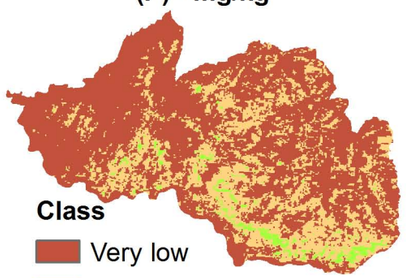
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



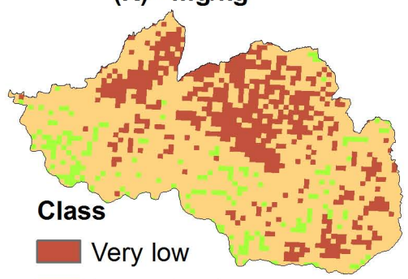
Range
- High : 0.25
- Low : 0.02

Phosphorus (P) - mg/kg



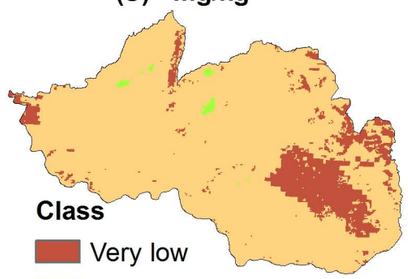
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



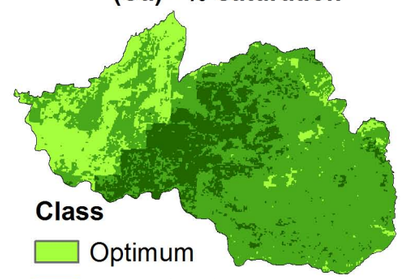
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



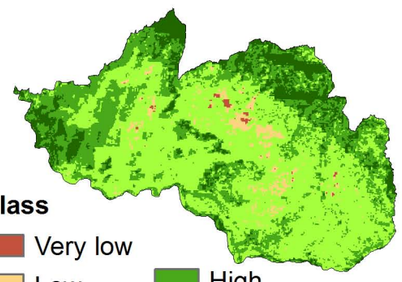
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



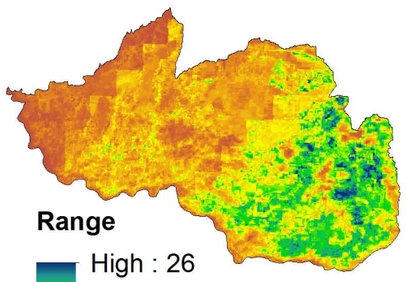
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



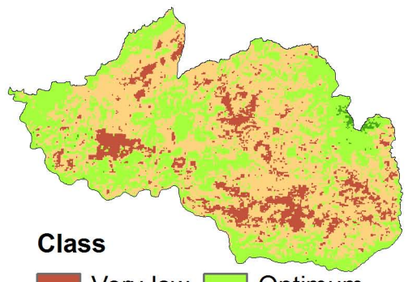
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



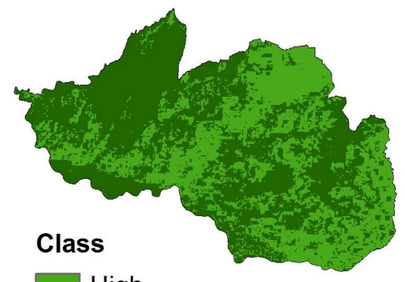
Range
- High : 26
- Low : 1.88

Iron (Fe) - mg/kg



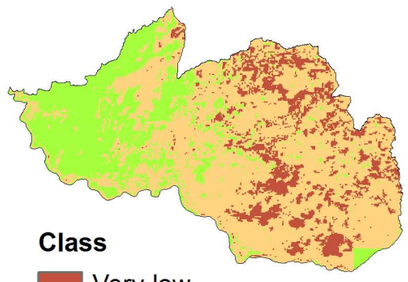
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



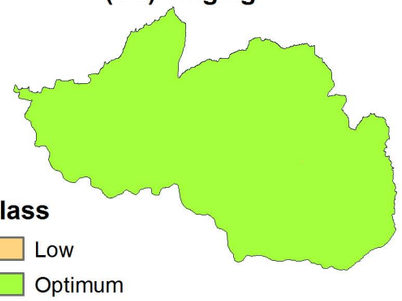
Class
- High
- Very high

Zinc (Zn) - mg/kg



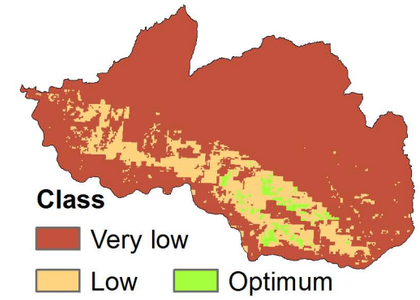
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



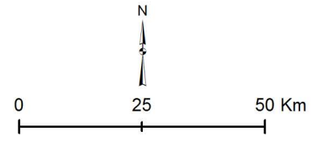
Class
- Low
- Optimum

Boron (B) - mg/kg

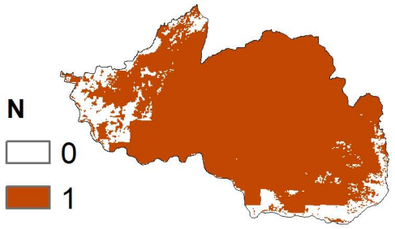


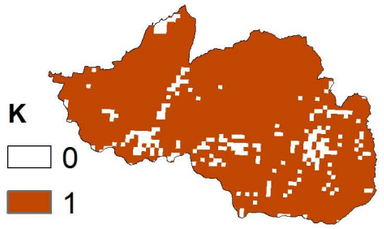
Class
- Very low
- Low
- Optimum

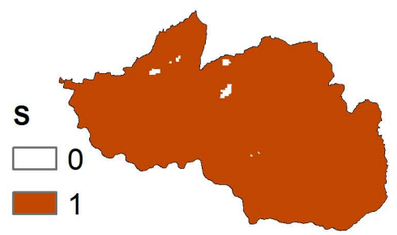
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

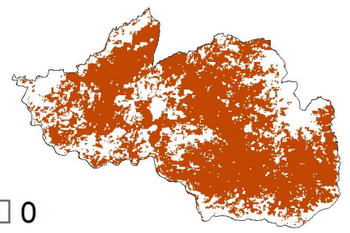


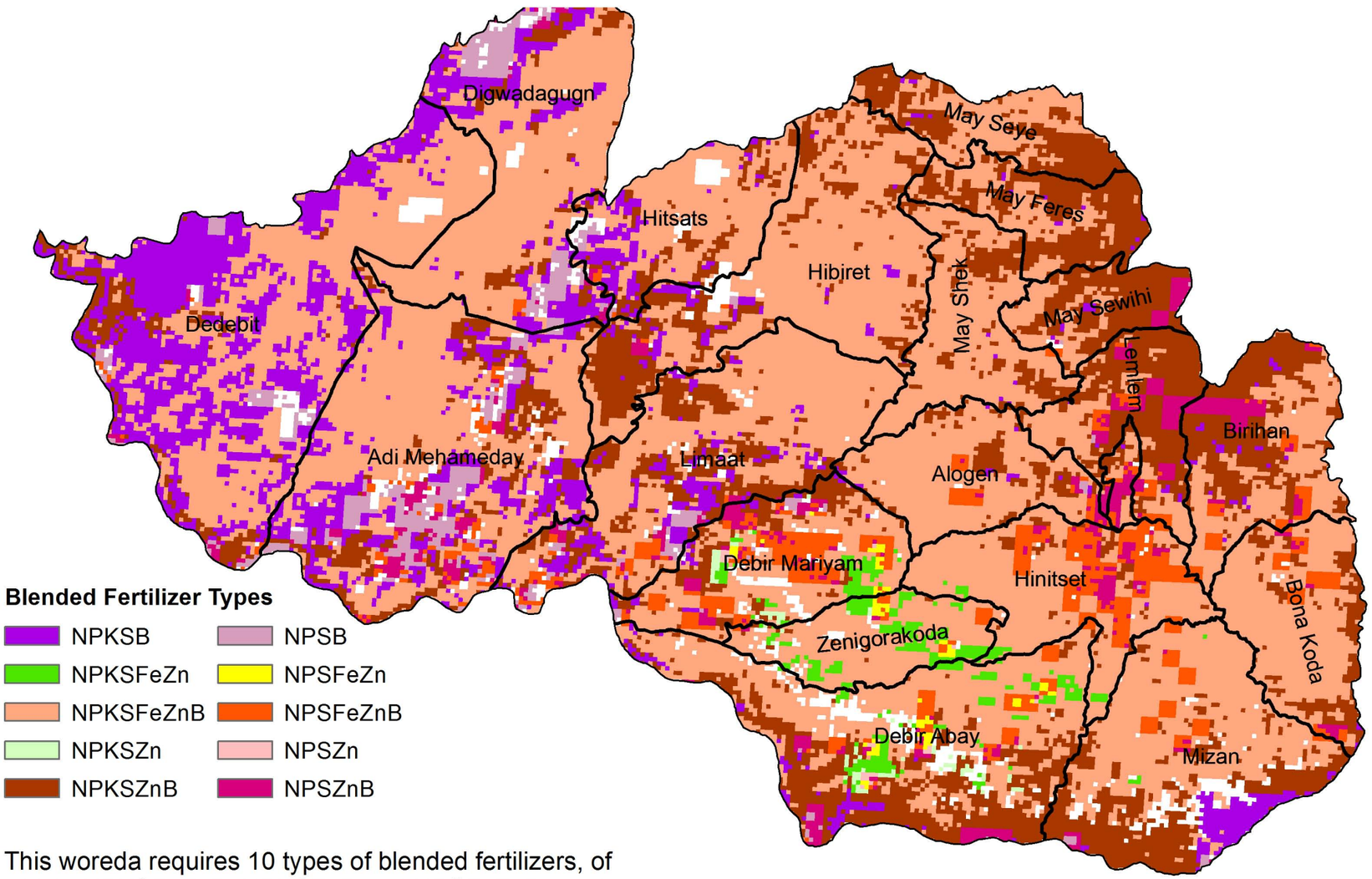
Fertilizer Type Requirement of Asegede Tsimbila Woreda



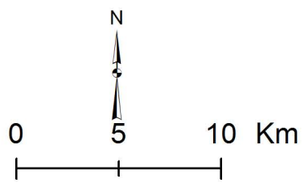




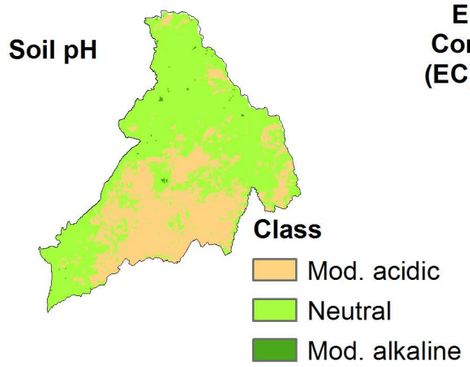


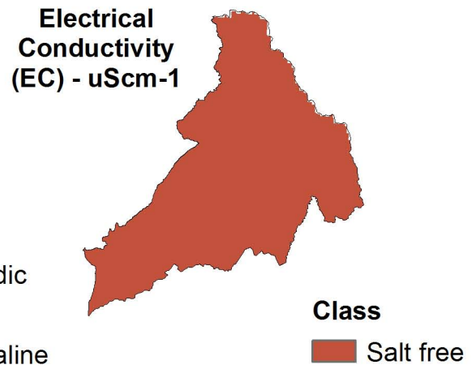


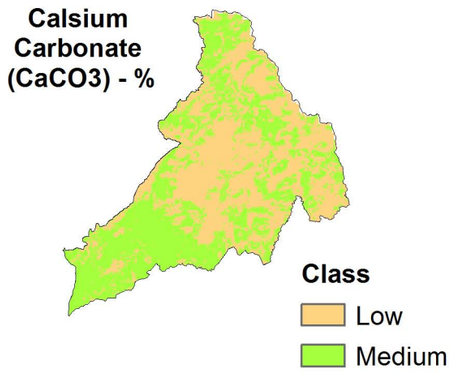
This woreda requires 10 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPSFeZnB are the most dominant blends, respectively.

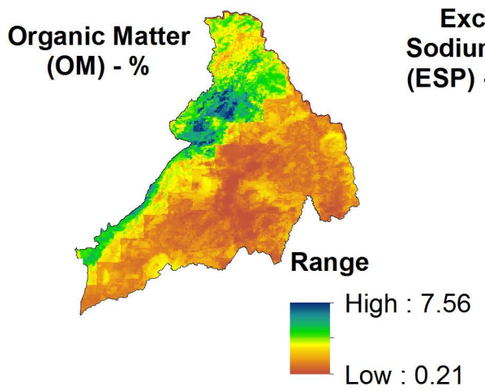


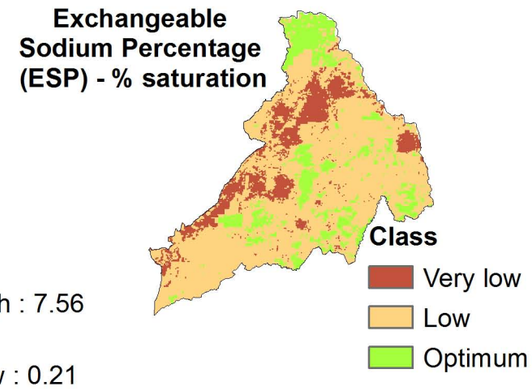
Soil Fertility Status of Laelay Adiyabo Woreda

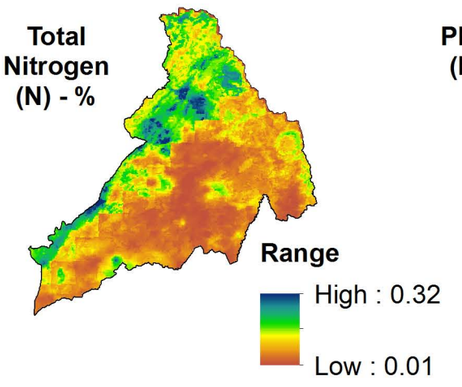


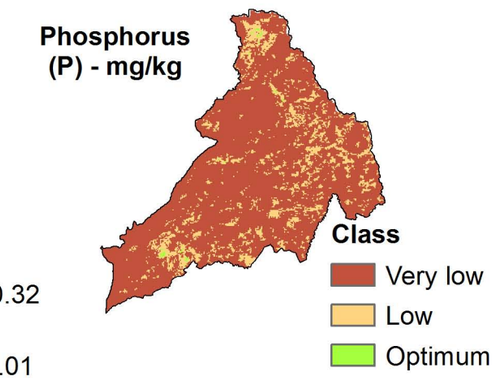


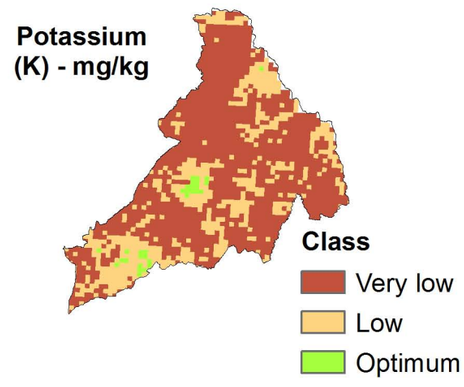


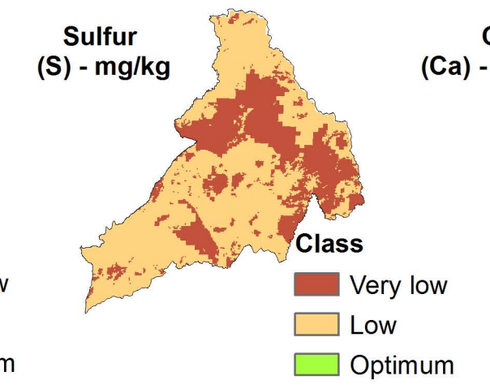


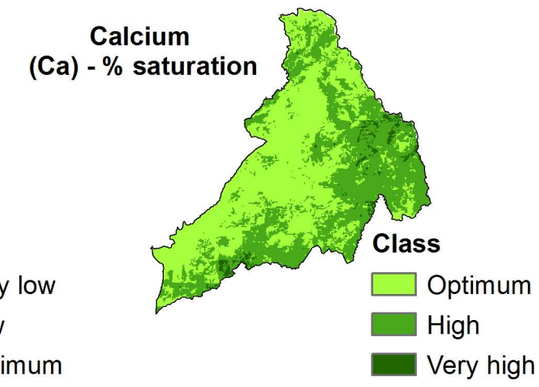


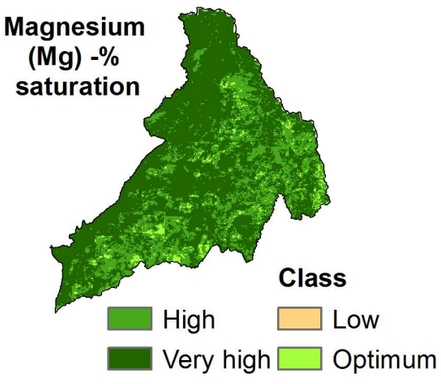


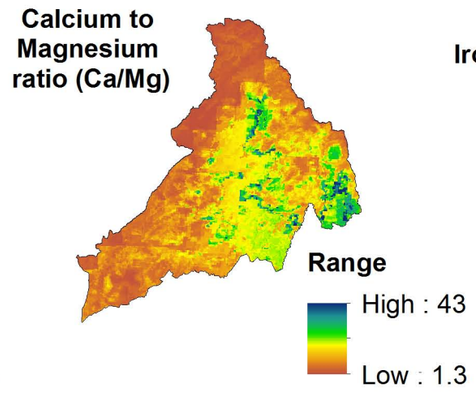


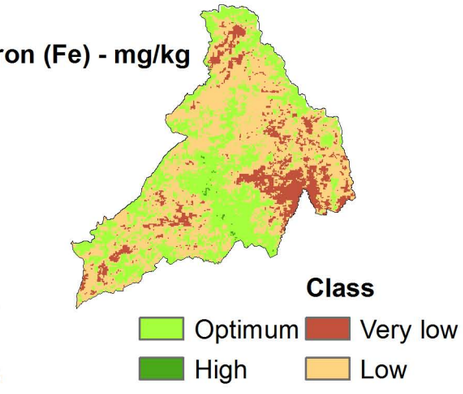


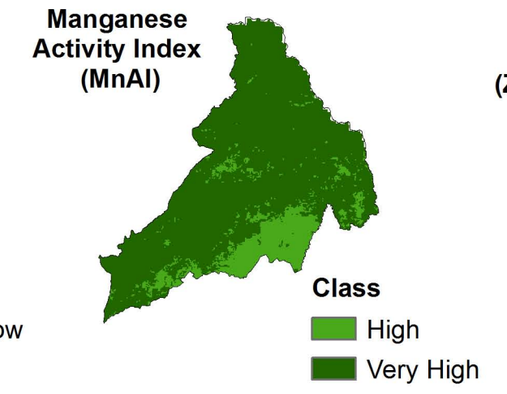


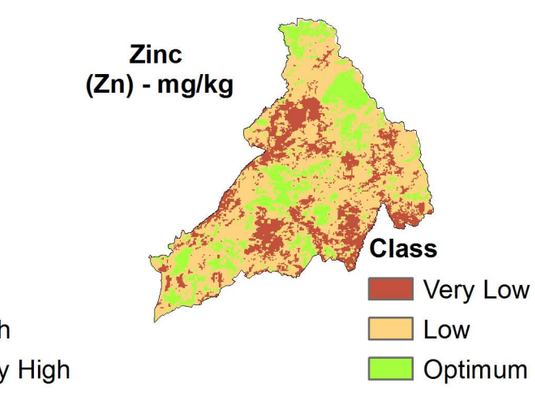


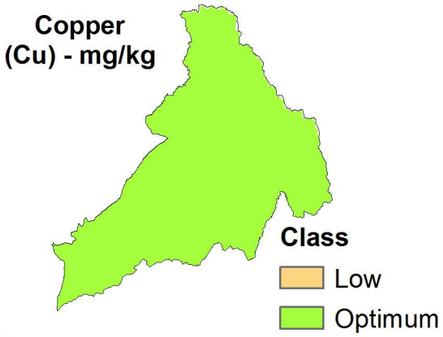


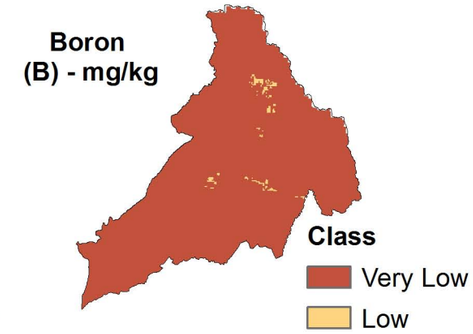




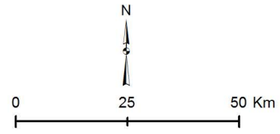




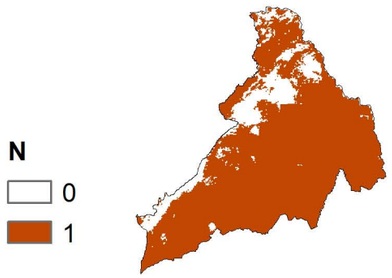


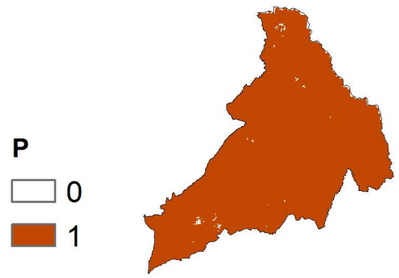


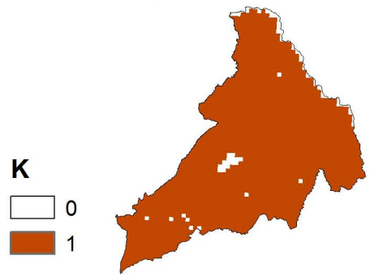
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

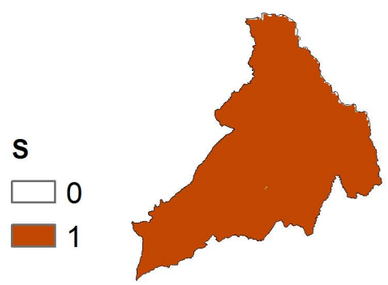


Fertilizer Type Requirement of Laelay Adiyabo Woreda

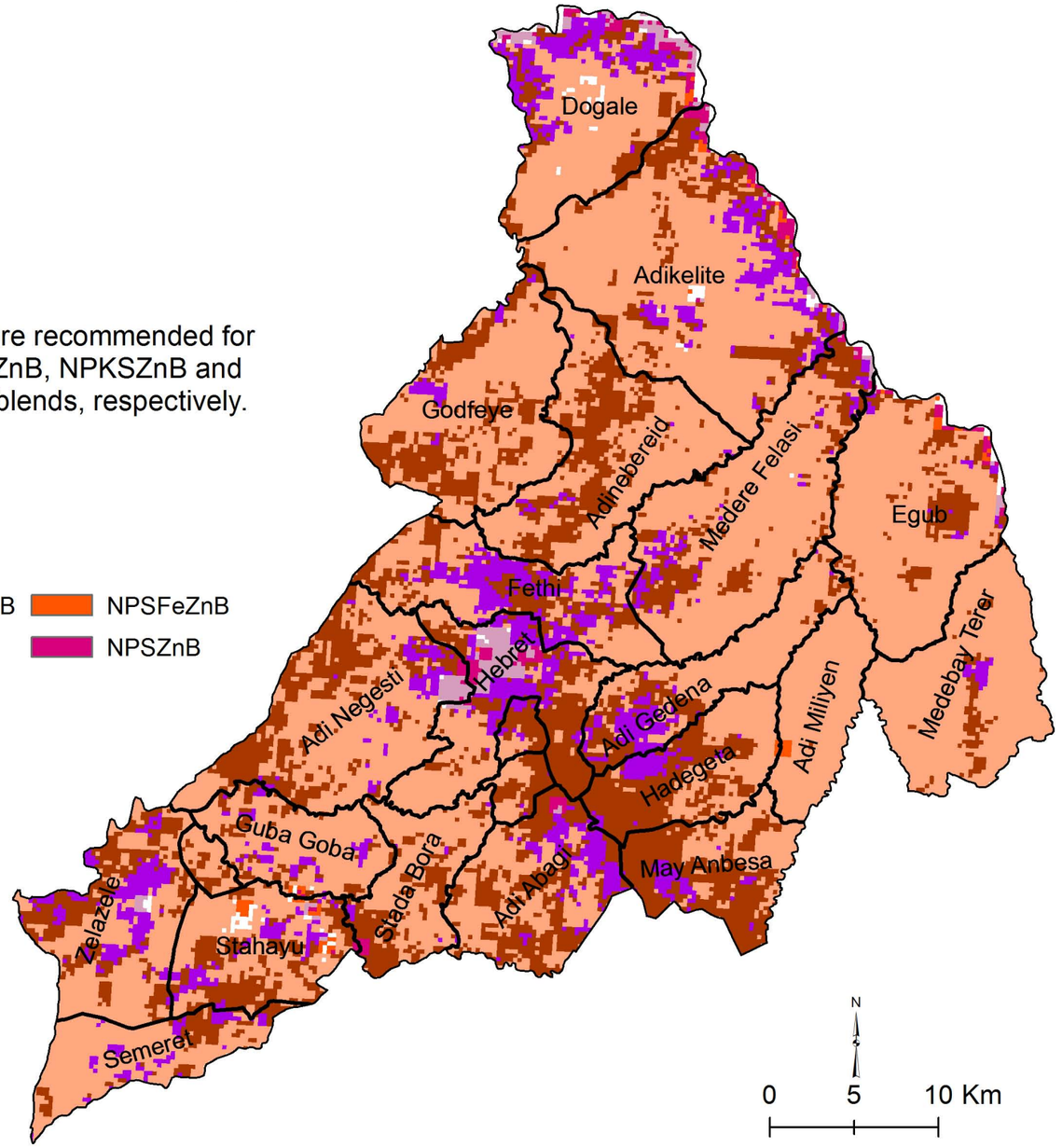


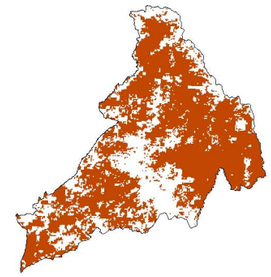


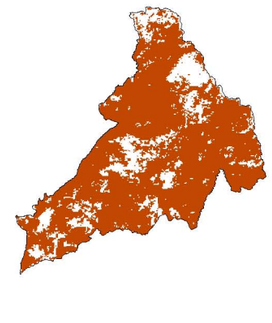




Six types of blended fertilizers are recommended for this woreda, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.

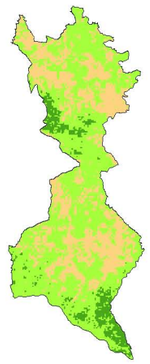






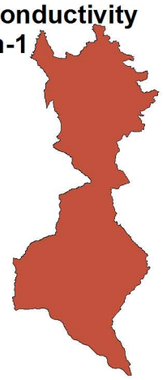
Soil Fertility Status of Medebay Zana Woreda

Soil pH



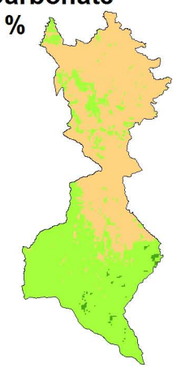
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



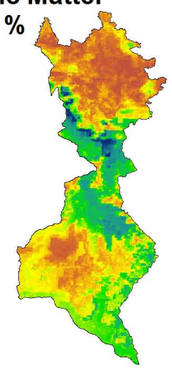
Class
- Salt free

Calsium Carbonate (CaCO3) - %



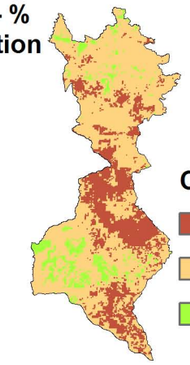
Class
- Low
- Medium
- High

Organic Matter (OM) - %



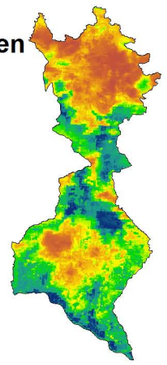
Range
- High : 5.45
- Low : 0.36

Exchangeable Sodium Percentage (ESP) - % saturation



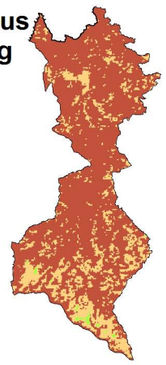
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



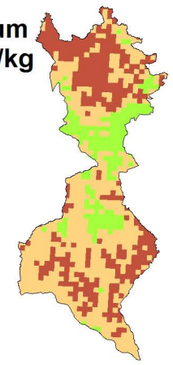
Range
- High : 0.25
- Low : 0.01

Phosphorus (P) - mg/kg



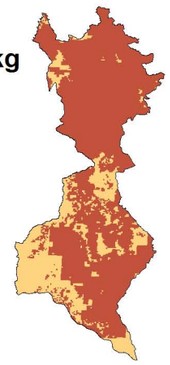
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



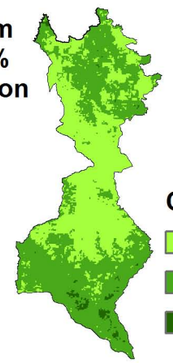
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



Class
- Very lo
- Low
- Optimu

Calcium (Ca) - % saturation

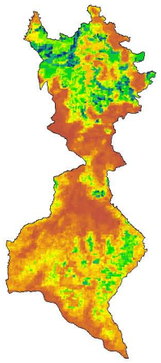


Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation

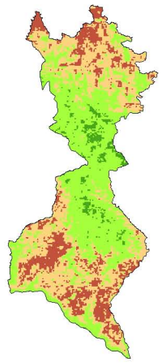
Class
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



Range
- High : 42.2
- Low : 2.09

Iron (Fe) - mg/kg

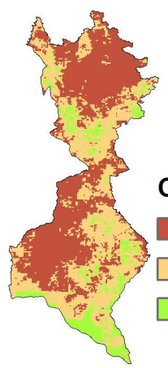


Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)

Class
- High
- Very high

Zinc (Zn) - mg/kg

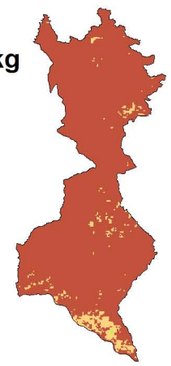


Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg

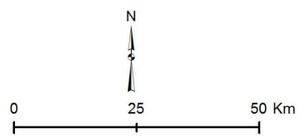
Class
- Optimum

Boron (B) - mg/kg

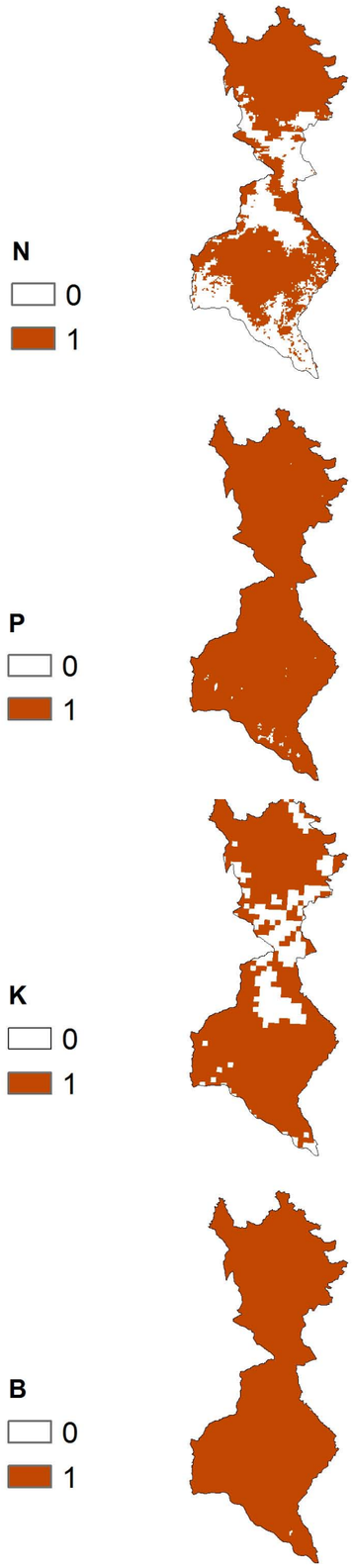


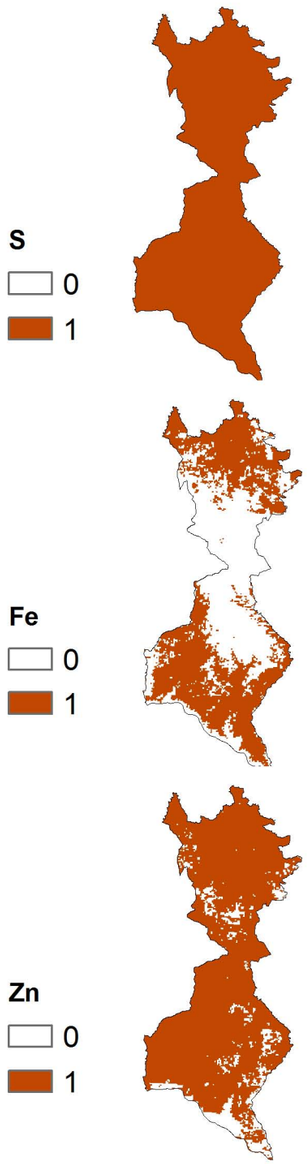
Class
- Very low
- Low
- Optimum

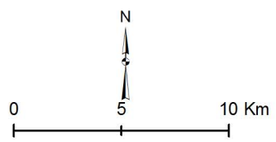
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

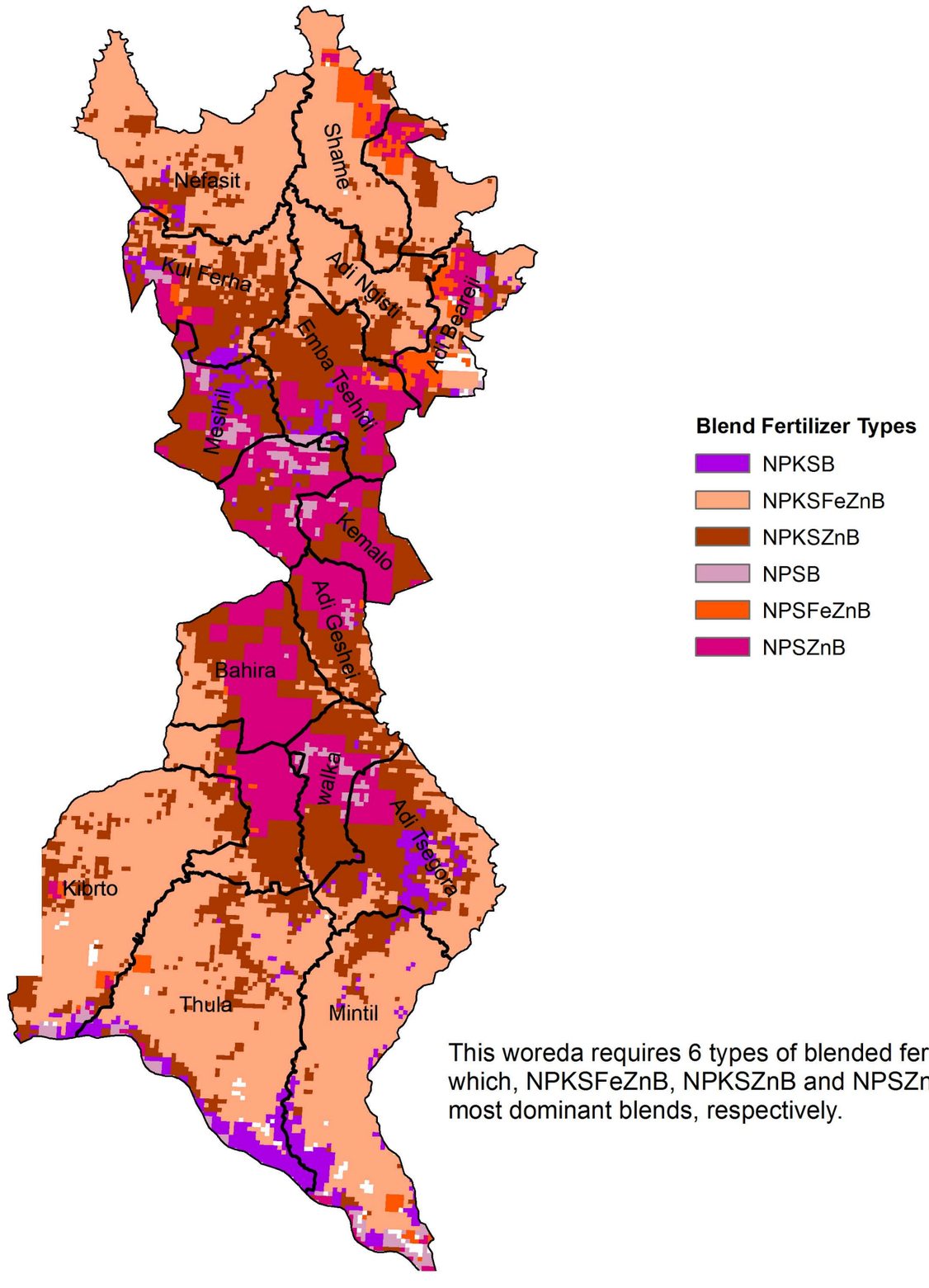


Fertilizer Type Requirement of Medebay Zana Woreda



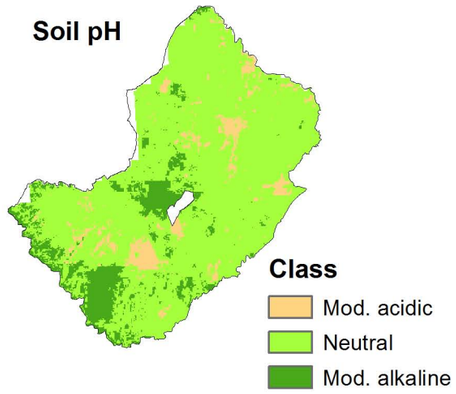


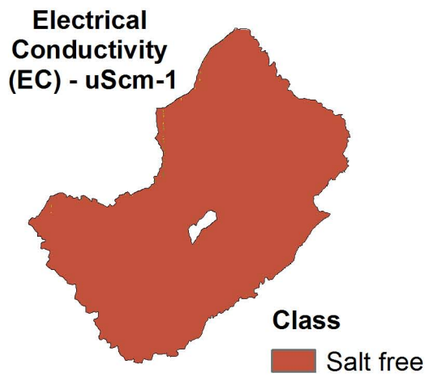


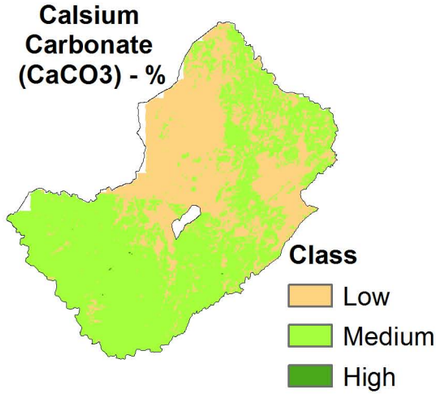


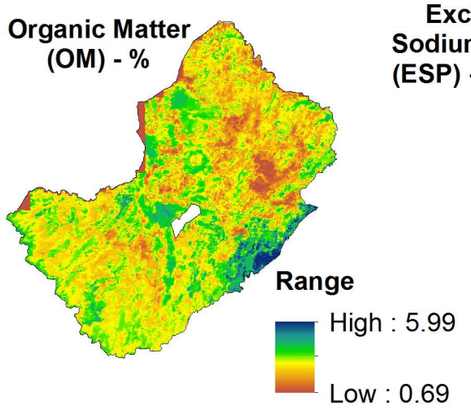
This woreda requires 6 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPSZnB are the most dominant blends, respectively.

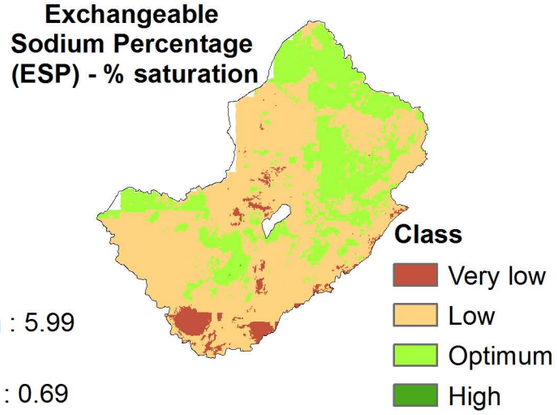
Soil Fertility Status of Tahitay Adiyabo Woreda

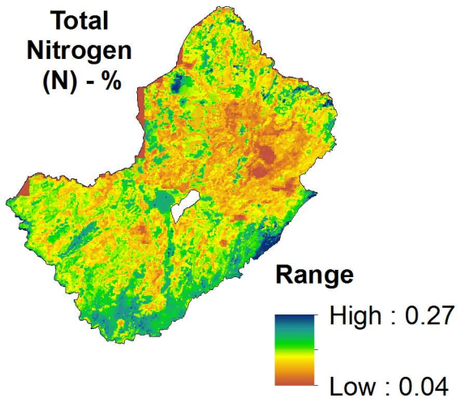


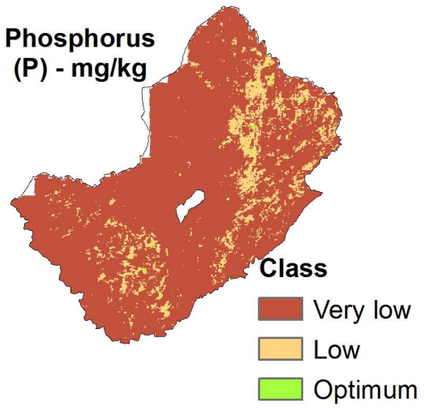


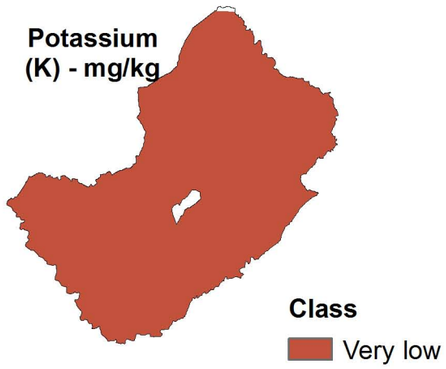


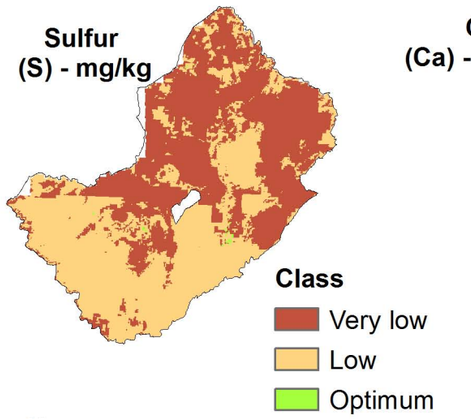


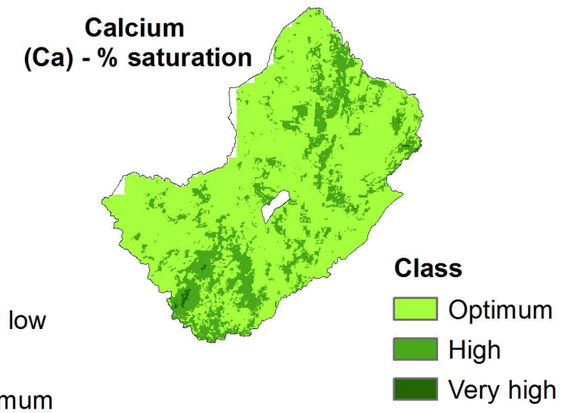


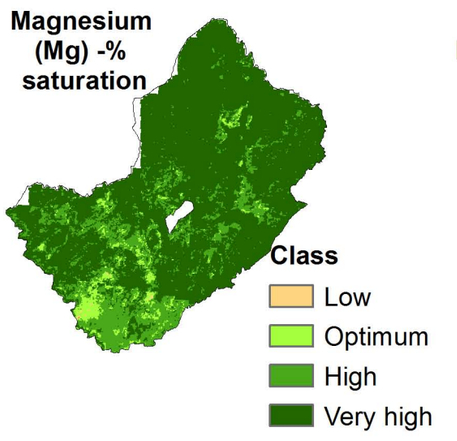


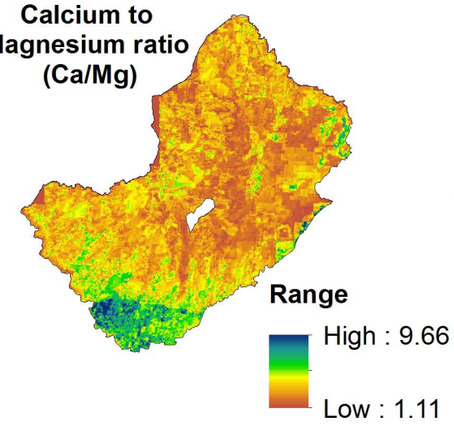


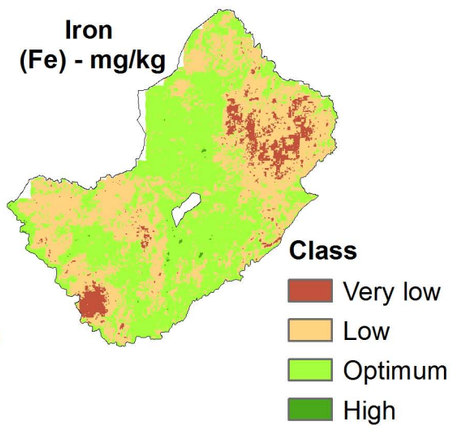


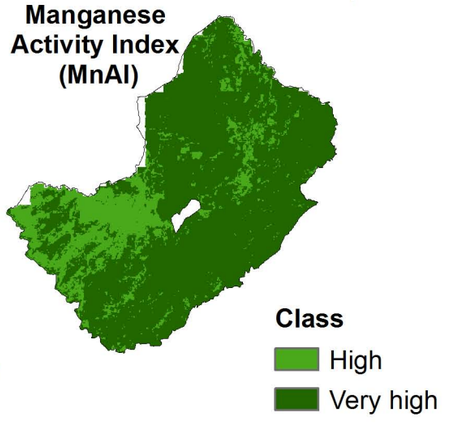


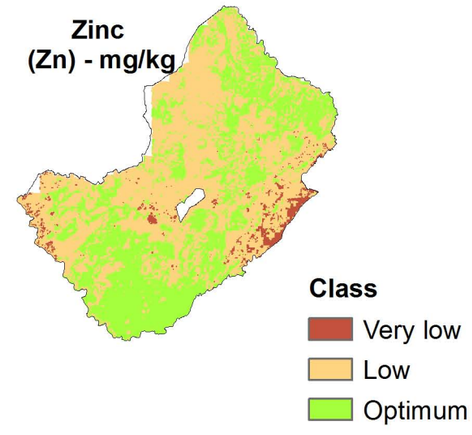


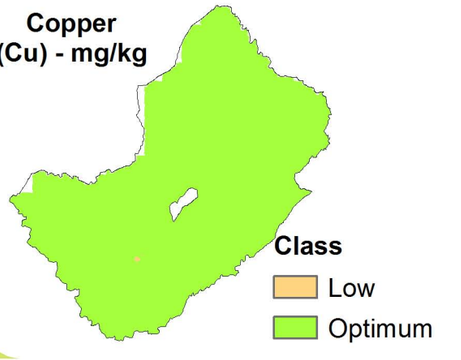


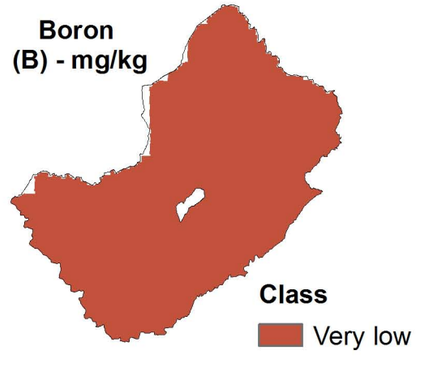




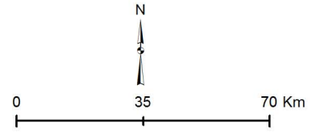




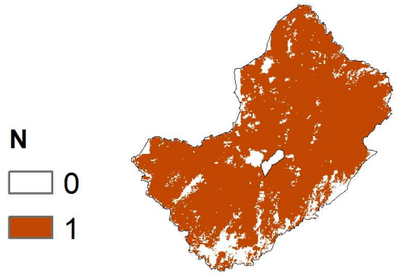


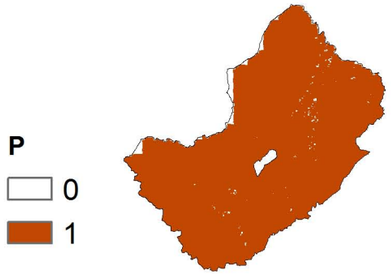


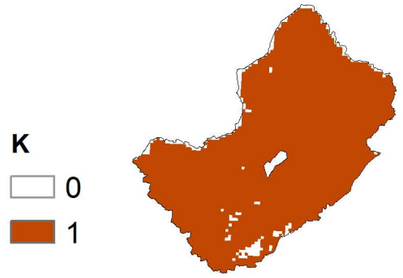
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

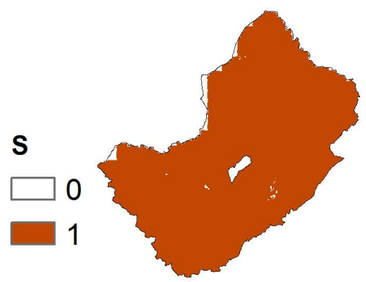


Fertilizer Type Requirement of Tahitay Adiyabo Woreda

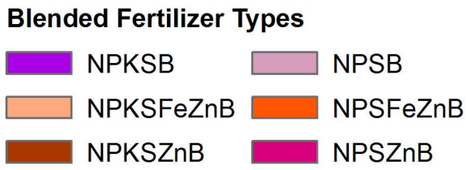


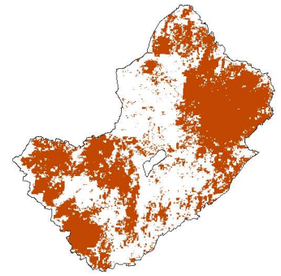


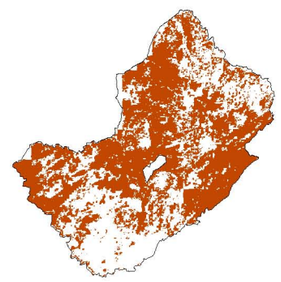


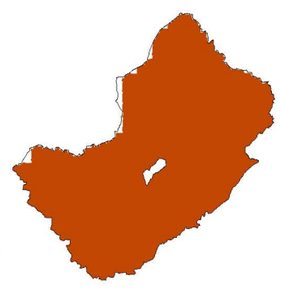


Six types of blended fertilizers are recommended for this woreda, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.

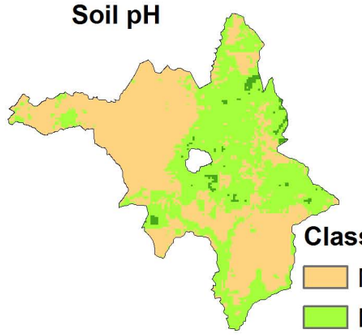


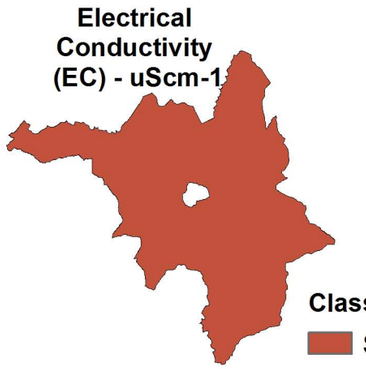


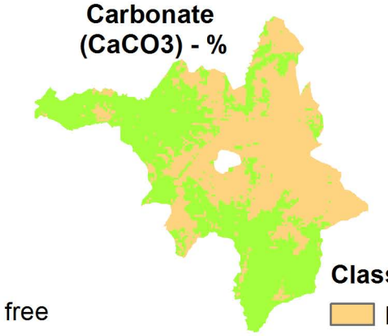


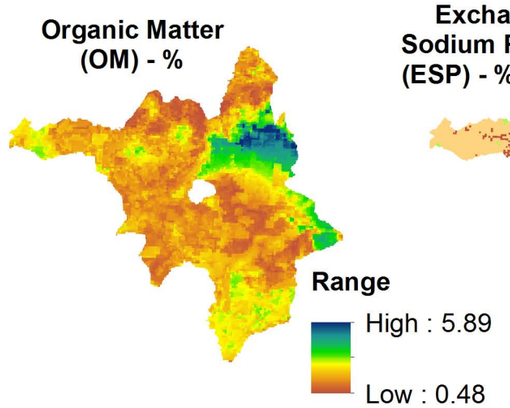


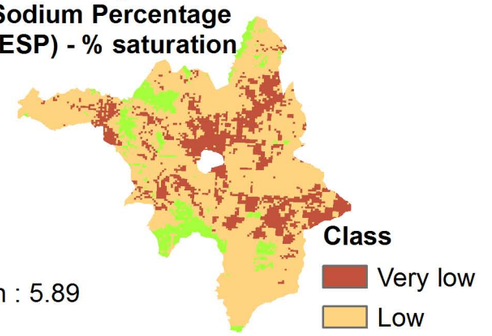
Soil Fertility Status of Tahitay Qoraro Woreda

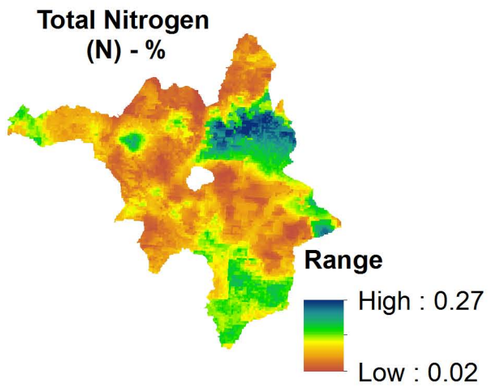


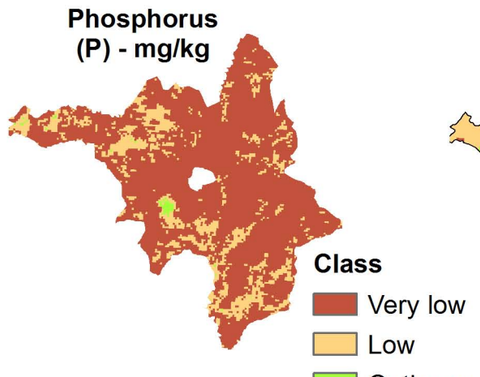


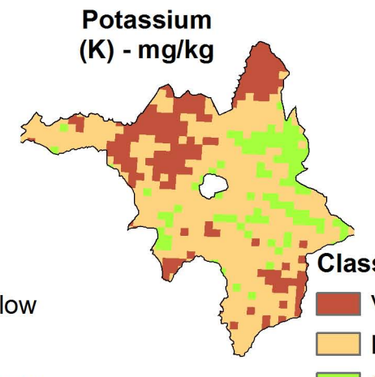


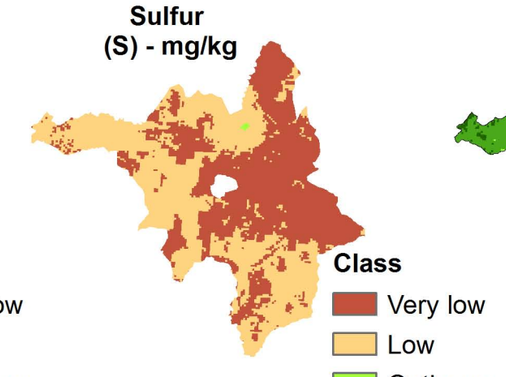


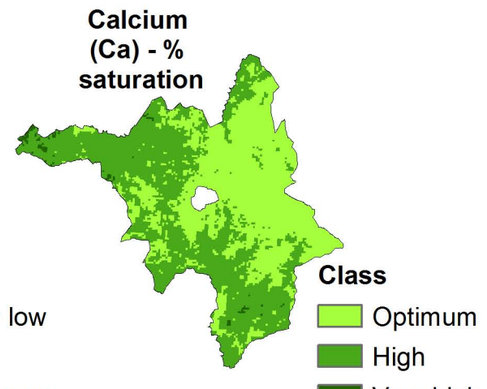


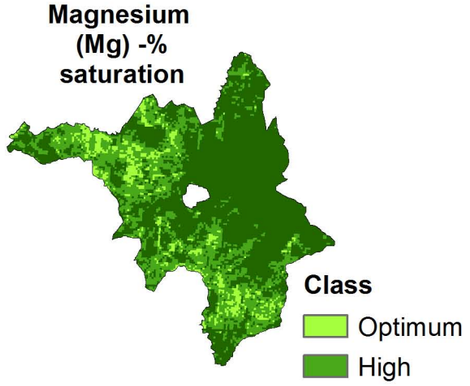


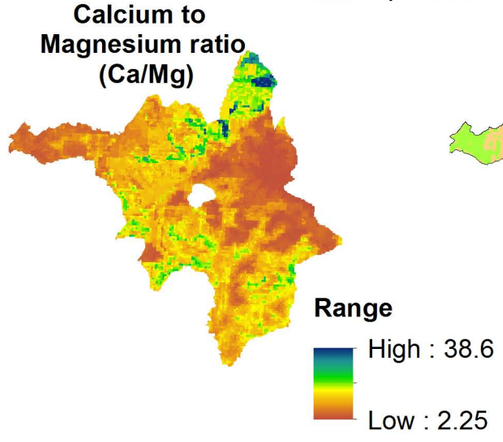


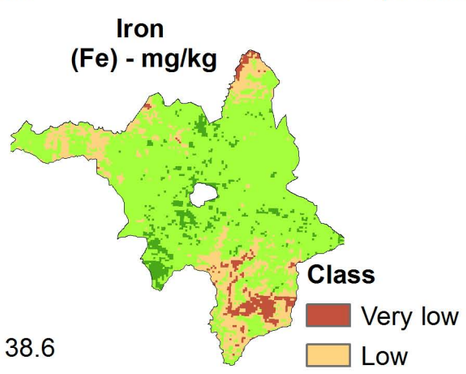


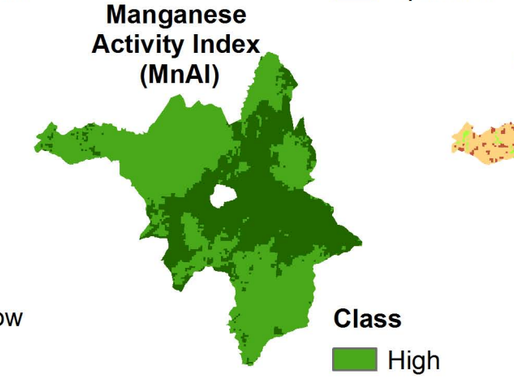


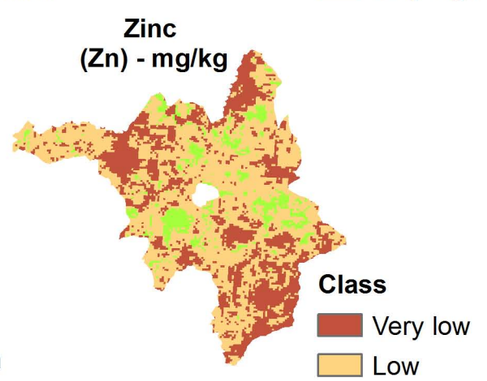


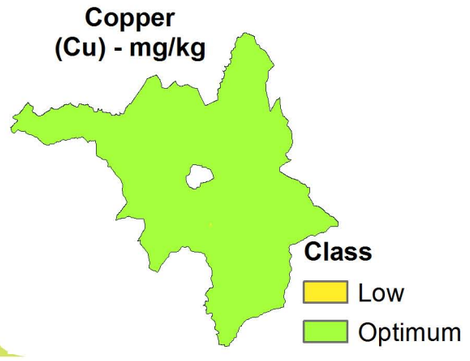


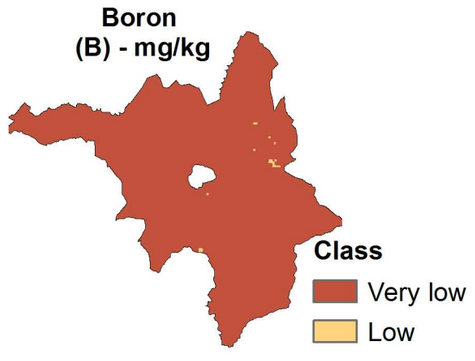




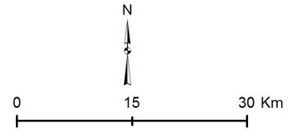




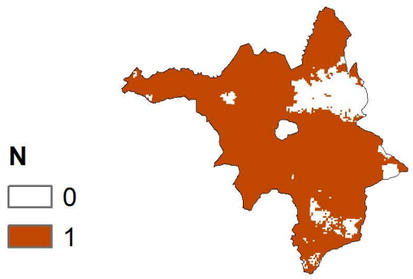


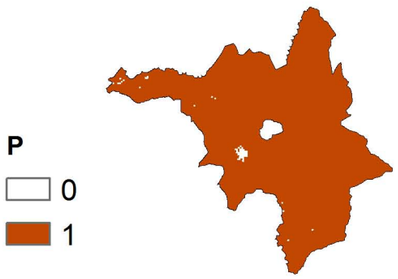


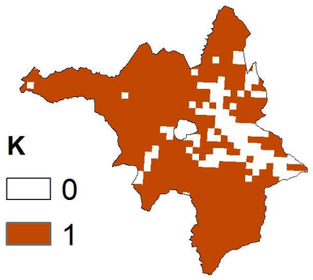
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

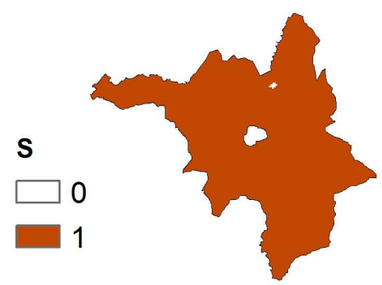


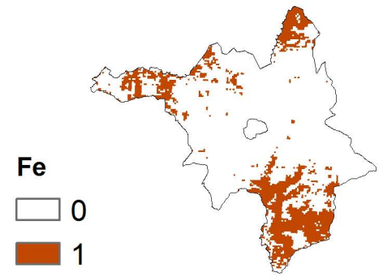
Fertilizer Type Requirement of Tahitay Qoraro Woreda

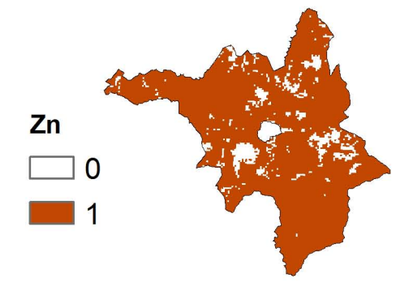


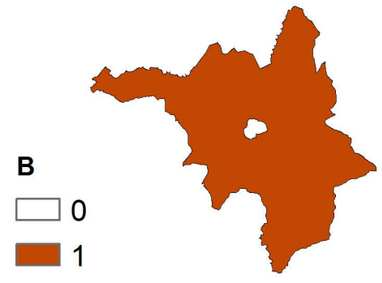








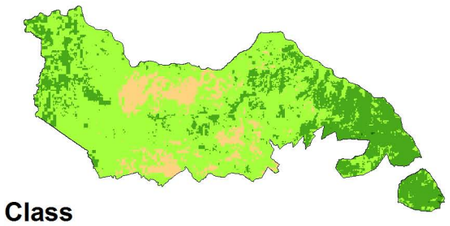




This woreda requires 6 types of blended fertilizers, of which, NPKSZnB, NPKSFeZnB and NPSZnB are the most dominant blends, respectively.

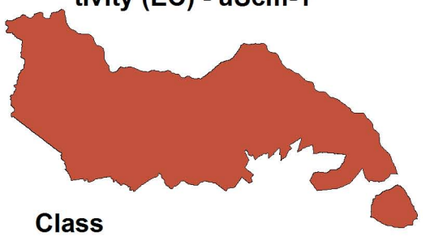
Soil Fertility Status of Tselemt Woreda

Soil pH



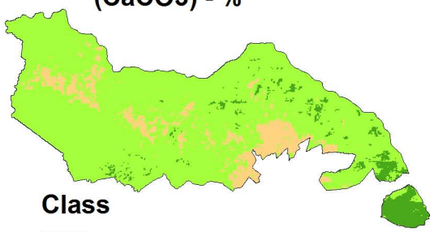
Class
- Mod. acidic
- Mod. alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



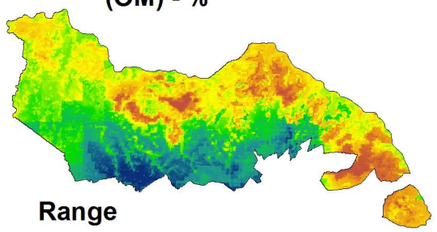
Class
- Salt free

Calsium Carbonate (CaCO3) - %



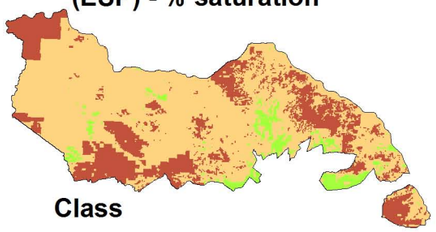
Class
- Low
- Optimum
- High

Organic Matter (OM) - %



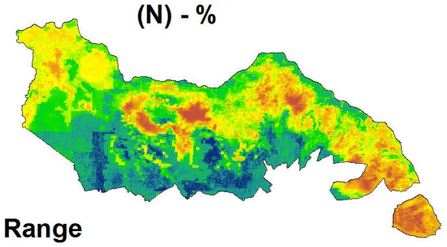
Range
- High : 5.83
- Low : 0.83

Exchangeable Sodium Percentage (ESP) - % saturation



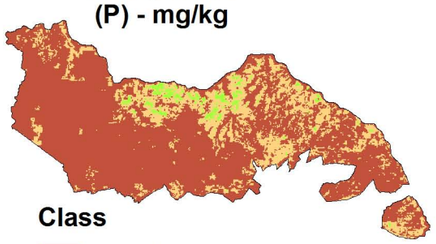
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



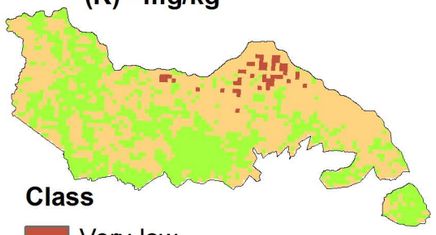
Range
- High : 0.33
- Low : 0.02

Phosphorus (P) - mg/kg



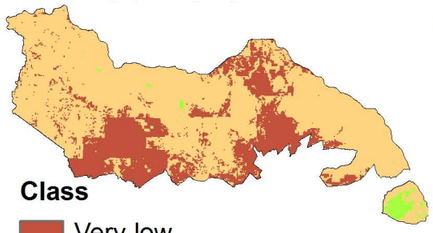
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



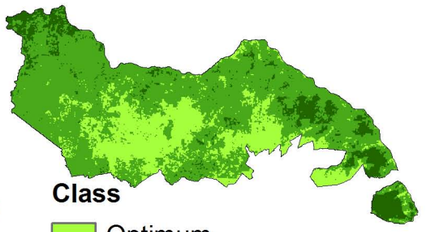
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



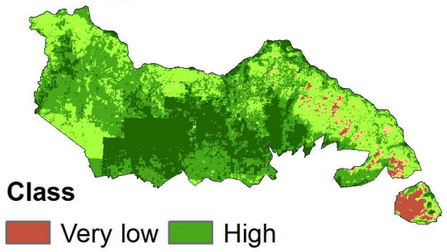
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



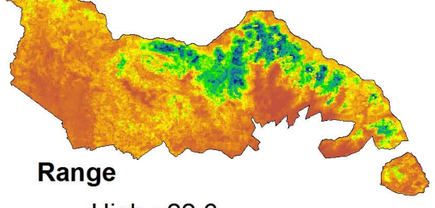
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



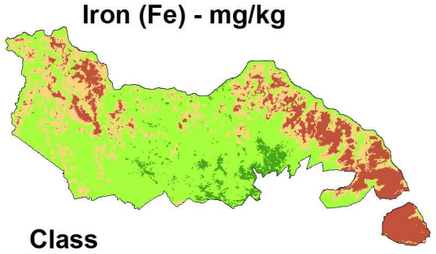
Class
- Very low
- High
- Low
- Very high
- Optimum

Calcium to Magnesium ratio (Ca/Mg)



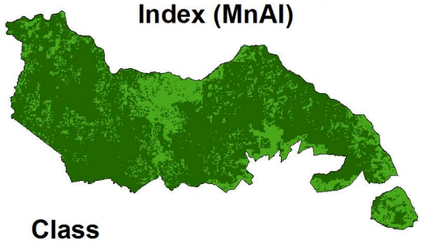
Range
- High : 22.6
- Low : 1.33

Iron (Fe) - mg/kg



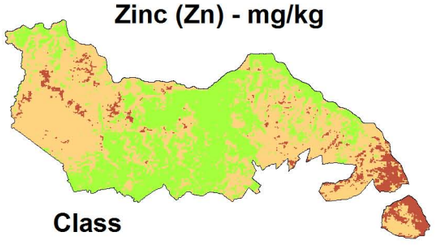
Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)



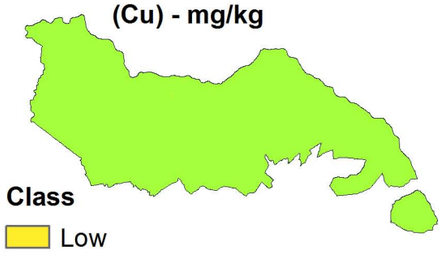
Class
- High
- Very high

Zinc (Zn) - mg/kg



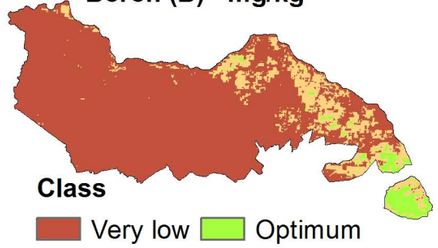
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



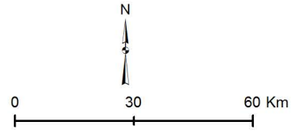
Class
- Low
- Optimum

Boron (B) - mg/kg

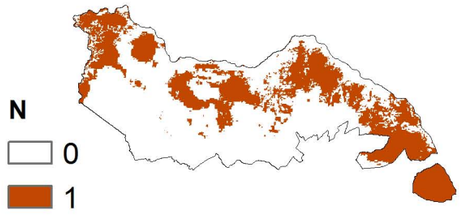


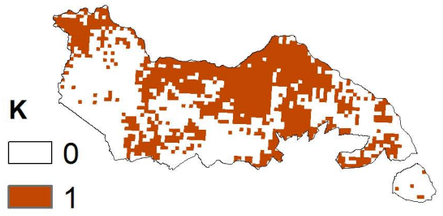
Class
- Very low
- Optimum
- Low
- High

Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.



Fertilizer Type Requirement of Tselemt Woreda



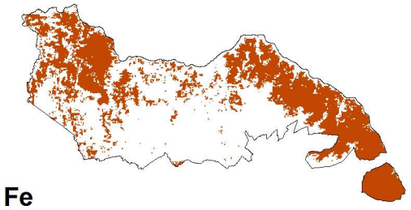


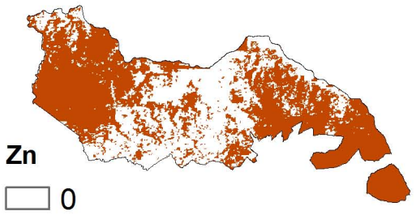
Nine types of blended fertilizers are recommended for this woreda, of which, NPKSFeZnB, NPSZnB and NPKSB are the most dominant blends, respectively.

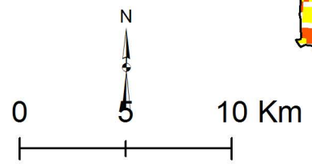
Blended Fertilizer Types

- NPKS
- NPKSFeZnB
- NPSFeZn
- NPKSB
- NPKSZnB
- NPSFeZnB
- NPKSFeZn
- NPSB
- NPSZnB

Waldiba Gedam
May Ayene
May Tehilit
May Ambesa
Dima
Mechara
Maygimere
Chachore
Fiyelwiha
Wohedet
Sekota Silasse
Sekoia Mariam
Mayame
Babako
Stada Kemi
Medhani Alem
Serako
Mezker
Adi Wesene
Midir Hamsho
Fiyelwiha
Meda

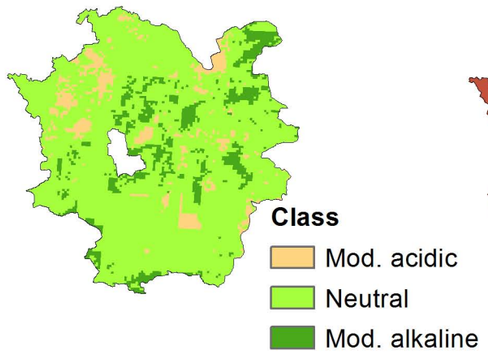




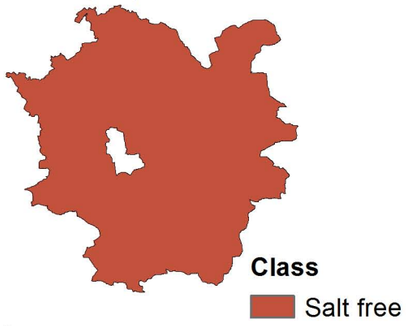


Soil Fertility Status of Adwa Woreda

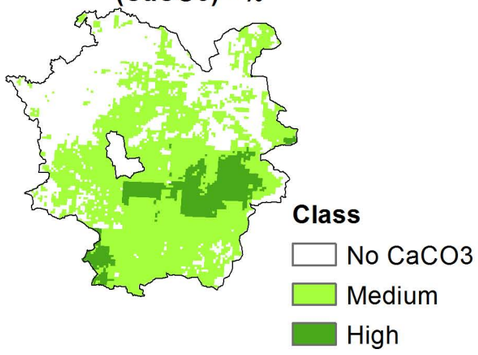
Soil pH



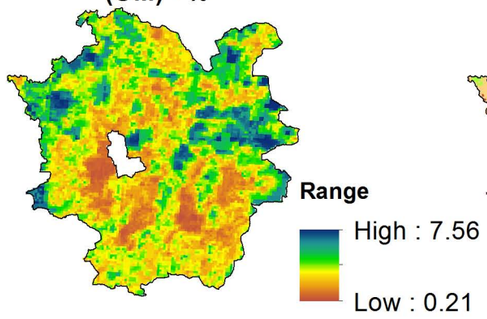
Electrical Conductivity (EC) - uScm-1



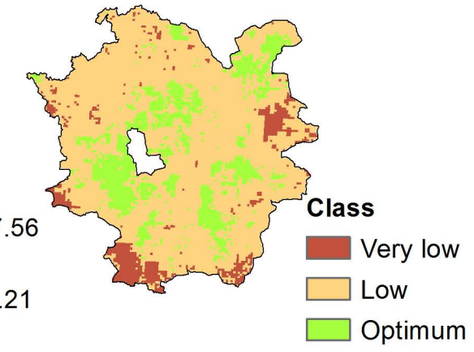
Calcium Carbonate (CaCO3) - %



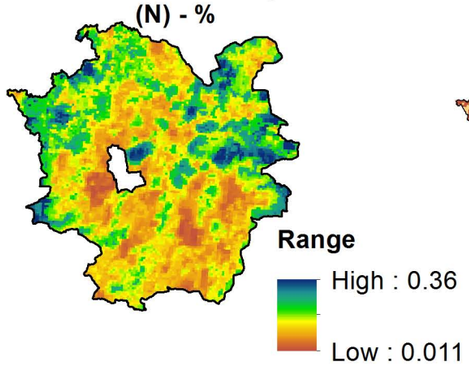
Organic Matter (OM) - %



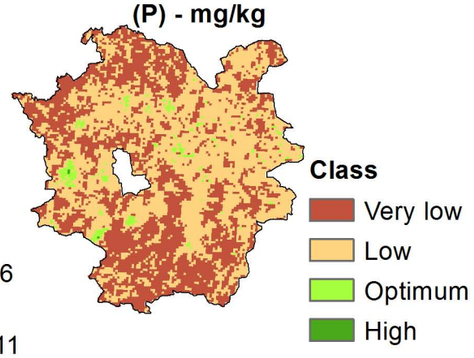
Exchangeable Sodium Percentage (ESP) - % saturation



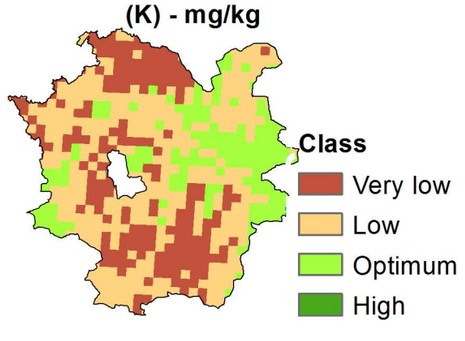
Total Nitrogen (N) - %



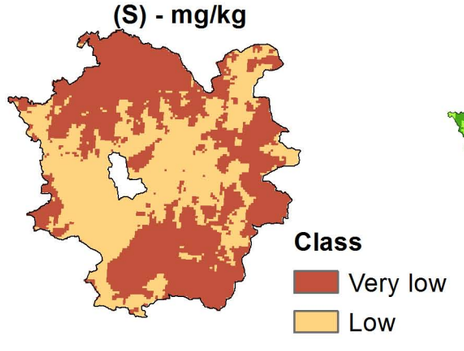
Phosphorus (P) - mg/kg



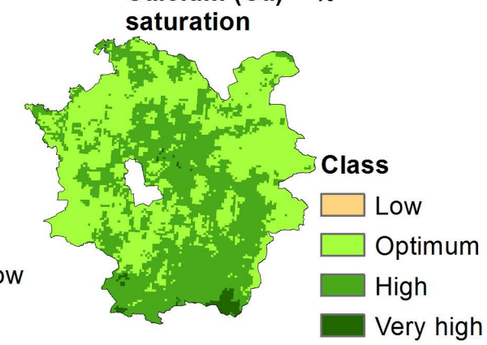
Potassium (K) - mg/kg



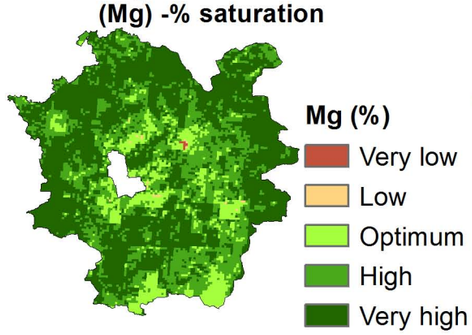
Sulfur (S) - mg/kg



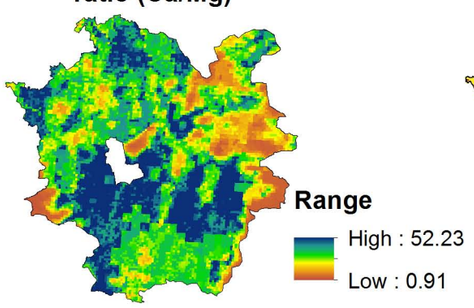
Calcium (Ca) - % saturation



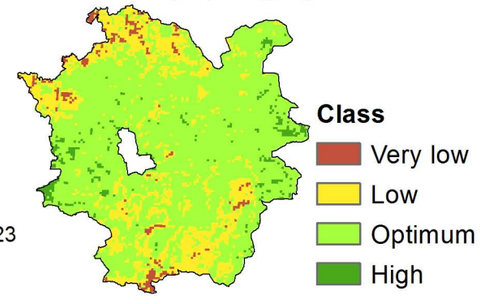
Magnesium (Mg) -% saturation



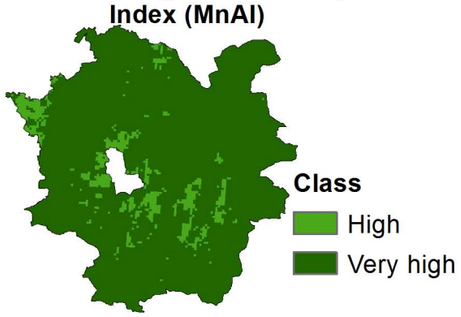
Calcium to Magnesium ratio (Ca/Mg)



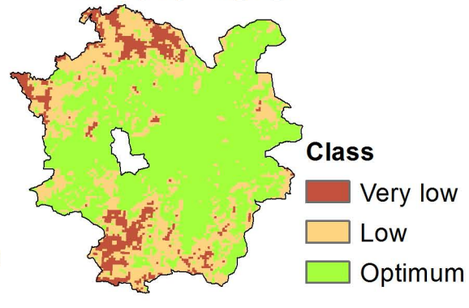
Iron (Fe) - mg/kg



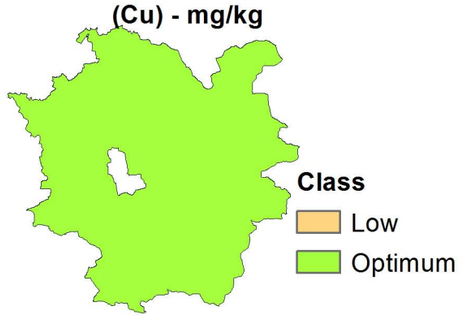
Manganese Activity Index (MnAI)



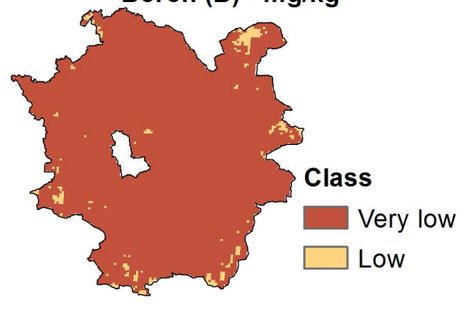
Zinc (Zn) - mg/kg



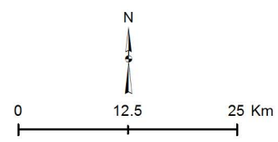
Copper (Cu) - mg/kg



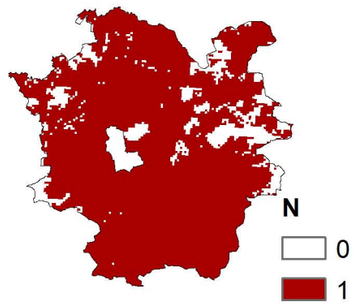
Boron (B) - mg/kg

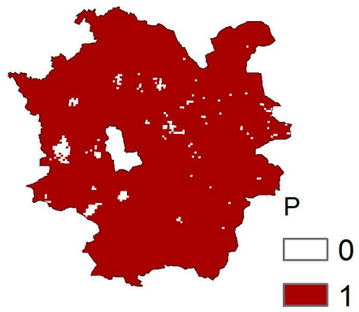


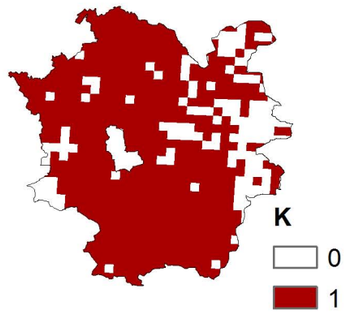
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

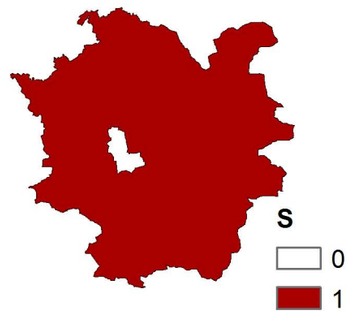


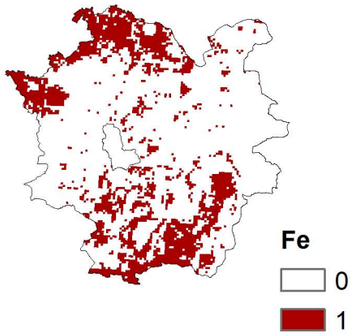
Fertilizer Type Requirement of Adwa Woreda

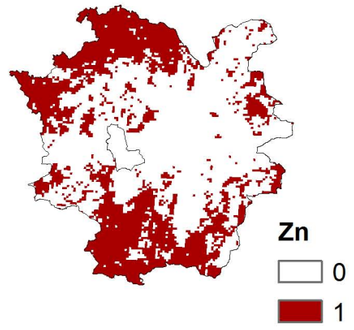






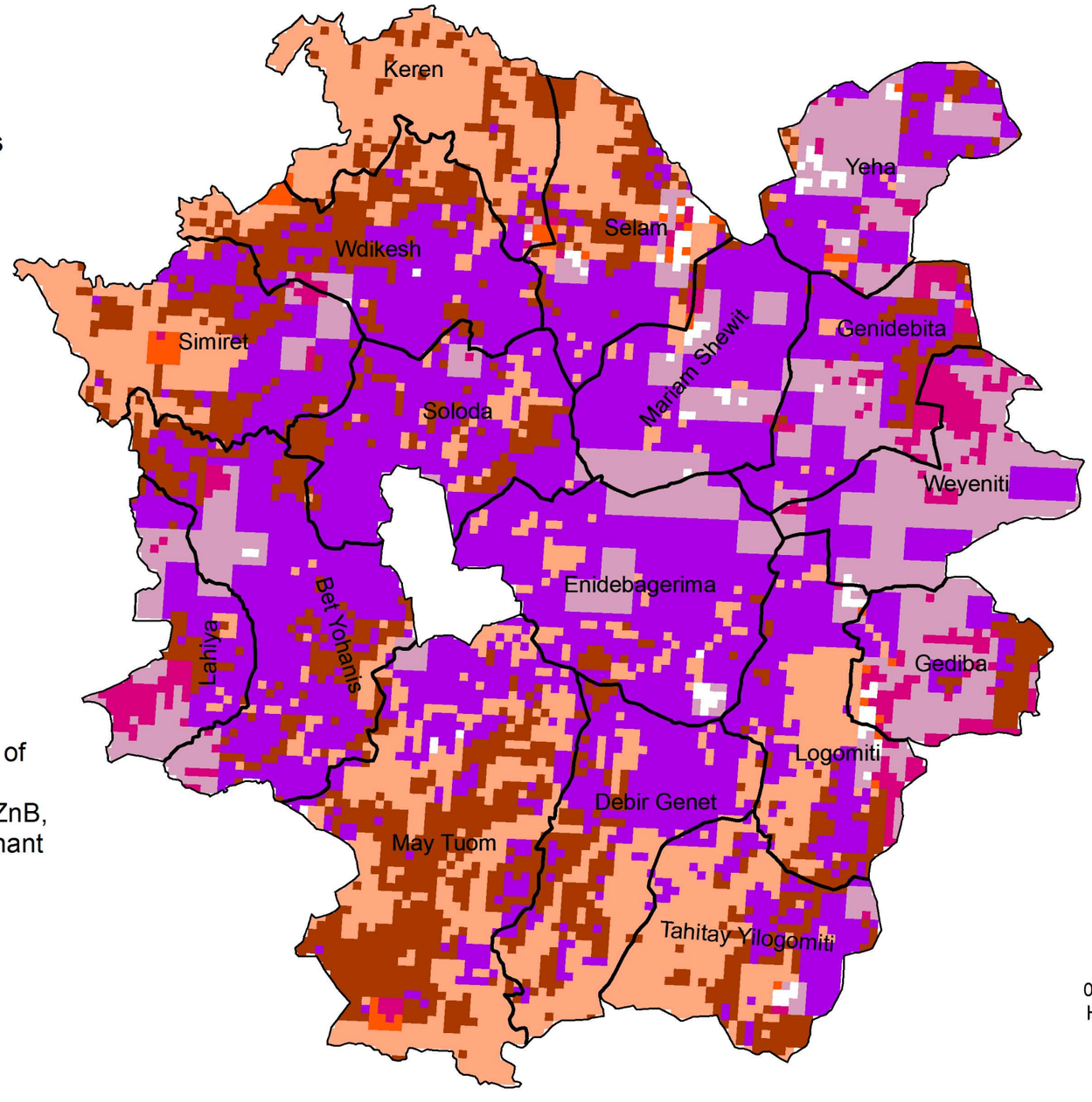


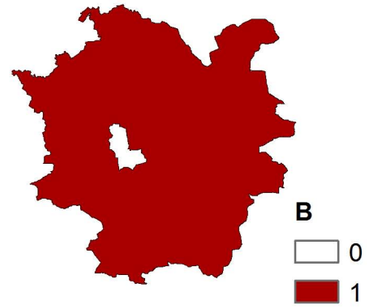


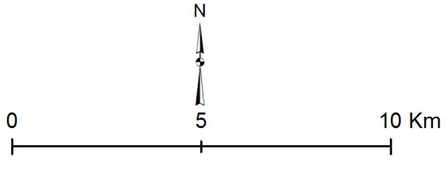


Blended Fertilizer Types

- NPKSB
- NPKSFeZnB
- NPKSZnB
- NPSB
- NPSFeZnB
- NPSZnB

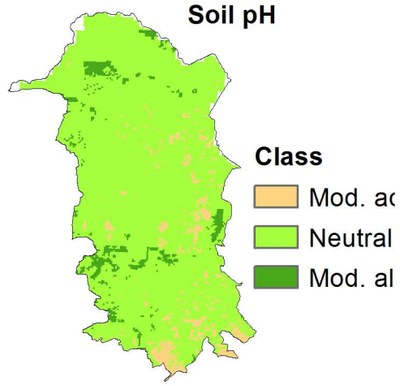


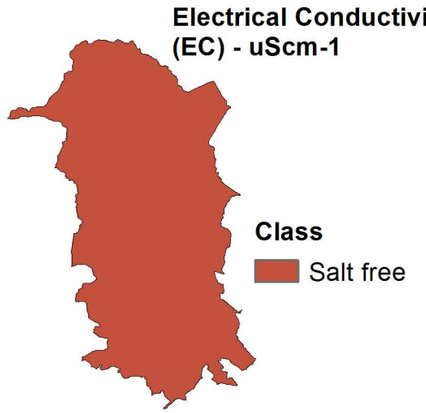


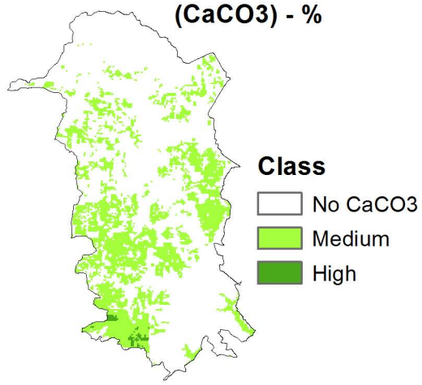


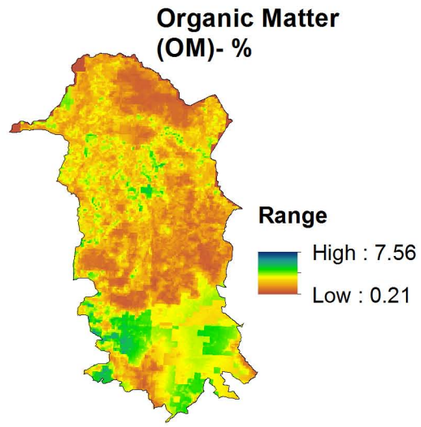
This woreda requires 6 tyeps of blended fertilizers, of which, NPKSB, NPKSFeZnB, NPKSZnB, and NPSB are the most dominant blends, respectively.

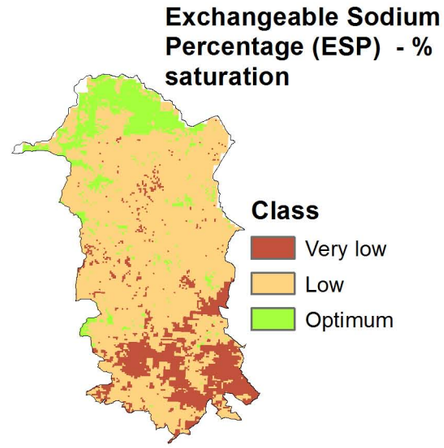
Soil Fertility Status of Ahiferom Woreda

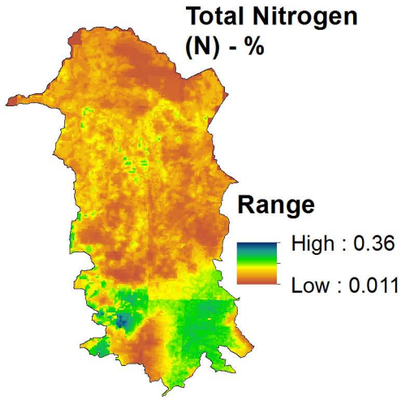


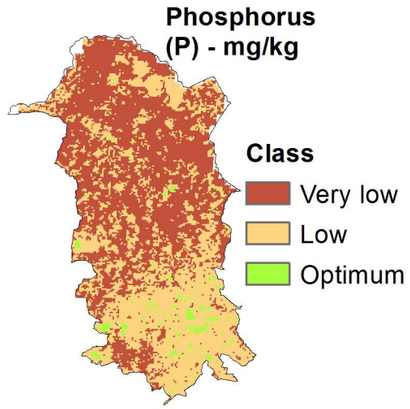


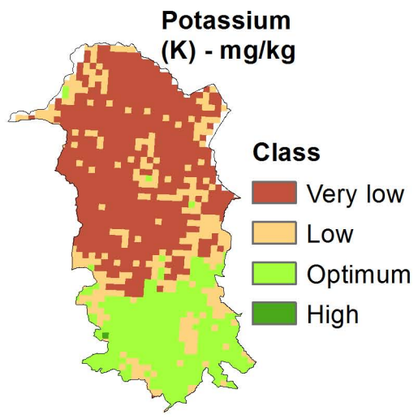


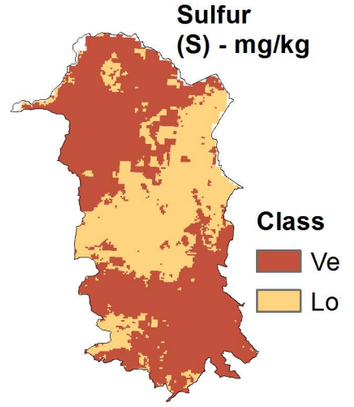


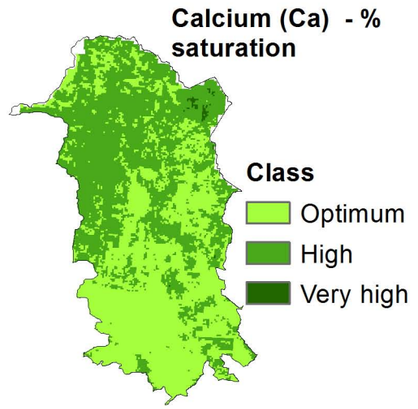


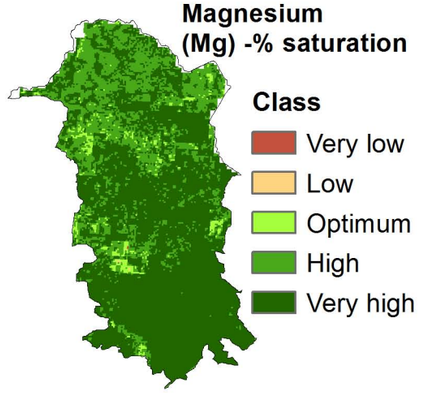


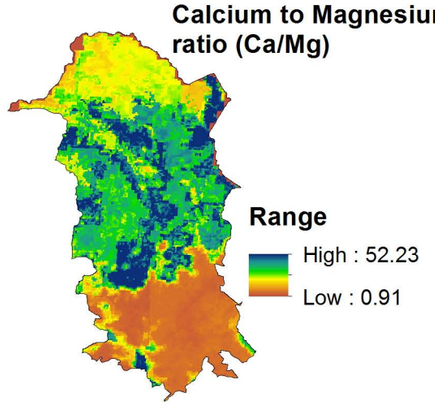


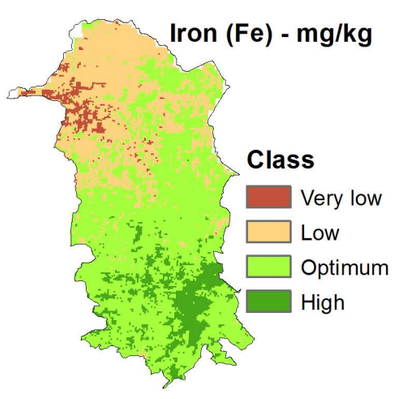


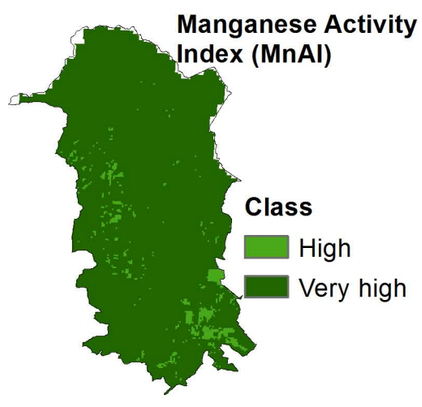


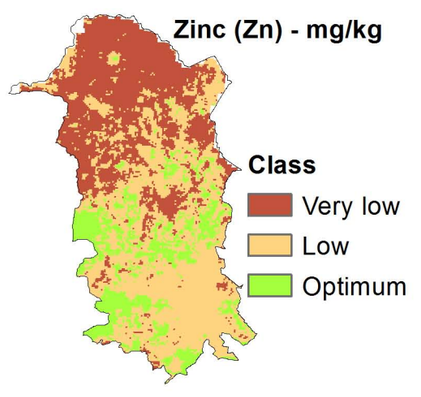


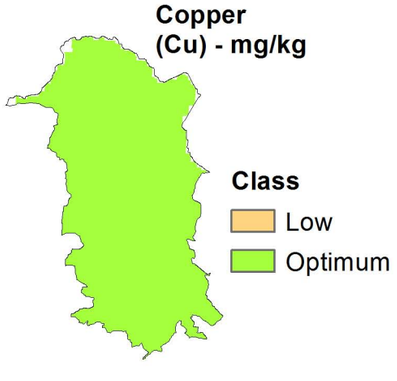


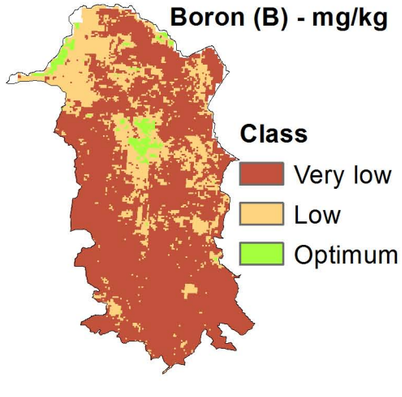




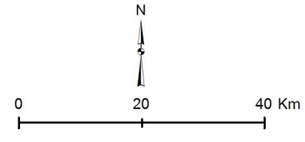




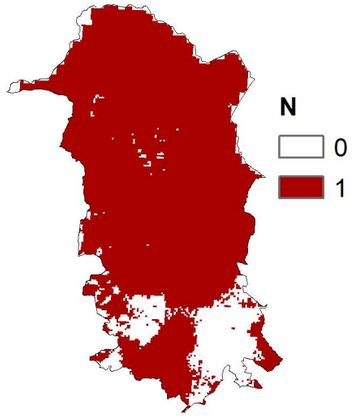


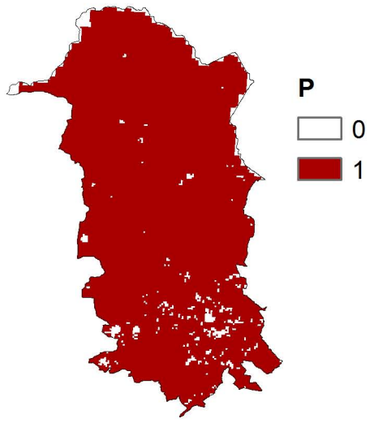


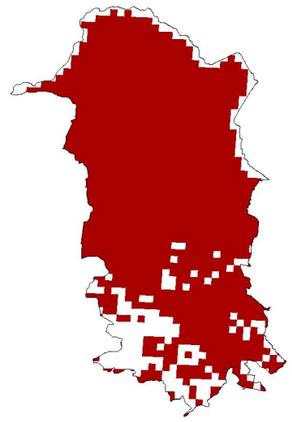
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

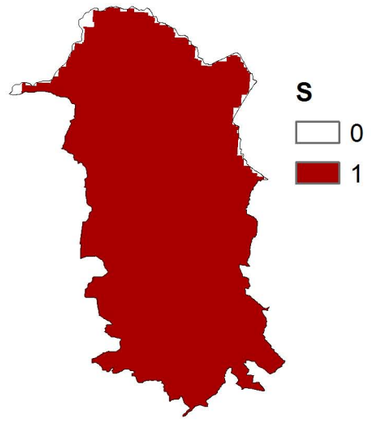


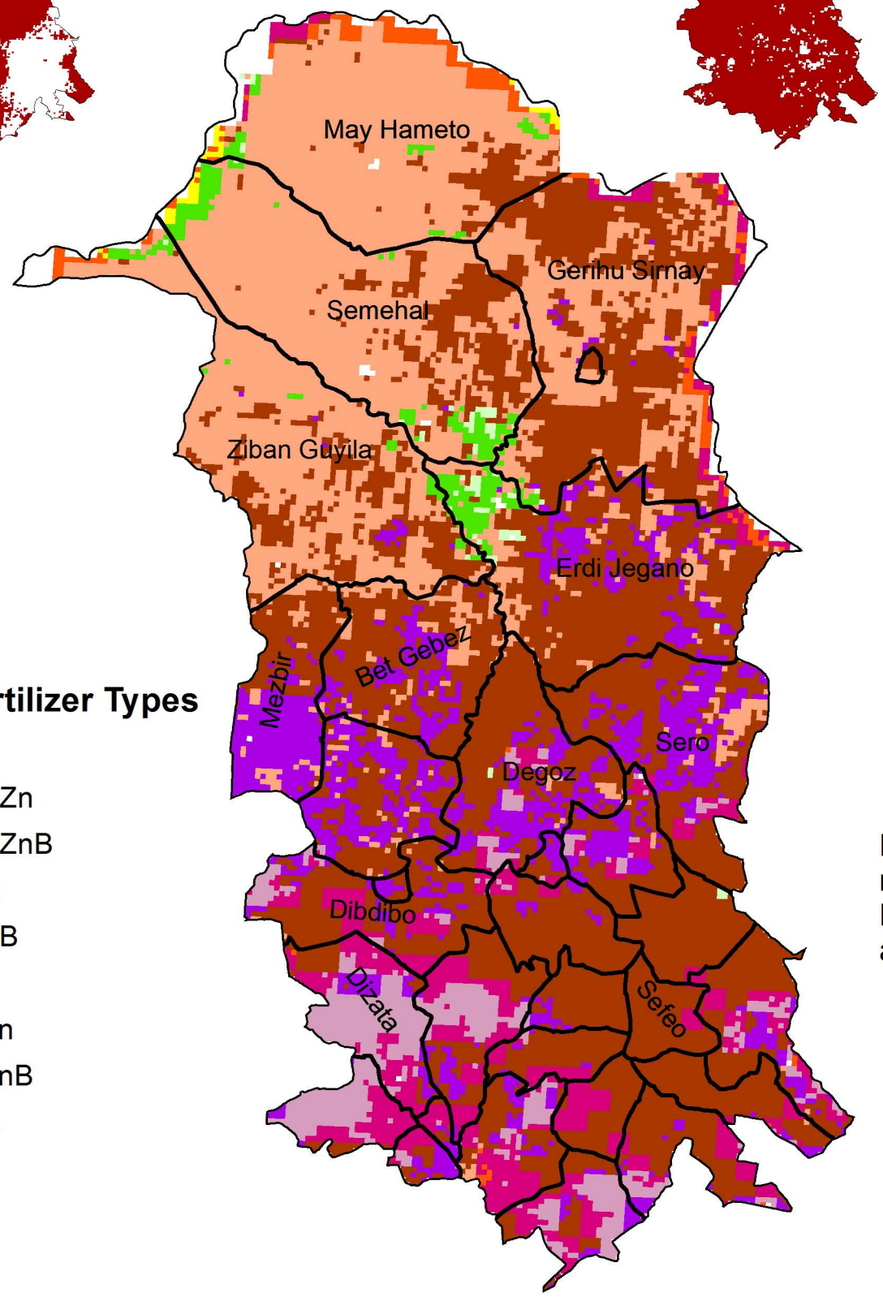
Fertilizer Type Requirement of Ahiferom Woreda

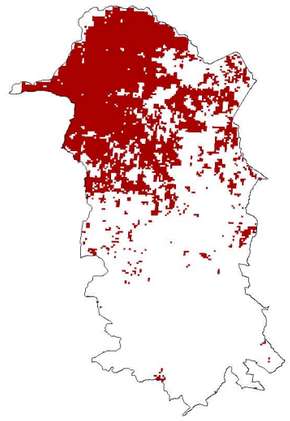


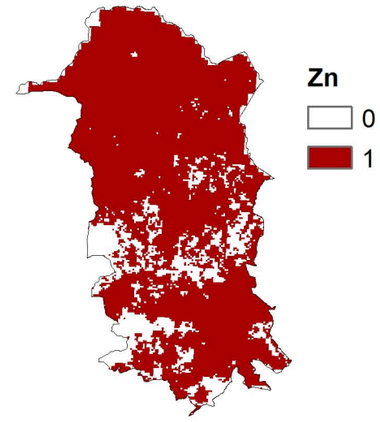








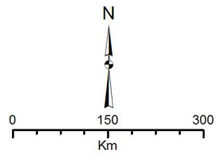


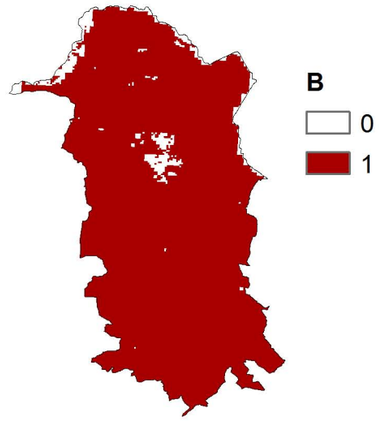


Blended fertilizer Types

- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZnB

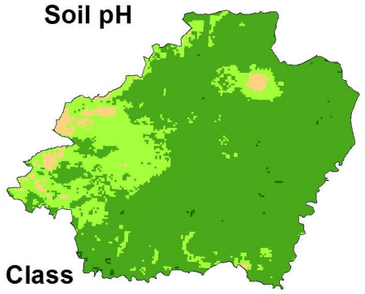
Nine tyeps of blended fertilizers are recommended for this woreda, of which, NPKSZnB, NPKSFeZnB, NPKSB and NPSZnB are the most dominant blends, respectively.





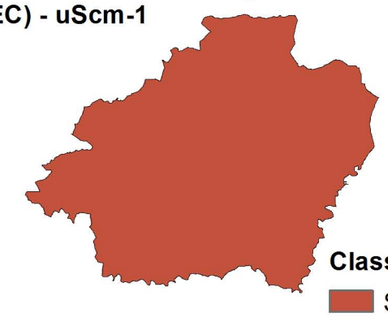
Soil Fertility Status of Degua Temben Woreda

Soil pH



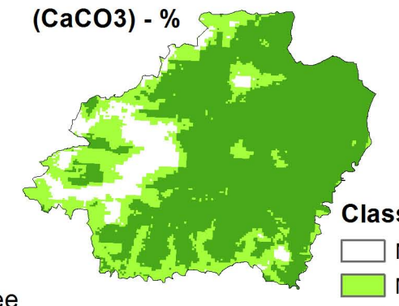
Class
- Mod. acidic
- Mod. alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



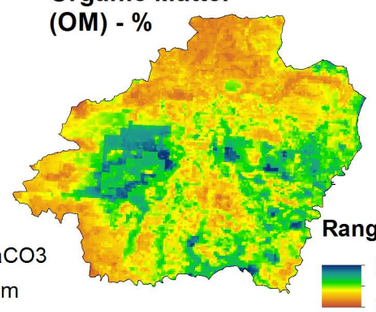
Class
- Salt free

Calcium Carbonate (CaCO3) - %



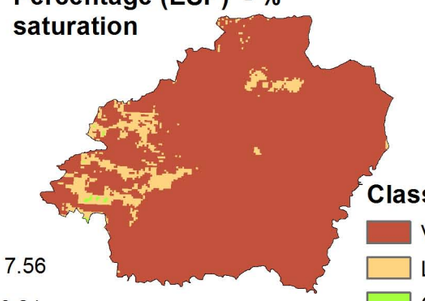
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



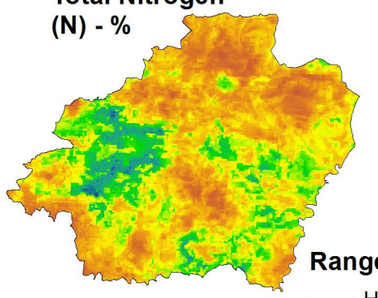
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



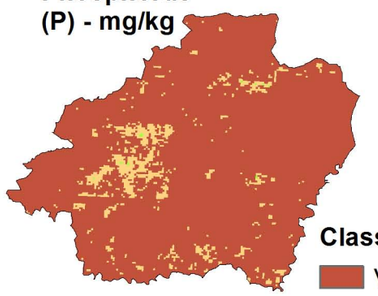
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



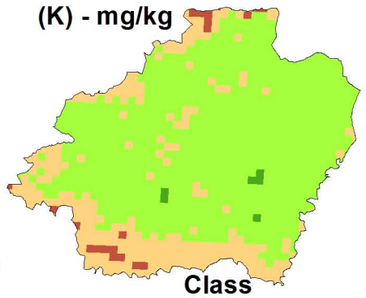
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



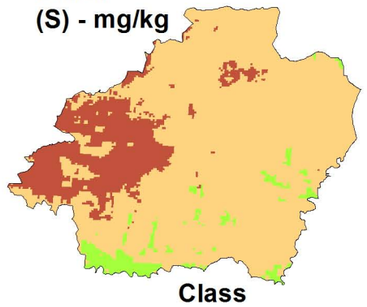
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



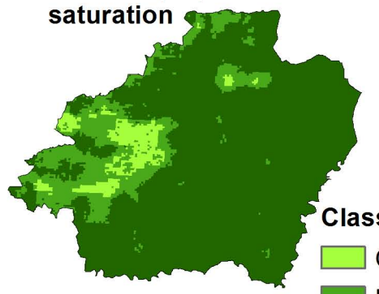
Class
- Very low
- Optimum
- Low
- High

Sulfur (S) - mg/kg



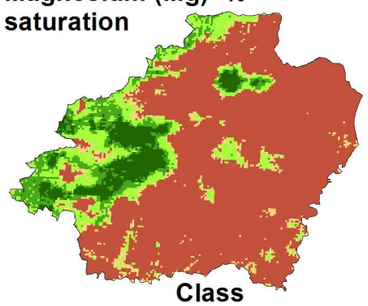
Class
- Very low
- Optimum
- Low
- High

Calcium (Ca) - % saturation



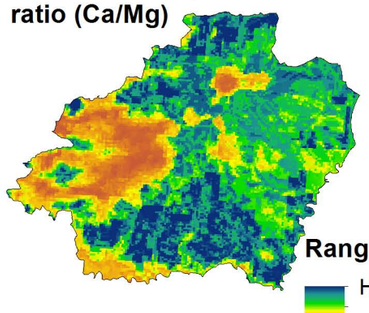
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



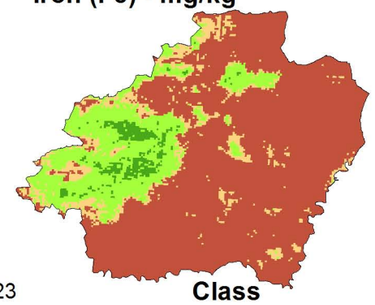
Class
- Very low
- High
- Low
- Very high
- Optimum

Calcium to Magnesium ratio (Ca/Mg)



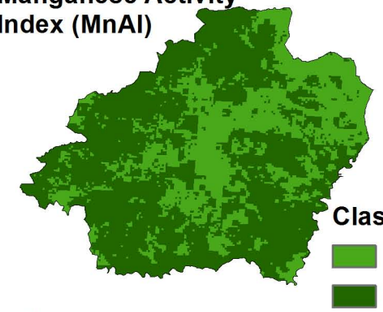
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



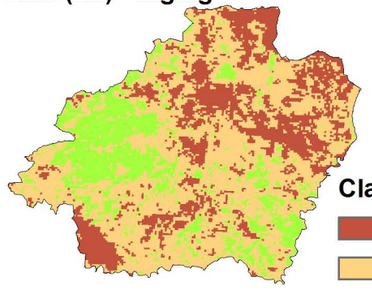
Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)



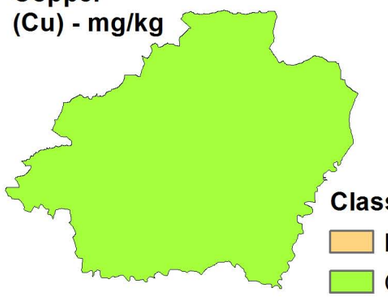
Class
- High
- Very high

Zinc (Zn) - mg/kg



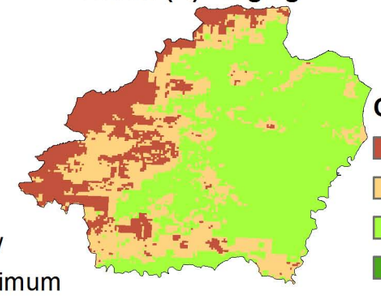
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



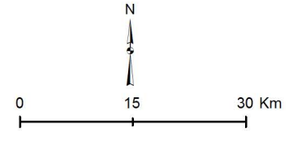
Class
- Low
- Optimum

Boron (B) - mg/kg

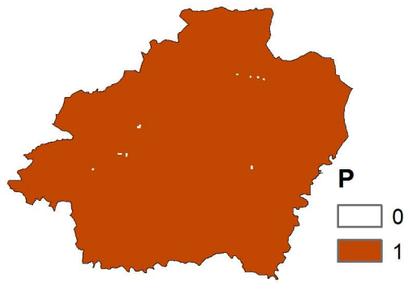


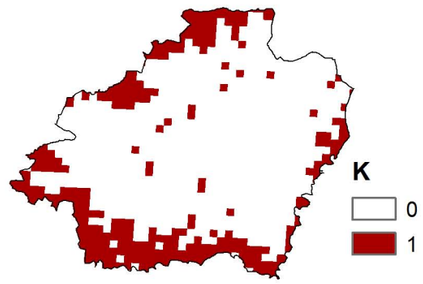
Class
- Very low
- Low
- Optimum
- High

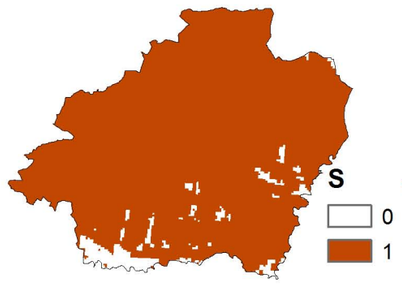
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.



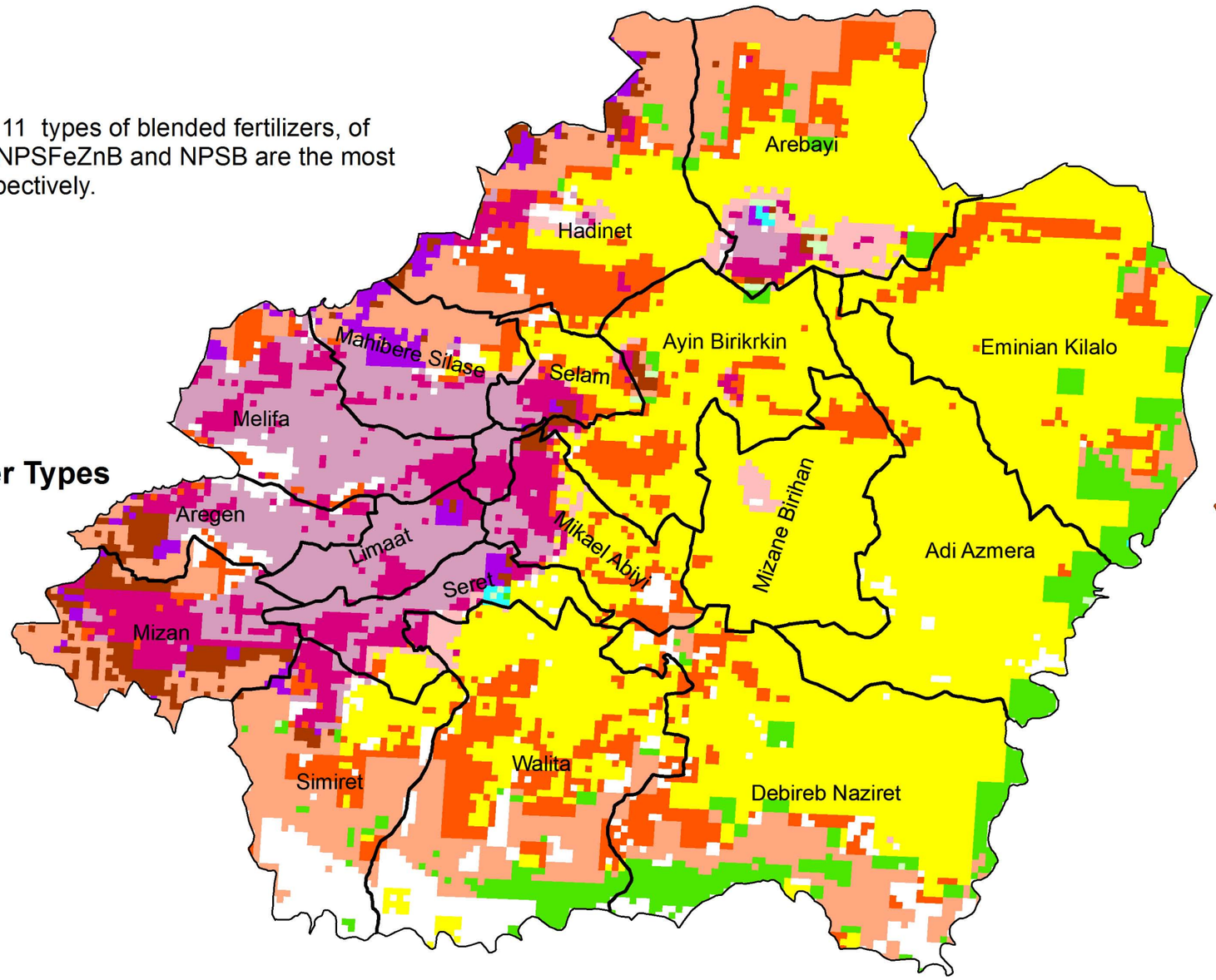
Fertilizer Type Requirement of Degua Temben Woreda





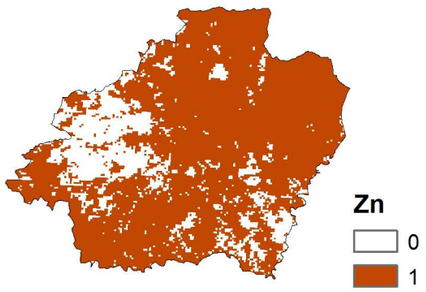


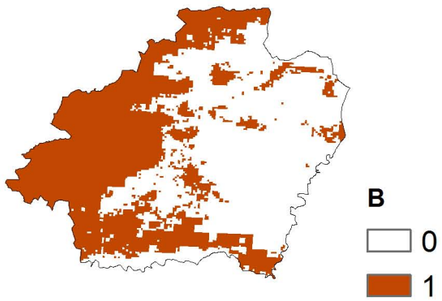
This woreda requires 11 types of blended fertilizers, of which, NPKSFeZnB, NPSFeZnB and NPSB are the most dominant blends, respectively.

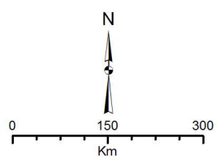


Blended fertilizer Types

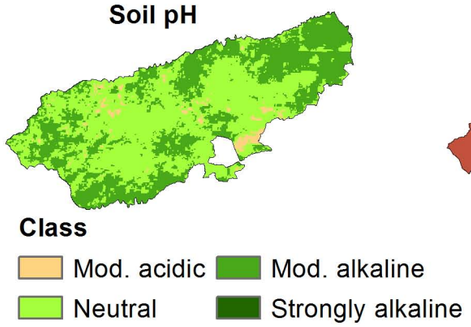
- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB

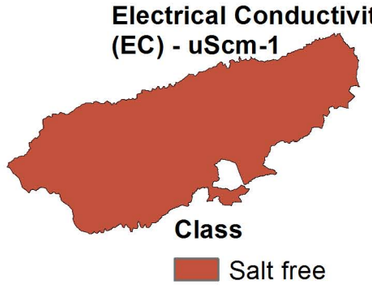


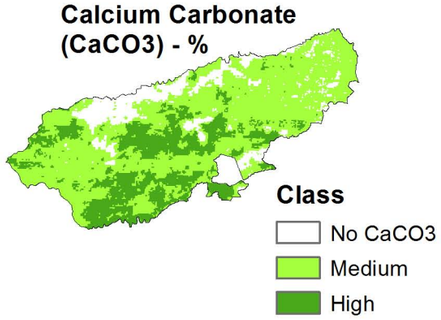


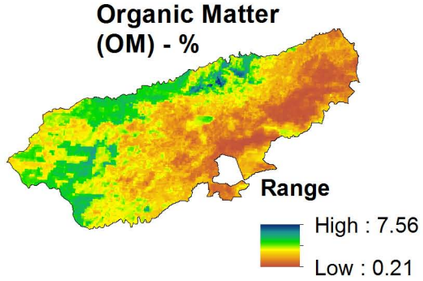


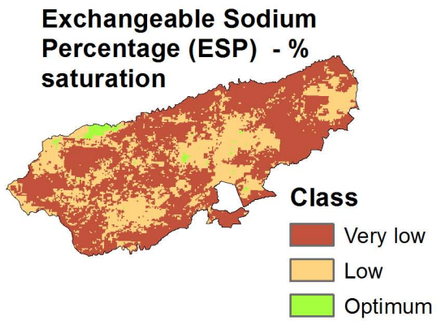
Soil Fertility Status of Kola Temben Woreda

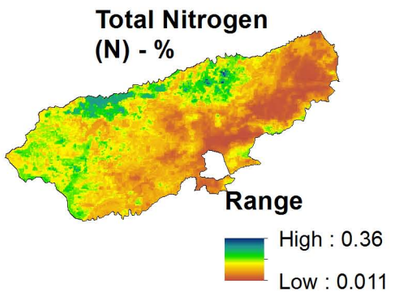


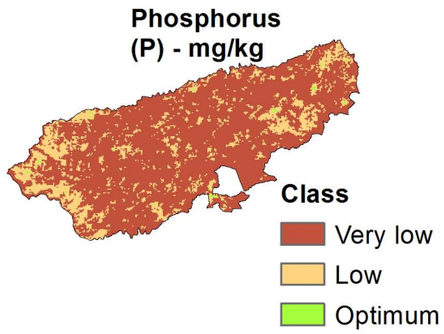


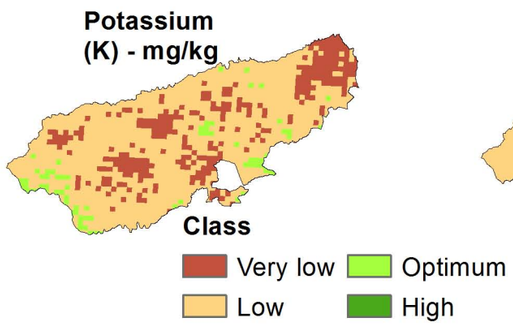


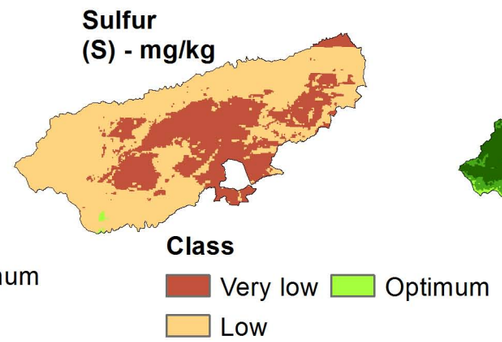


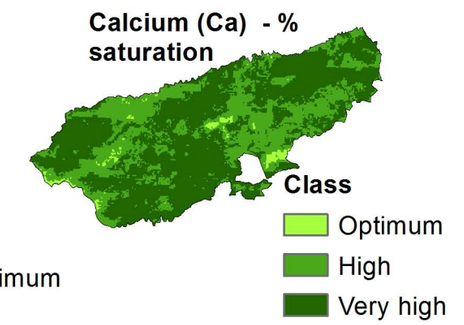


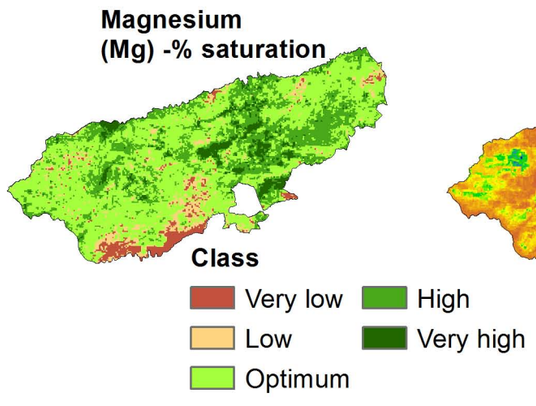


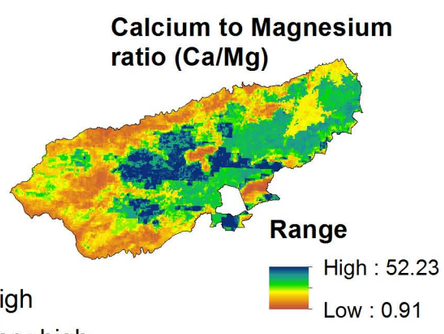


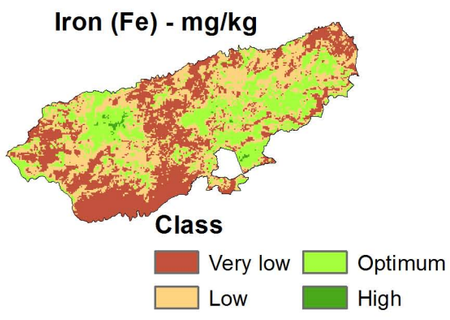


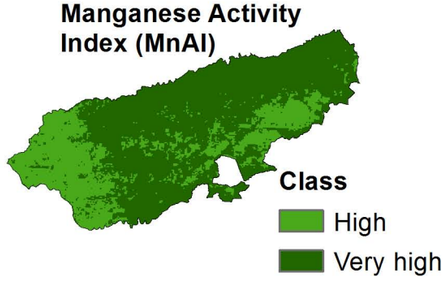


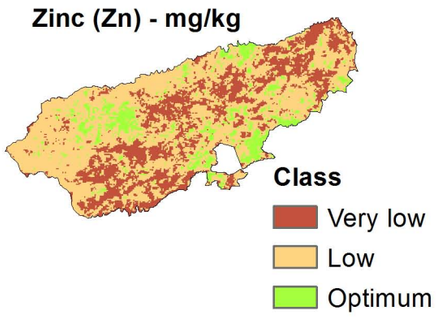


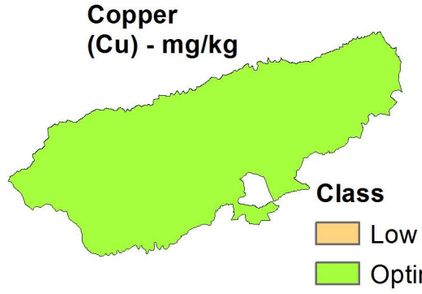


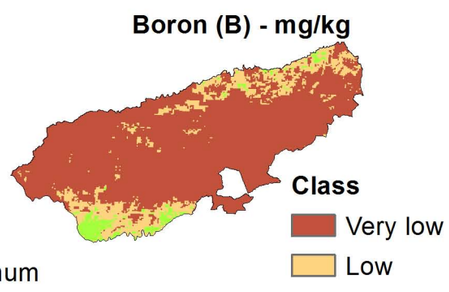




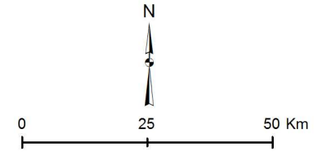




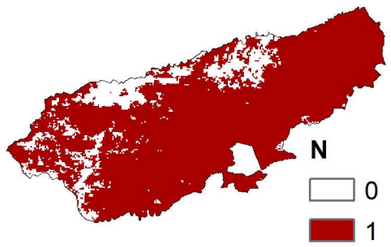


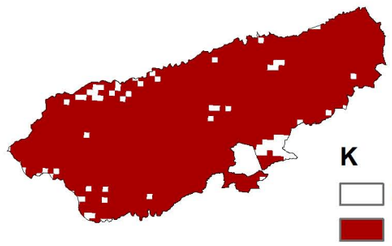


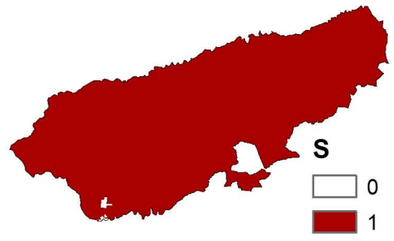
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

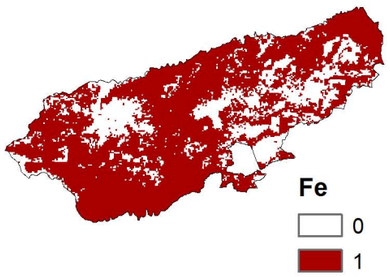


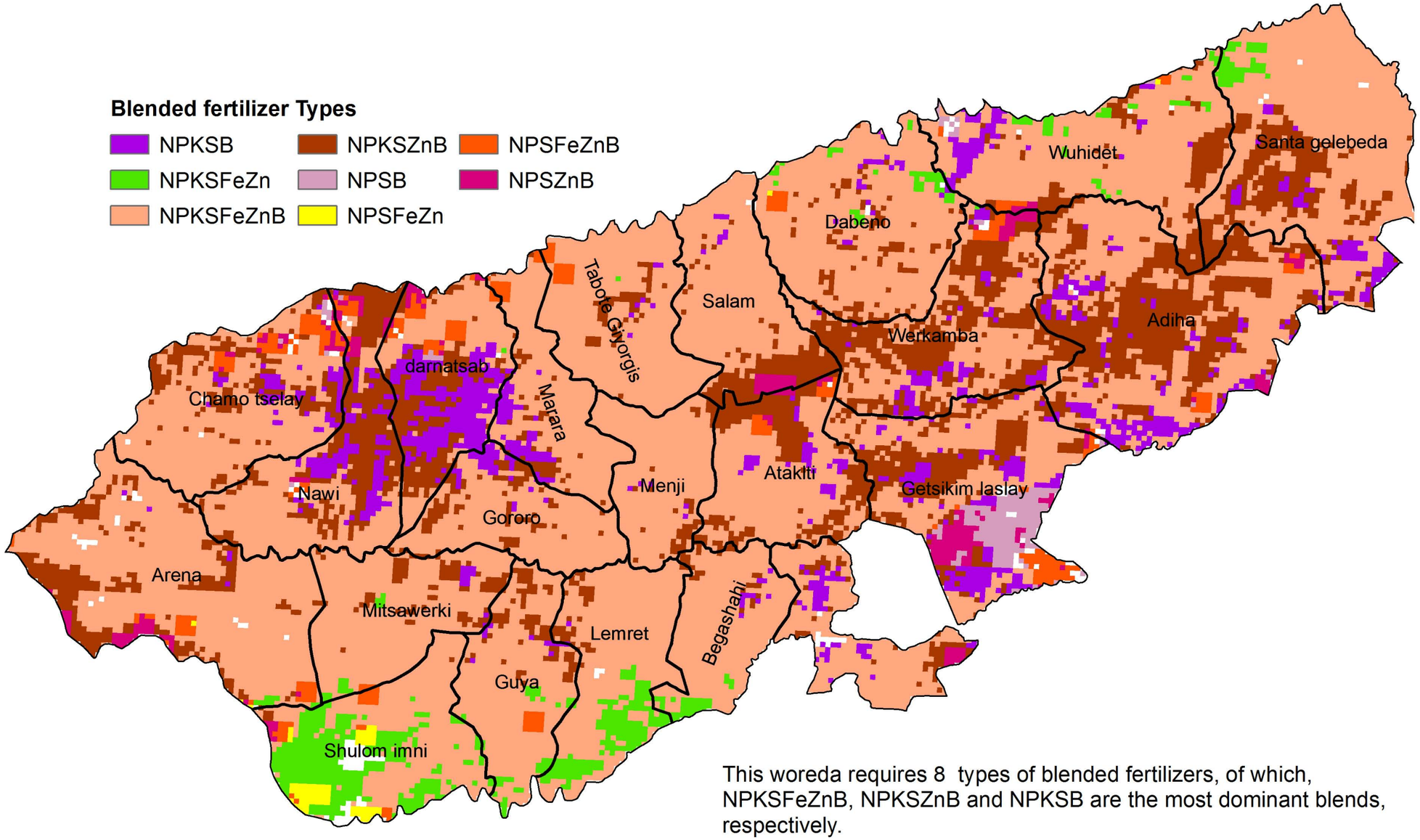
Fertilizer Type Requirement of Kola Temben Woreda

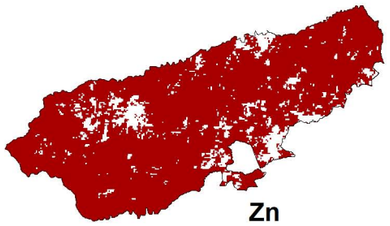


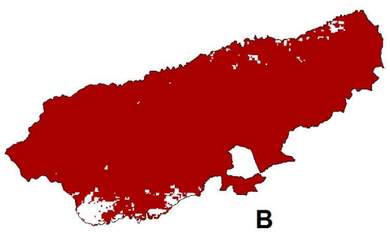




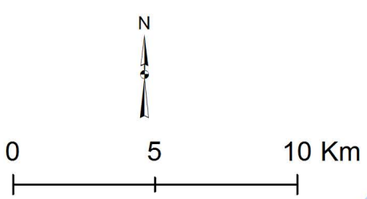






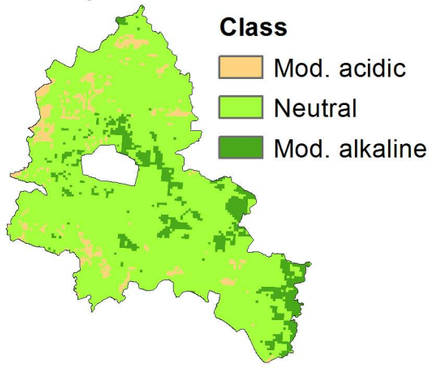


This woreda requires 8 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.

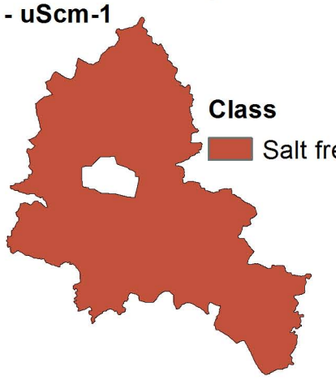


Soil Fertility Status of Laelay Mayichew Woreda

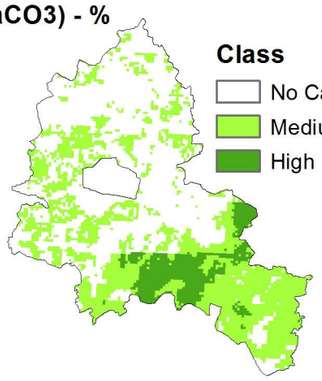
Soil pH



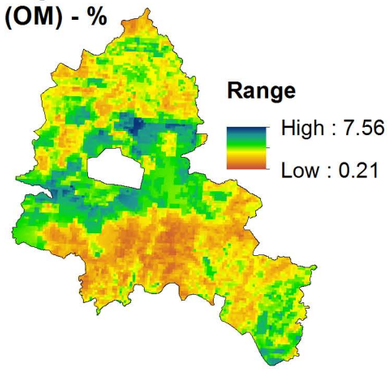
Electrical Conductivity (EC) - uScm-1



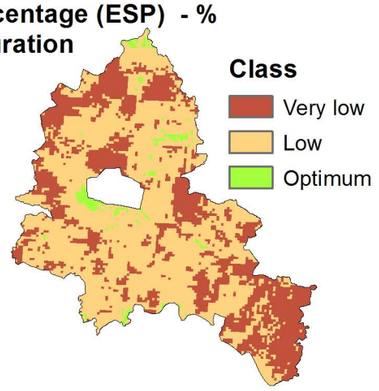
Calcium Carbonate (CaCO3) - %



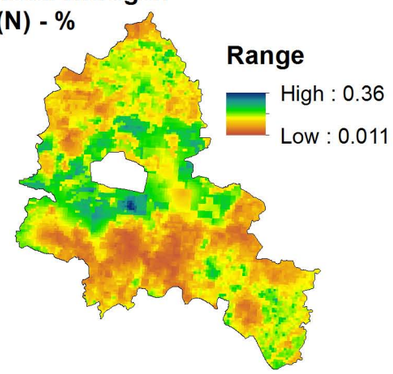
Organic Matter (OM) - %



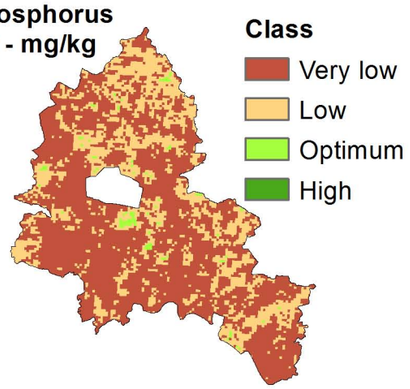
Exchangeable Sodium Percentage (ESP) - % saturation



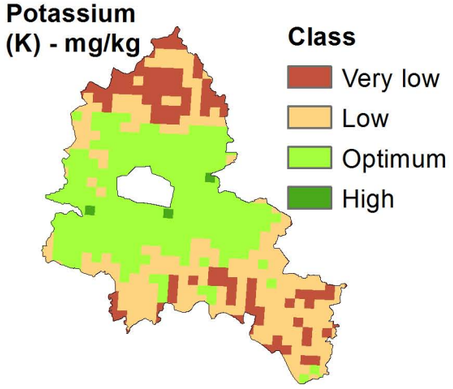
Total Nitrogen (N) - %



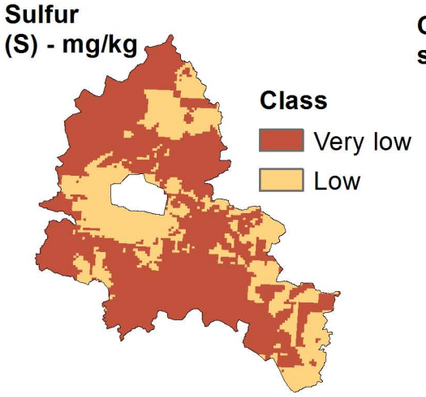
Phosphorus (P) - mg/kg



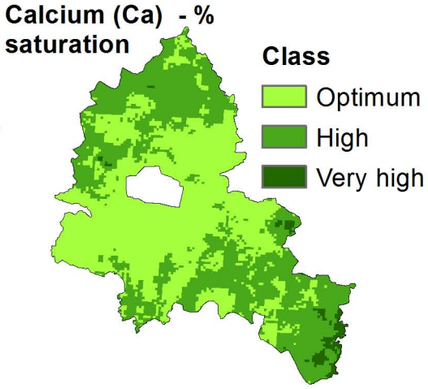
Potassium (K) - mg/kg



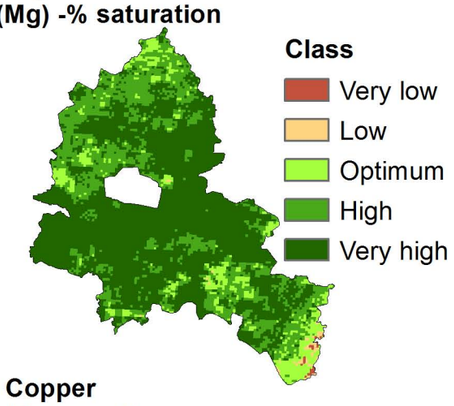
Sulfur (S) - mg/kg



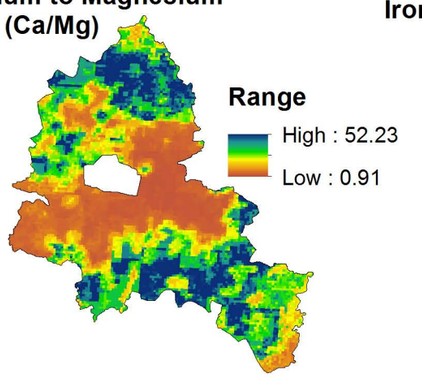
Calcium (Ca) - % saturation



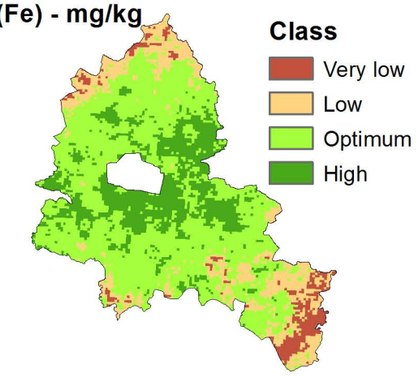
Magnesium (Mg) -% saturation



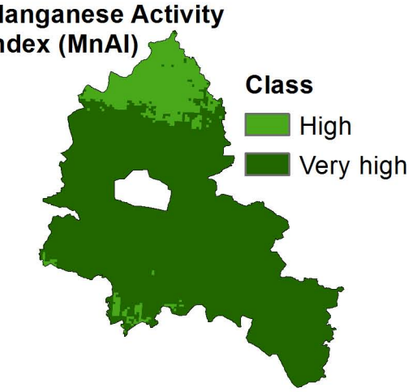
Calcium to Magnesium ratio (Ca/Mg)



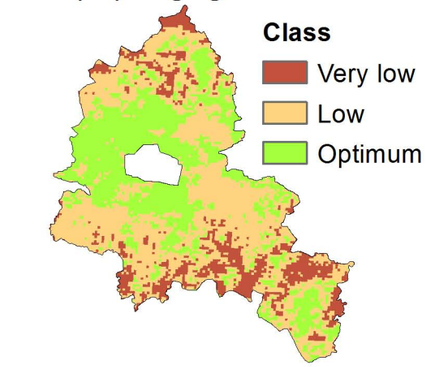
Iron (Fe) - mg/kg



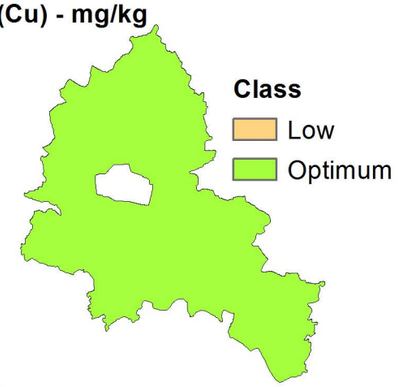
Manganese Activity Index (MnAI)



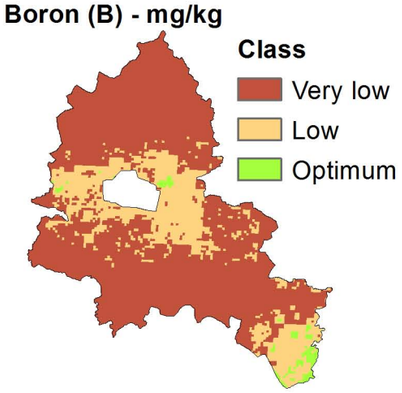
Zinc (Zn) - mg/kg



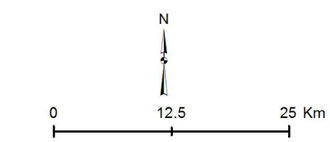
Copper (Cu) - mg/kg



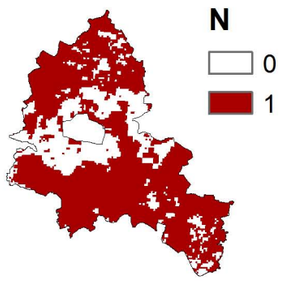
Boron (B) - mg/kg

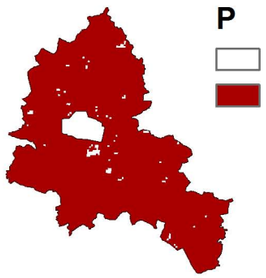


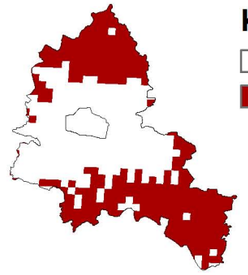
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

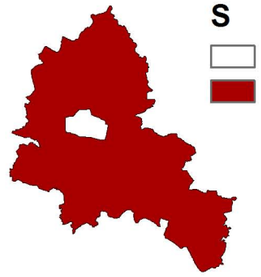


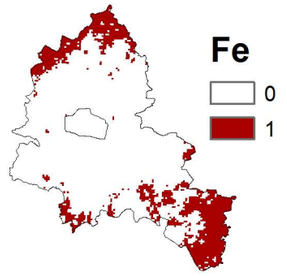
Fertilizer Type Requirement of Laelay Mayichew Woreda



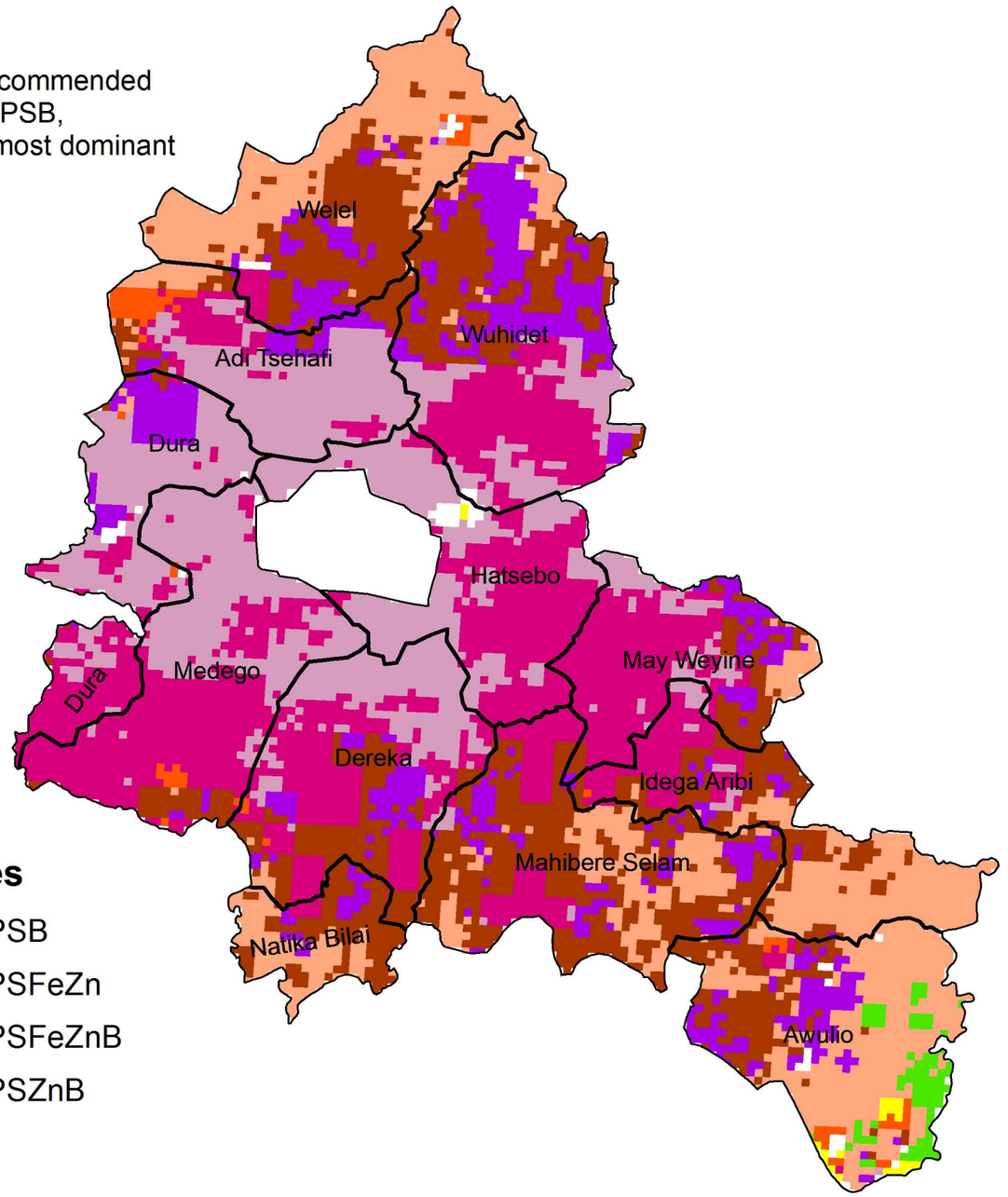


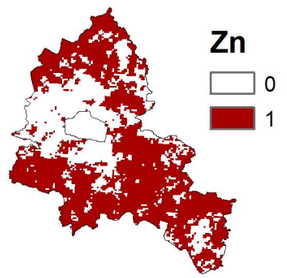


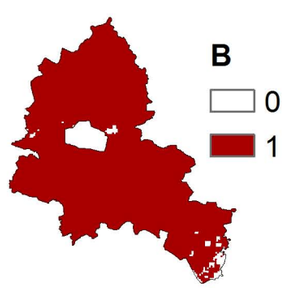




Ten types of blended fertilizers are recommended for this woreda, of which, NPSZnB, NPSB, NPKSZnB and NPKSFeZnB are the most dominant blends, respectively.

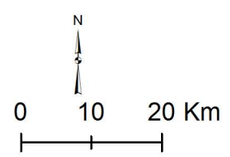






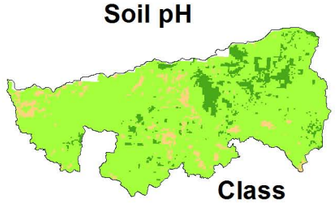
Blended Fertilizer Types

- NPKSB
- NPSB
- NPKSFeZn
- NPSFeZn
- NPKSFeZnB
- NPSFeZnB
- NPKSZnB
- NPSZnB



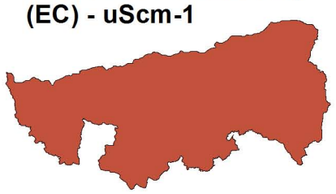
Soil Fertility Status of Mereb Leha Woreda

Soil pH



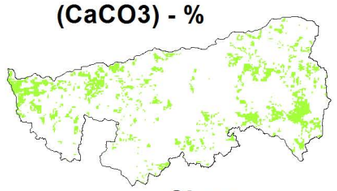
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



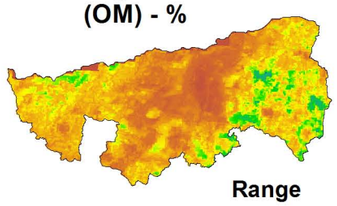
Class
- Salt free

Calcium Carbonate (CaCO3) - %



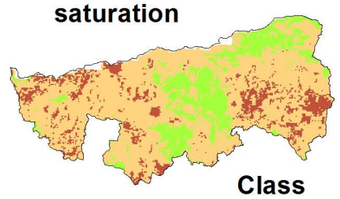
Class
- No CaCO3
- Optimum

Organic Matter (OM) - %



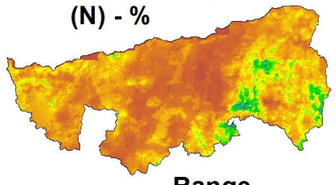
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



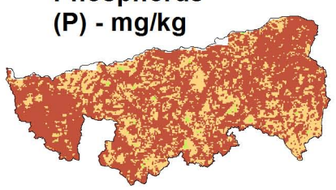
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



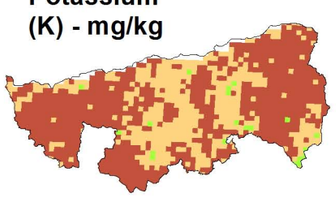
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



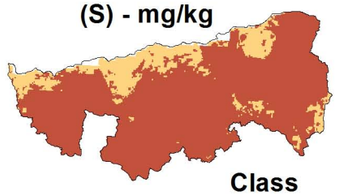
Class
- Very low
- Optimum
- Low

Potassium (K) - mg/kg



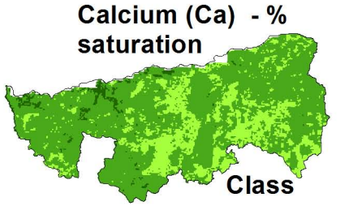
Class
- Very low
- Optimum
- Low

Sulfur (S) - mg/kg



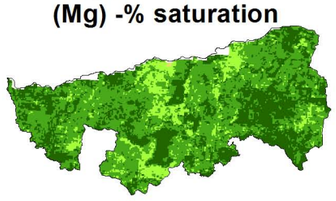
Class
- Very low
- Low

Calcium (Ca) - % saturation



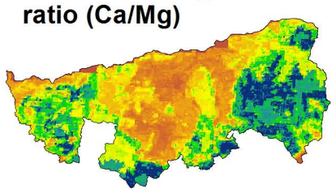
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



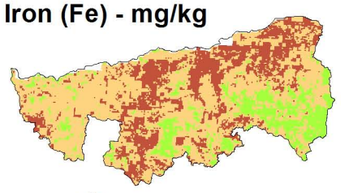
Class
- Low
- High
- Optimum
- Very high

Calcium to Magnesium ratio (Ca/Mg)



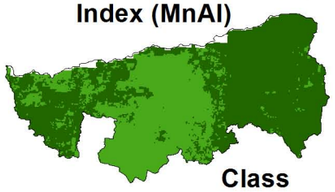
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



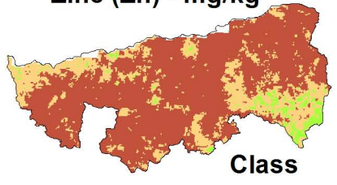
Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)



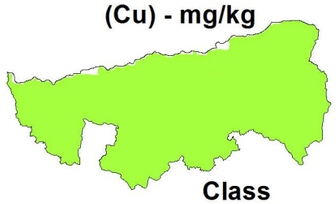
Class
- High
- Very high

Zinc (Zn) - mg/kg



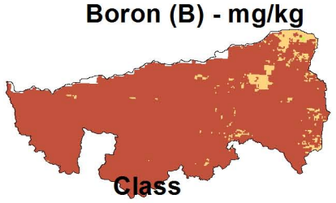
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



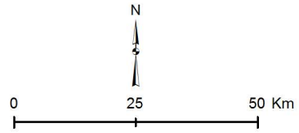
Class
- Low
- Optimum

Boron (B) - mg/kg

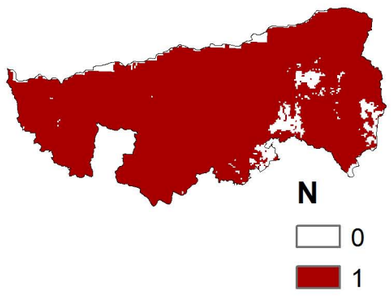


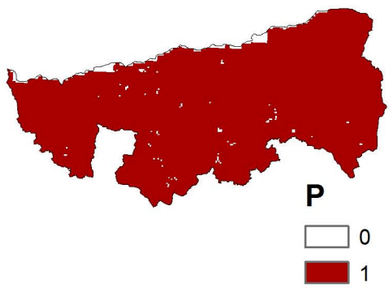
Class
- Very low
- Optimum
- Low

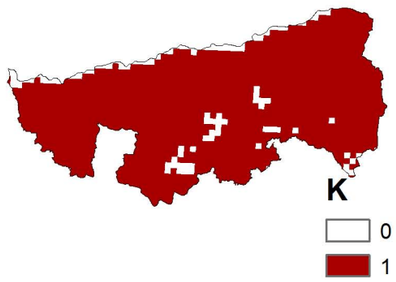
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda

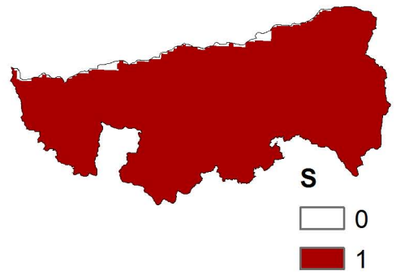


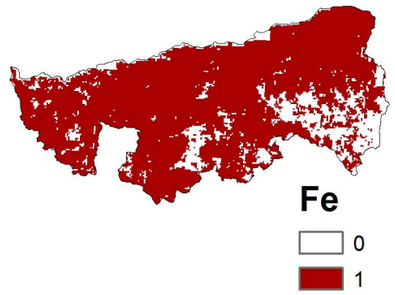
Fertilizer Type Requirement of Mereb Leha Woreda

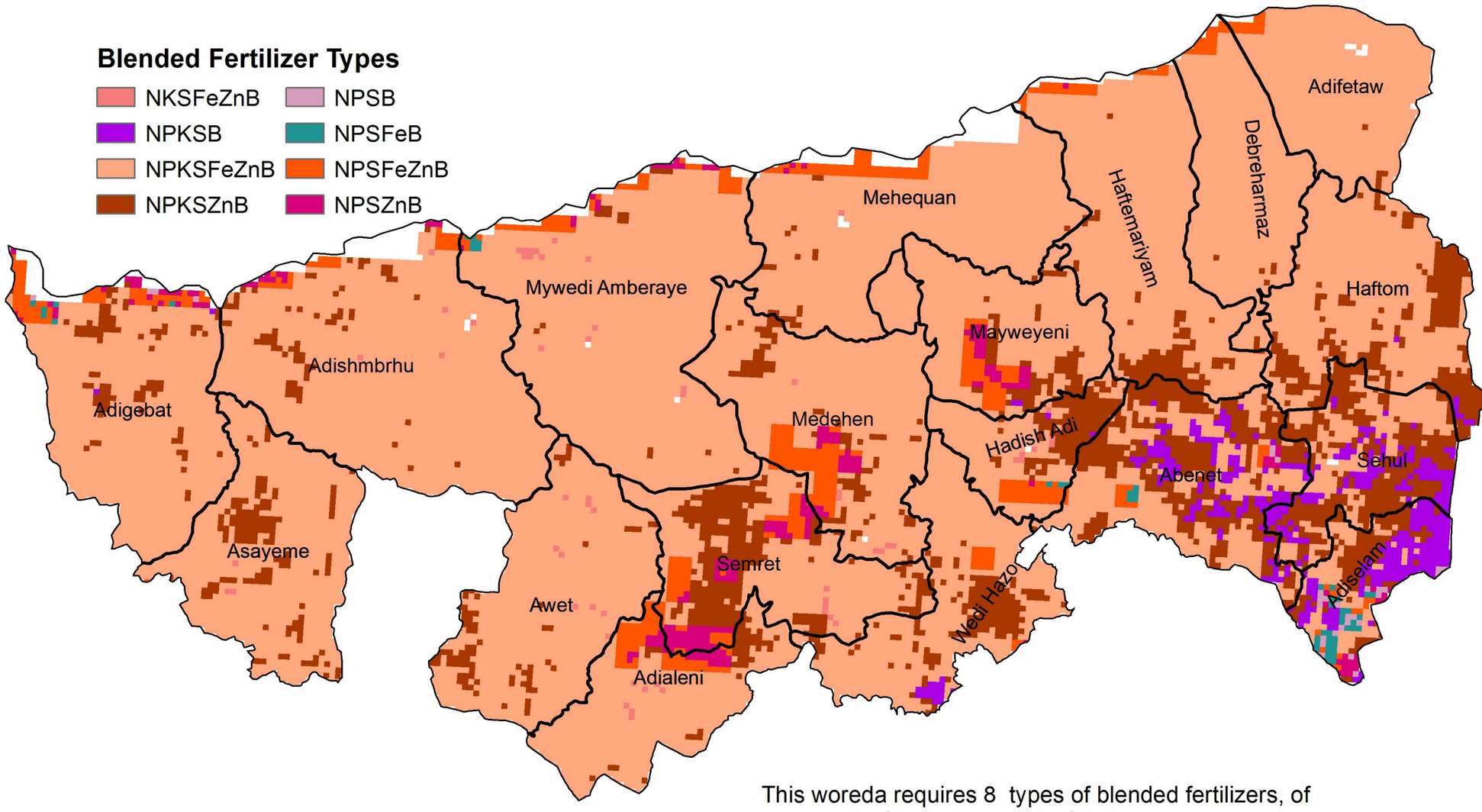


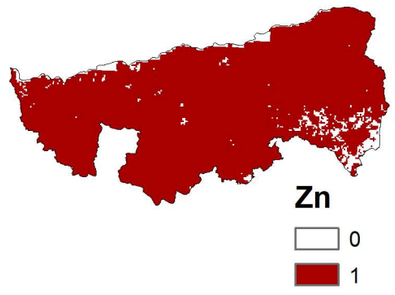


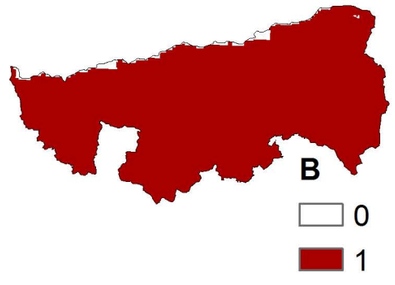




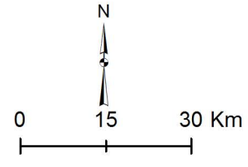




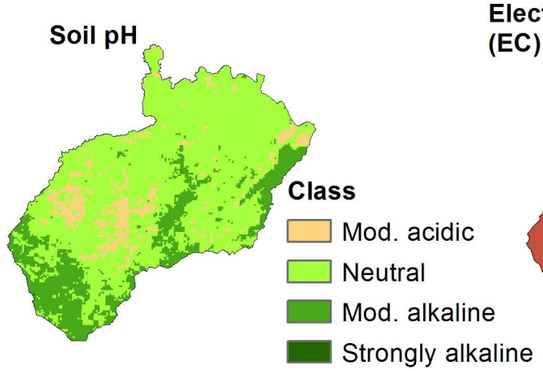


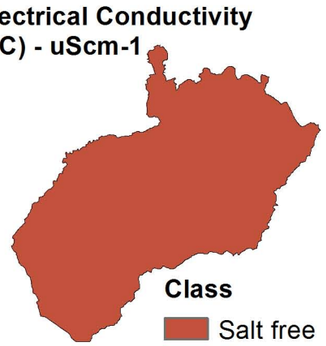


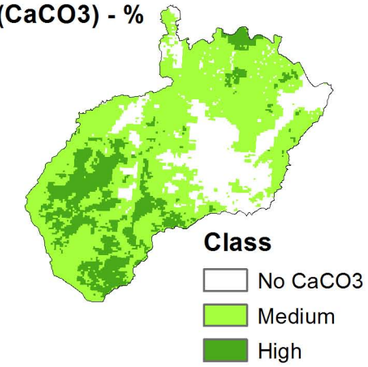
This woreda requires 8 types of blended fertilizers, of which, NPKSFeZnB and NPKSZnB are the most dominant blends, respectively.

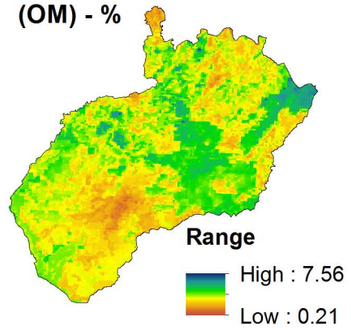


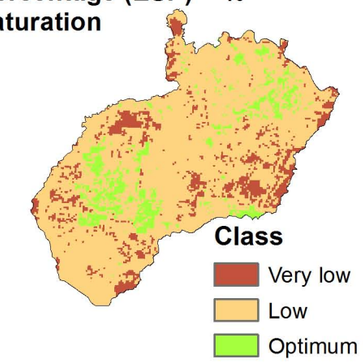
Soil Fertility Status of Nader Adet Woreda

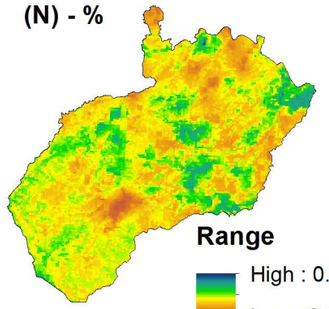


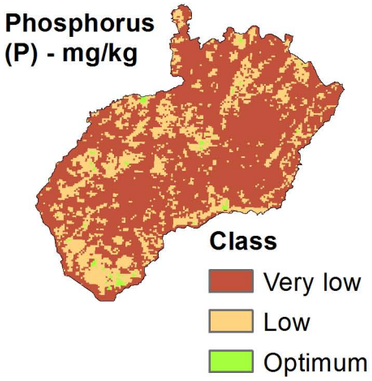


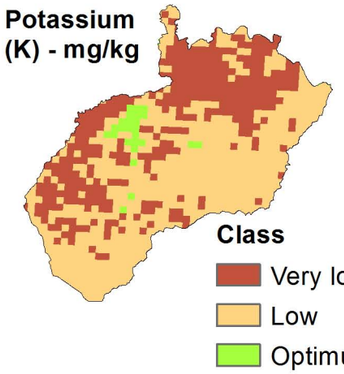


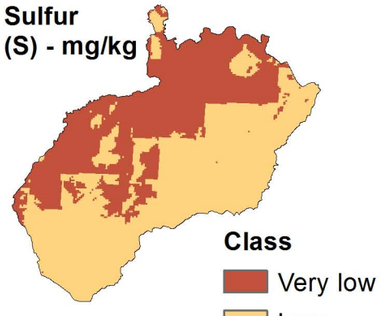


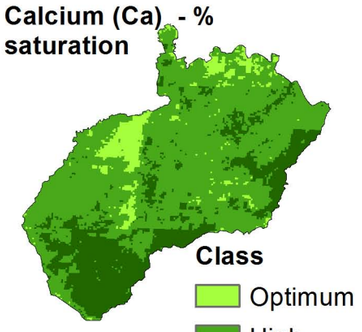


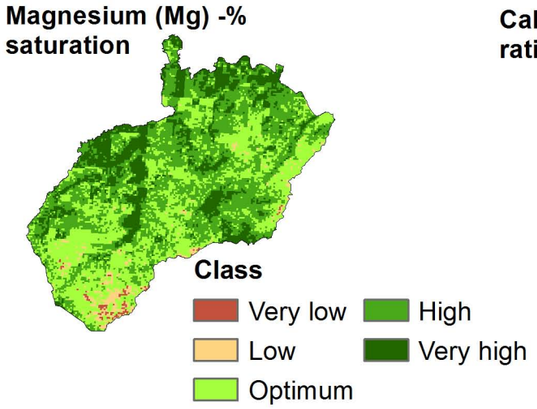


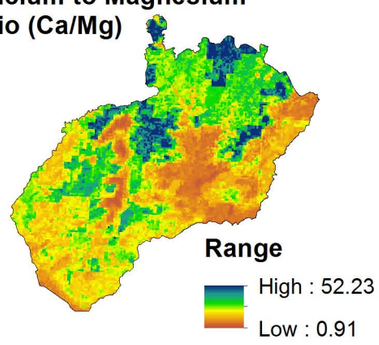


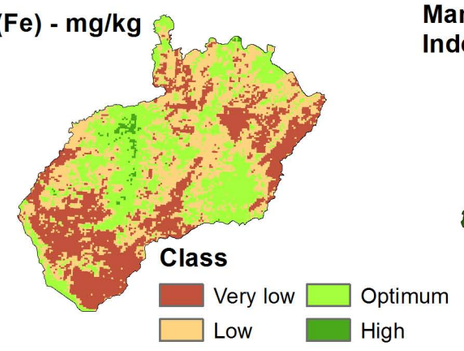


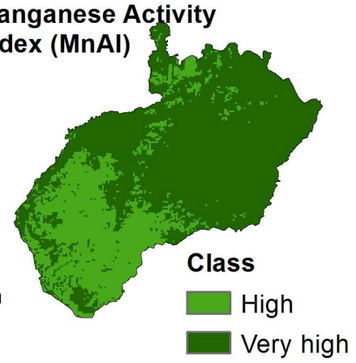


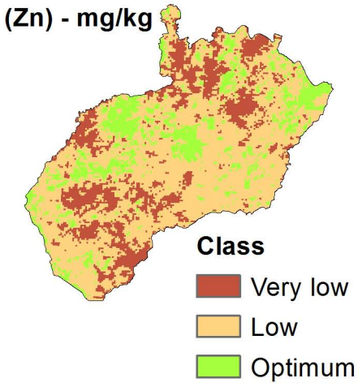


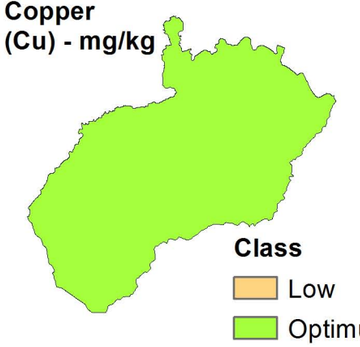


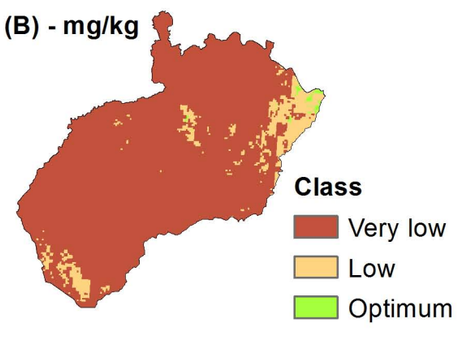




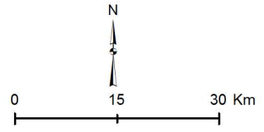




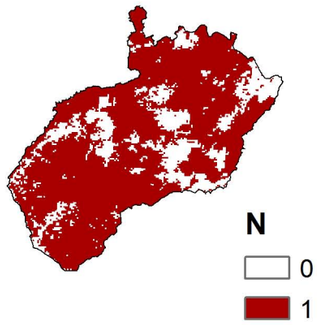


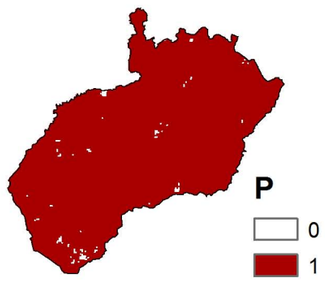


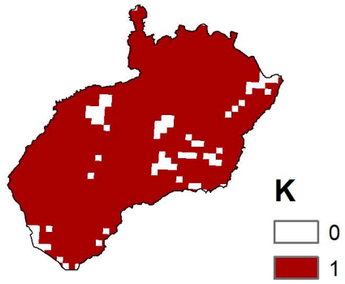
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

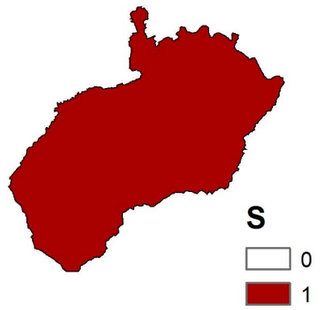


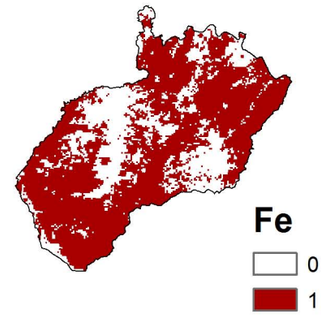
Fertilizer Type Requirement of Nader Adet Woreda



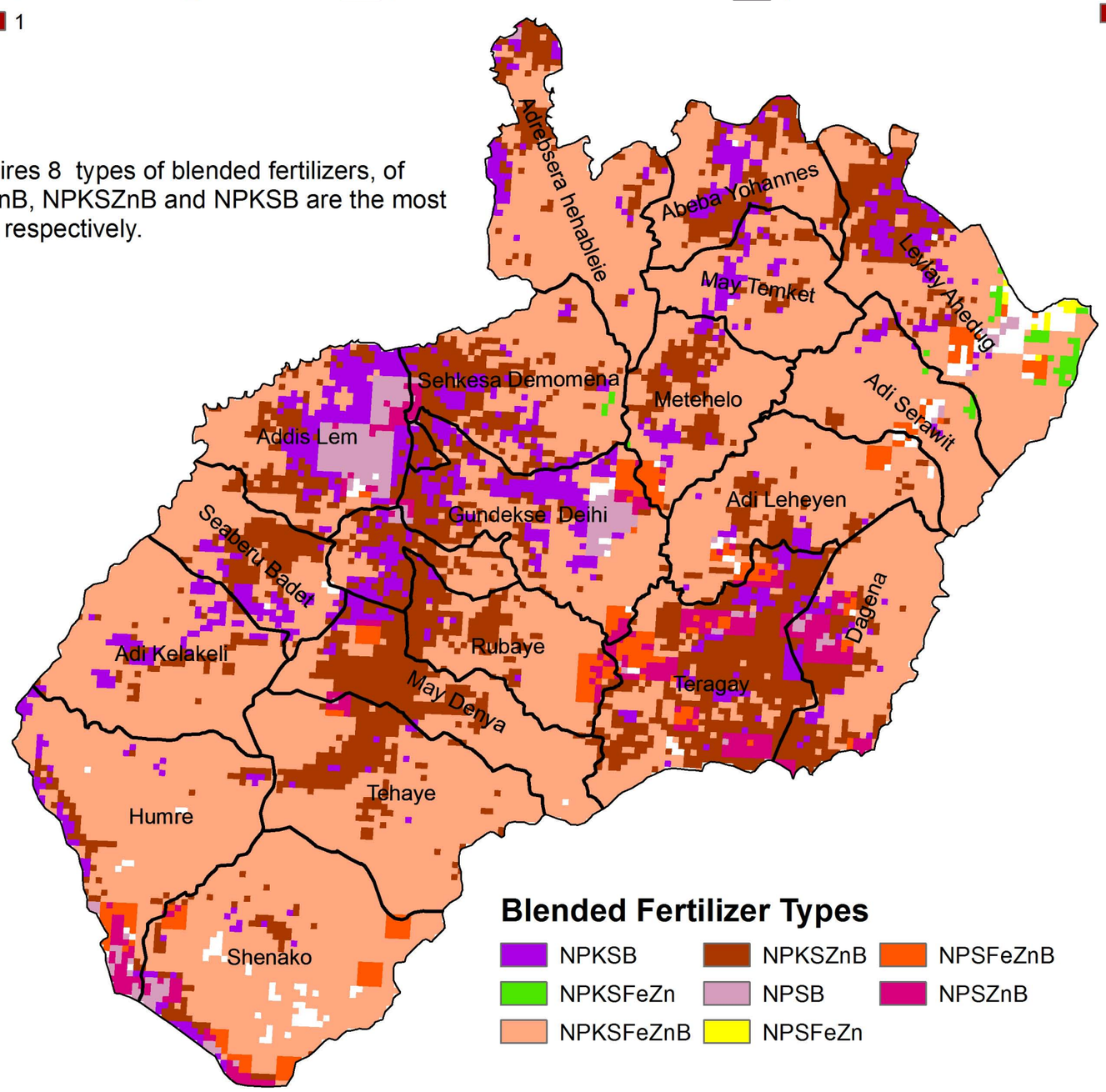


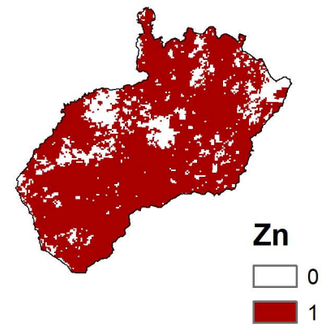


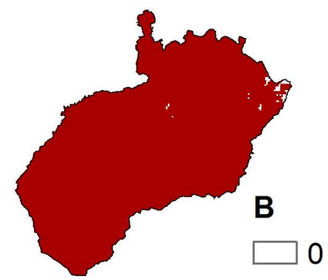


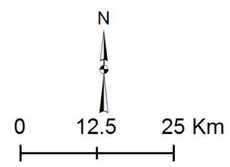


This woreda requires 8 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.



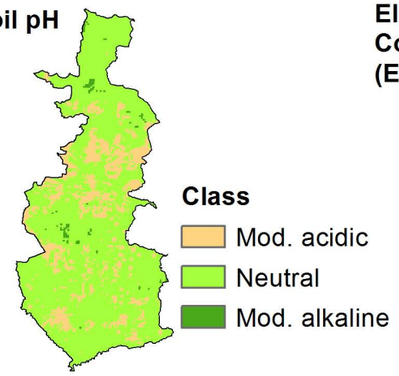




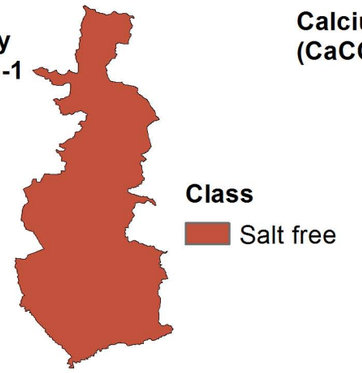


Soil Fertility Status of Tahitay Mayichew Woreda

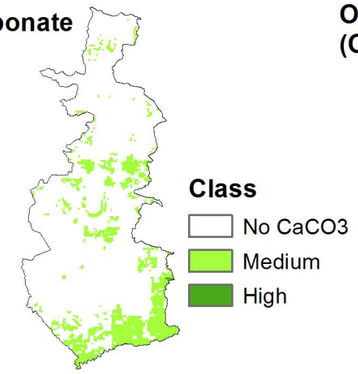
Soil pH



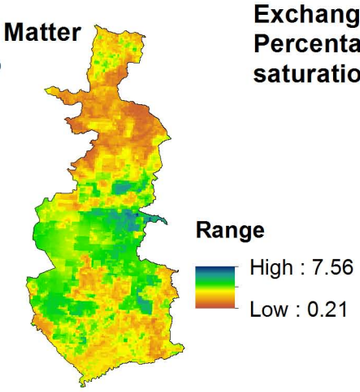
Electrical Conductivity (EC) - uScm-1



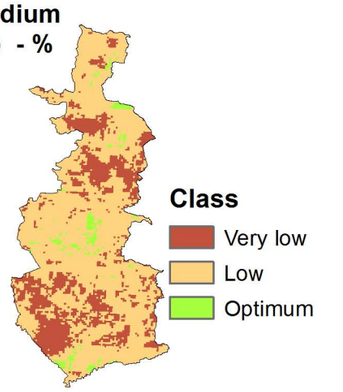
Calcium Carbonate (CaCO3) - %



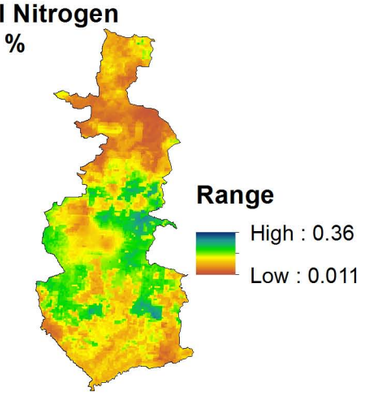
Organic Matter (OM) - %



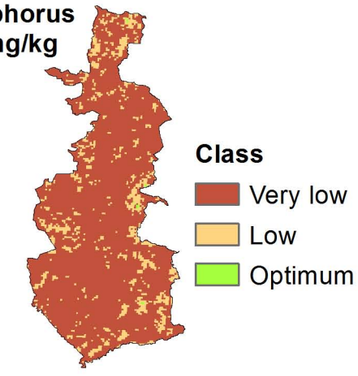
Exchangeable Sodium Percentage (ESP) - % saturation



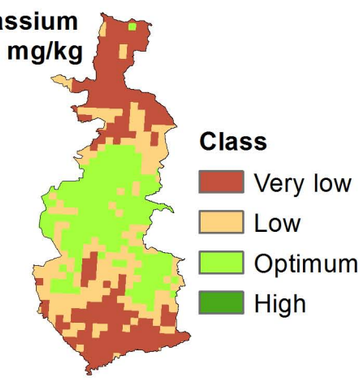
Total Nitrogen (N) - %



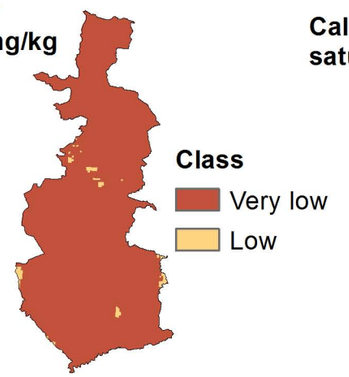
Phosphorus (P) - mg/kg



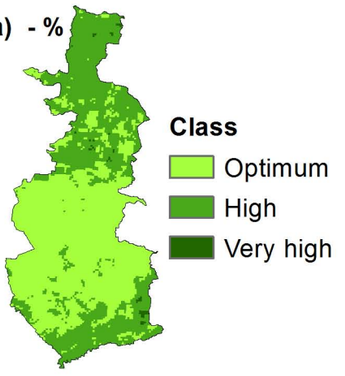
Potassium (K) - mg/kg



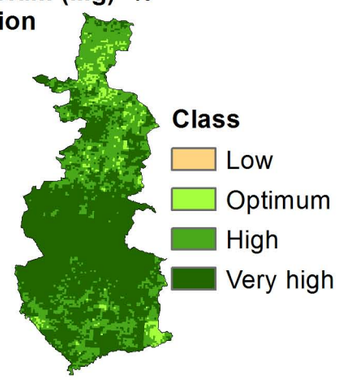
Sulfur (S) - mg/kg



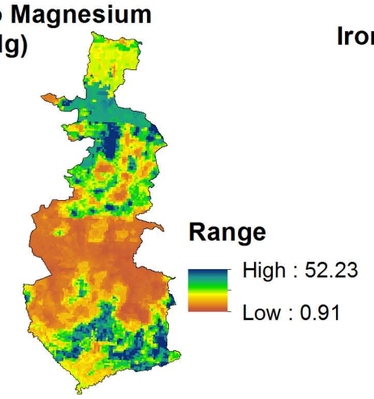
Calcium (Ca) - % saturation



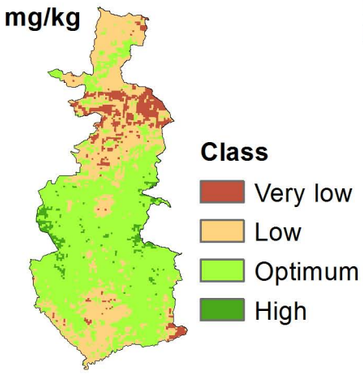
Magnesium (Mg) -% saturation



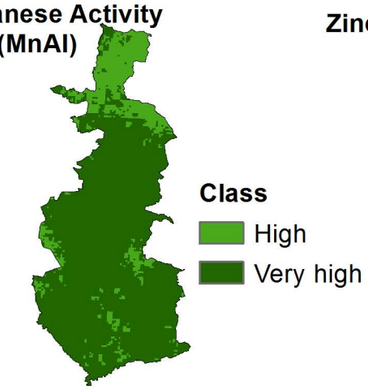
Calcium to Magnesium ratio (Ca/Mg)



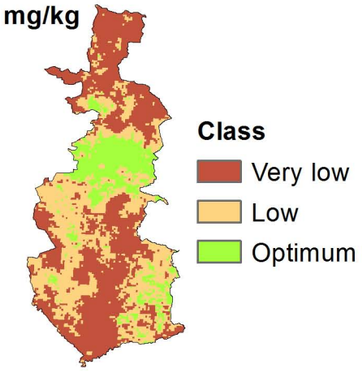
Iron (Fe) - mg/kg



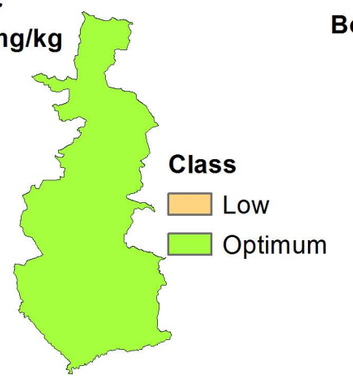
Manganese Activity Index (MnAI)



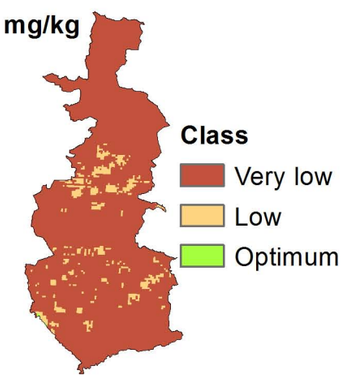
Zinc (Zn) - mg/kg



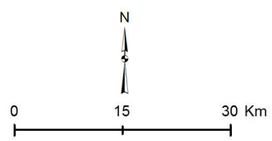
Copper (Cu) - mg/kg



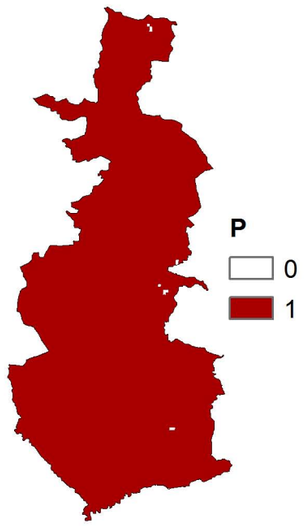
Boron (B) - mg/kg

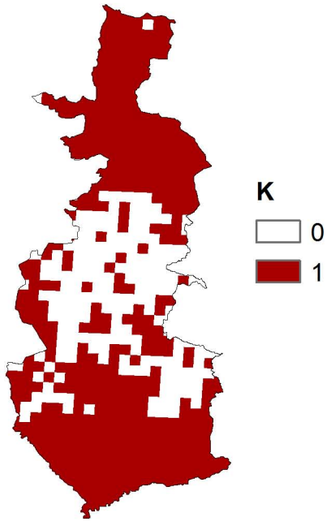


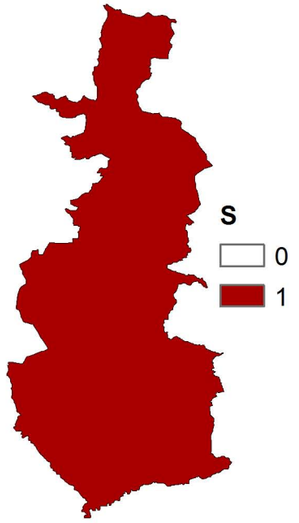
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

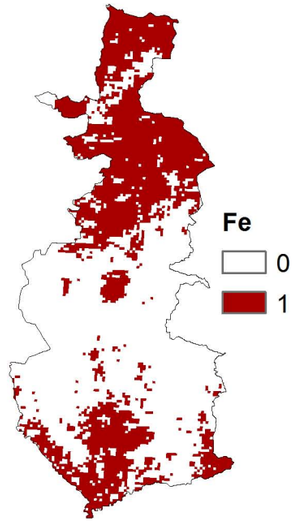


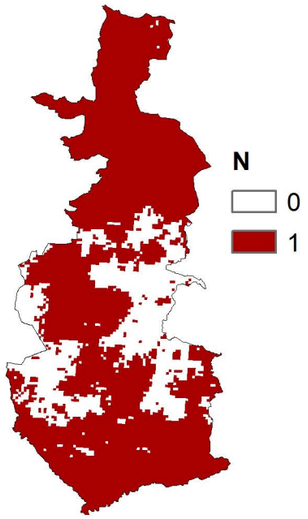
Fertilizer Type Requirement of Tahitay Mayichew Woreda

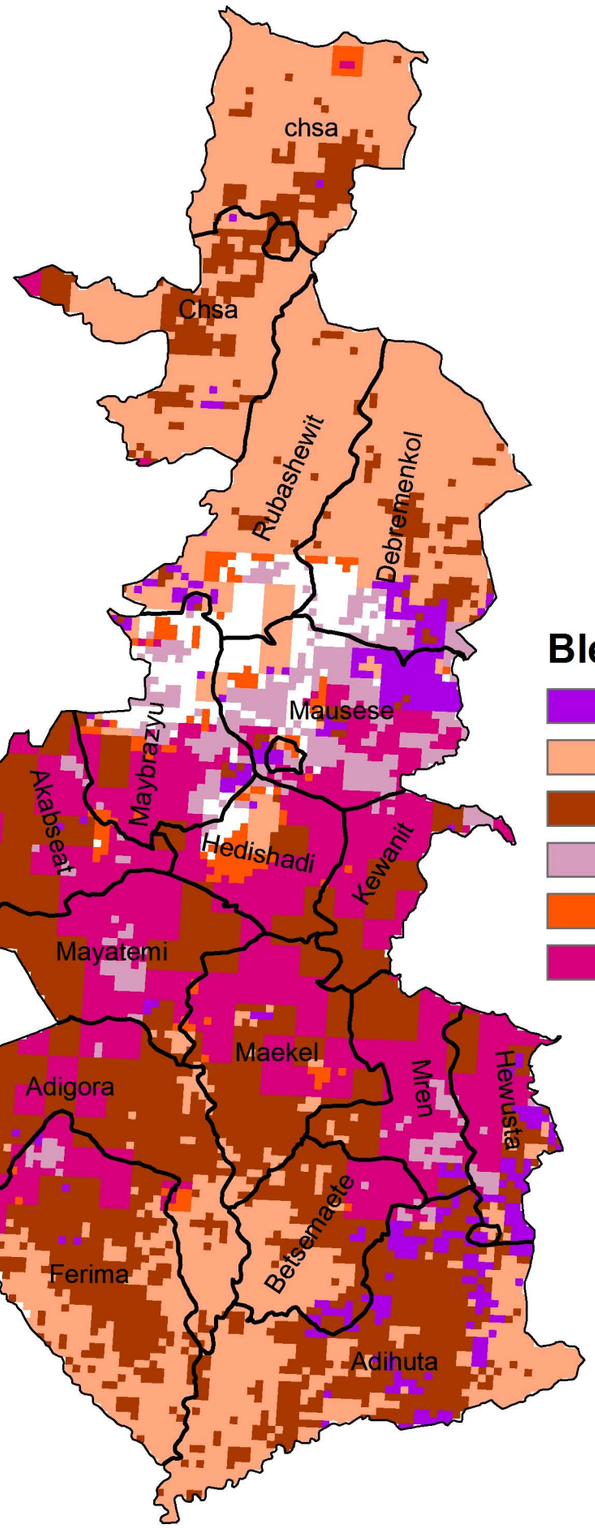






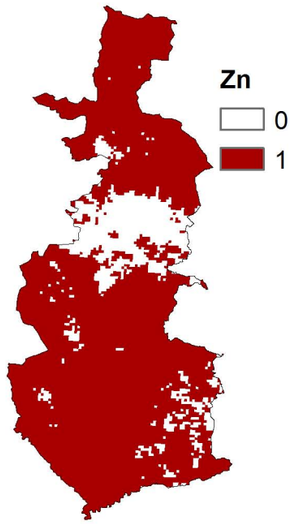


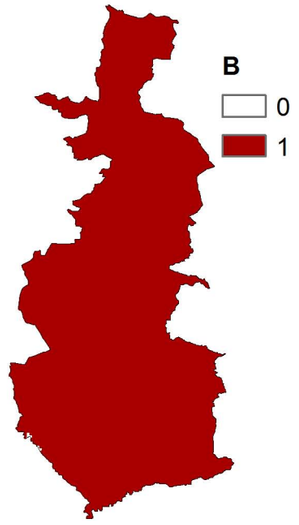




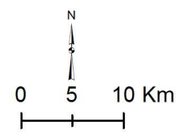
Blended Fertilizer Types

- NPKSB
- NPKSFeZnB
- NPKSZnB
- NPSB
- NPSFeZnB
- NPSZnB

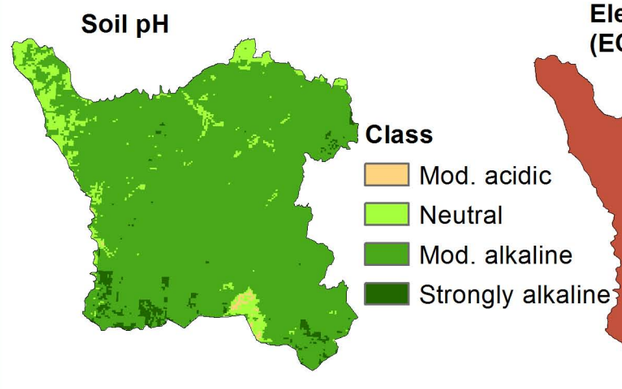


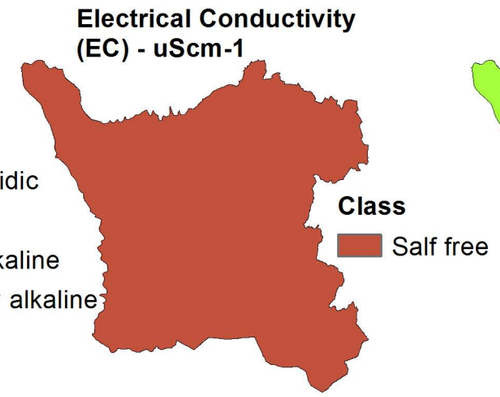


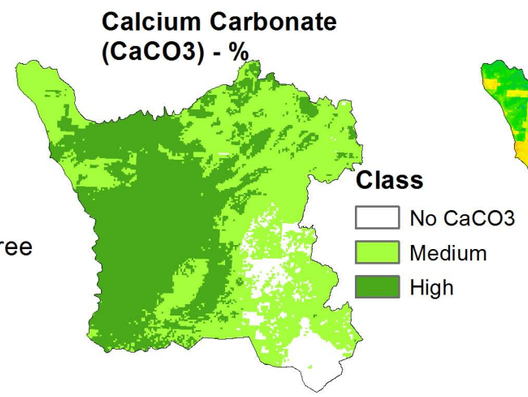
Six types of blended fertilizers are recommended for this woreda, of which, NPKSFeZnB, NPKSZnB and NPSZnB are the most dominant blends, respectively.

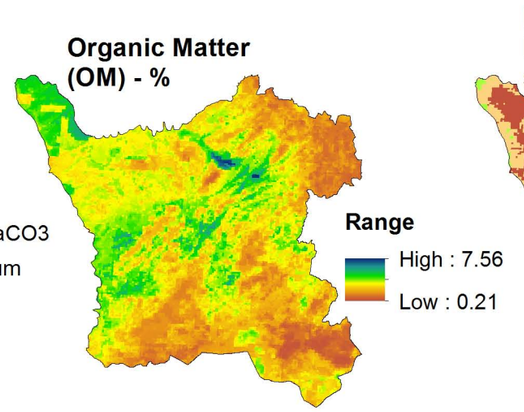


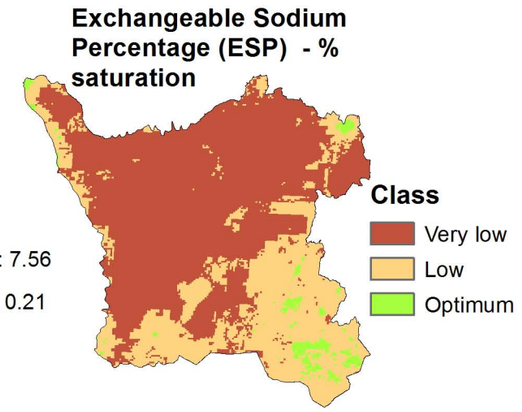
Soil Fertility Status of Tanqua Abergele Woreda

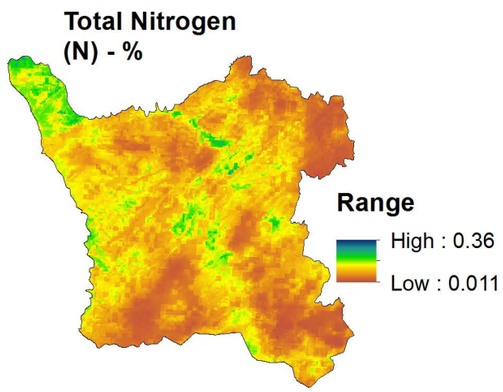


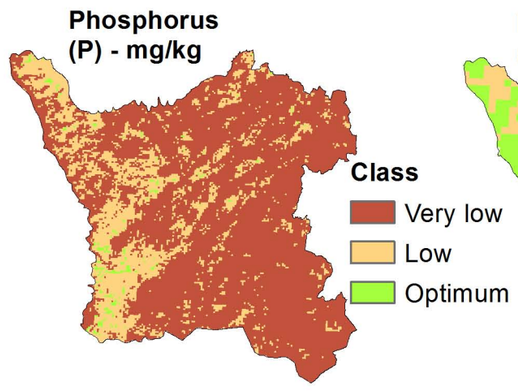


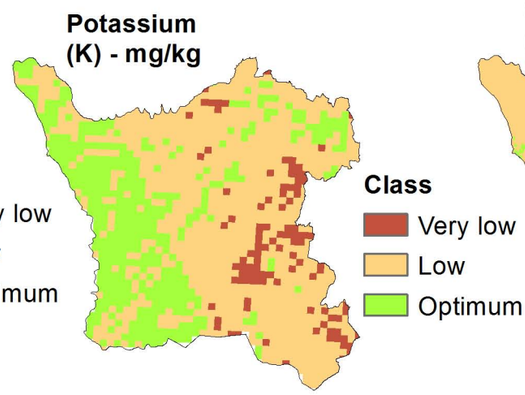


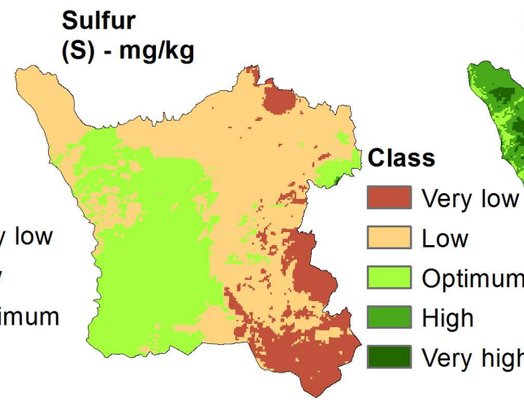


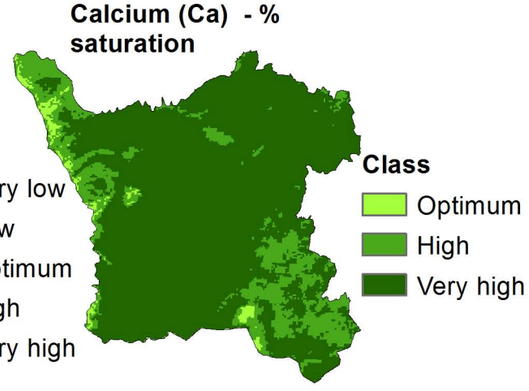


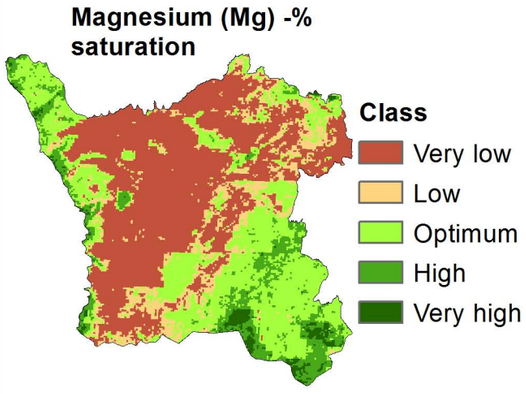


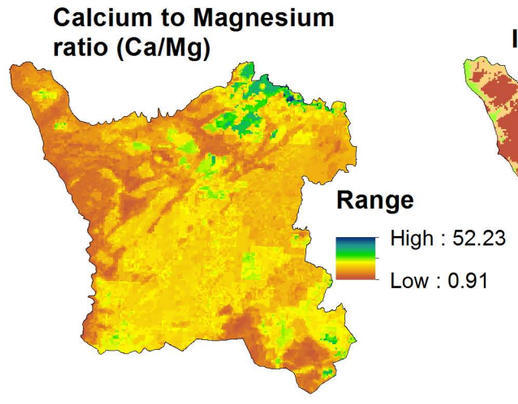


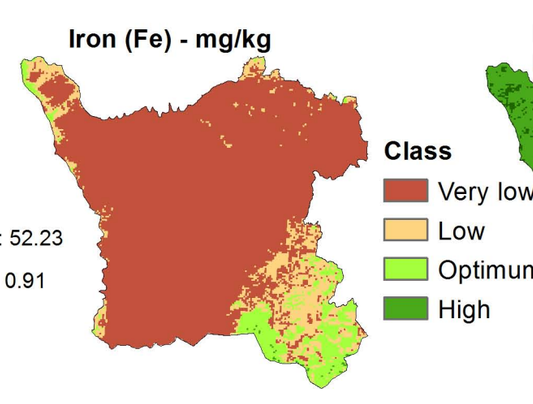


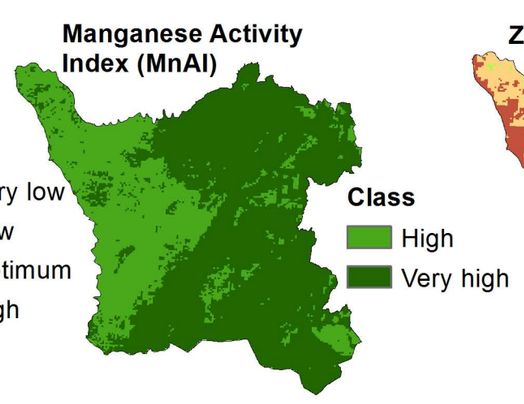


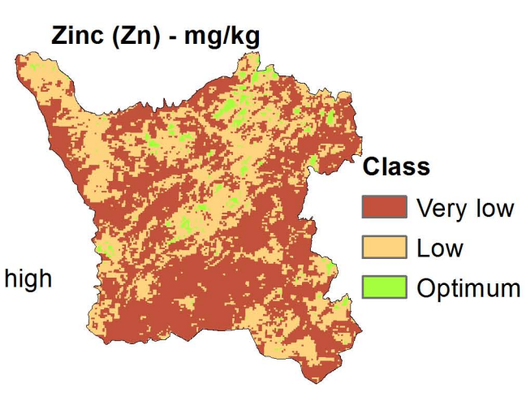


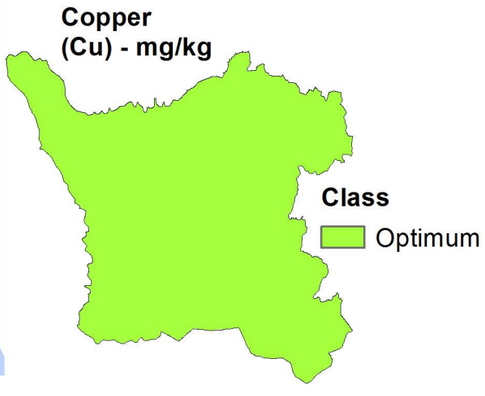


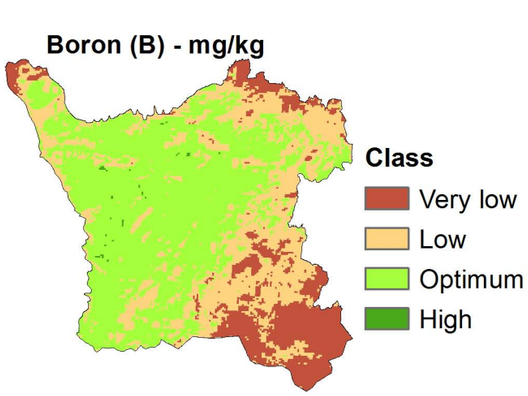




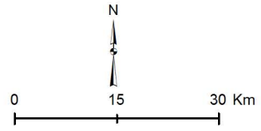




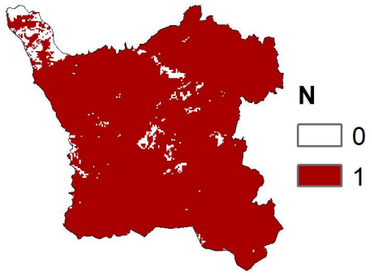


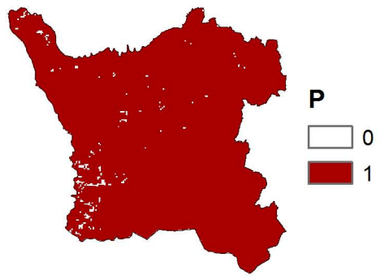


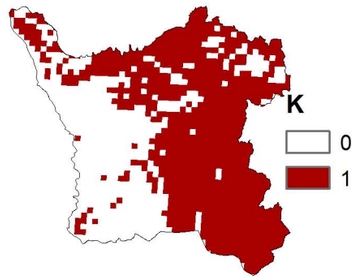
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

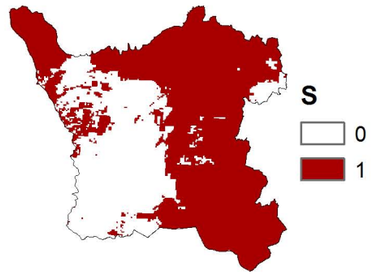


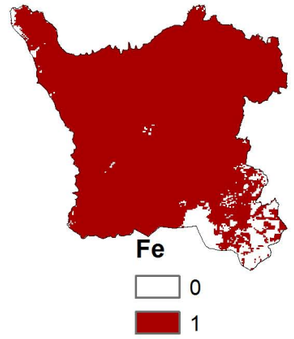
Fertilizer Type Requirement of Tanqua Abergele Woreda

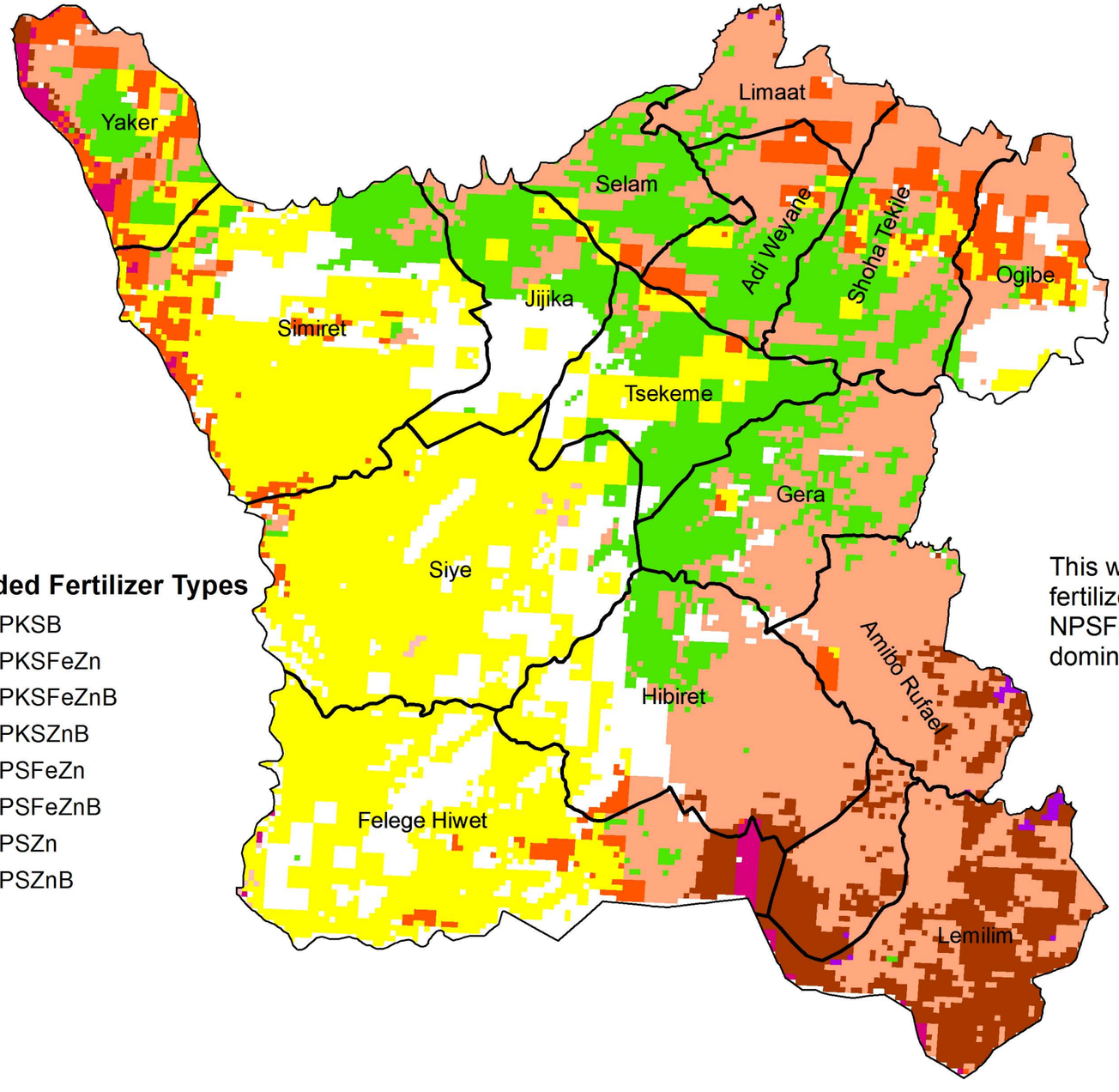








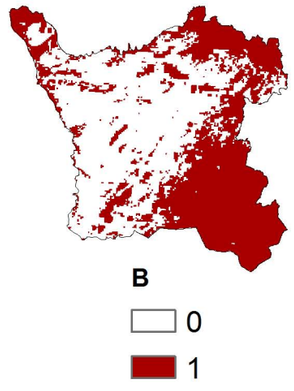


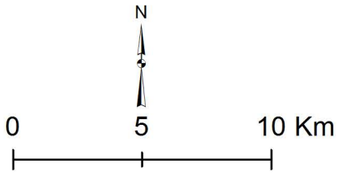


Blended Fertilizer Types

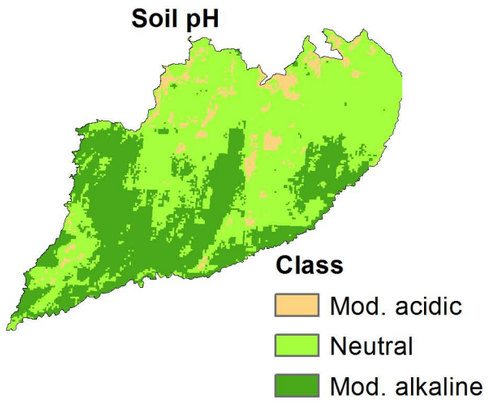
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZnB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB

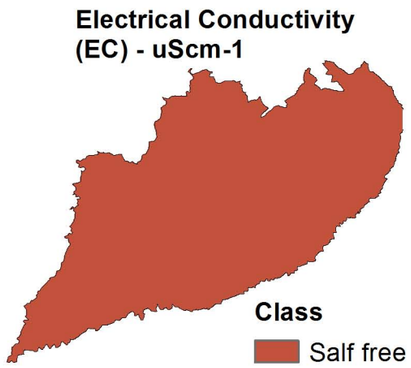
This woreda requires 8 types of blended fertilizers, of which, NPKSFeZnB, NPSFeZn and NPKSFeZn are the most dominant blends, respectively.

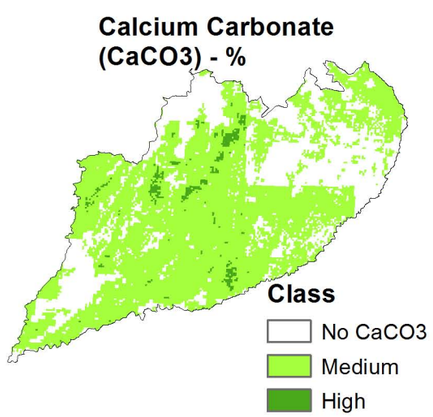


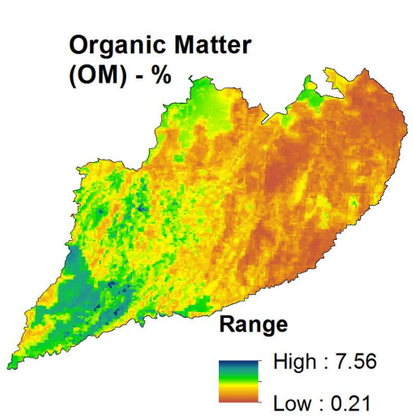


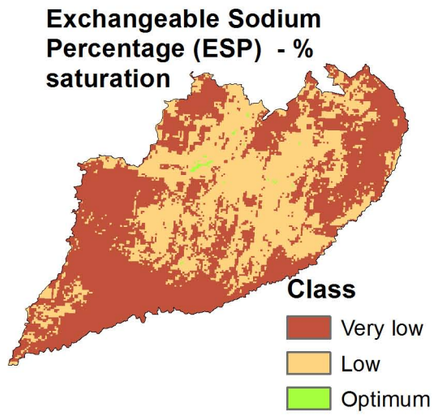
Soil Fertility Status of Wereilehi Woreda

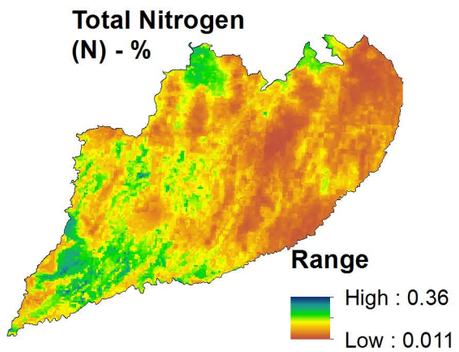


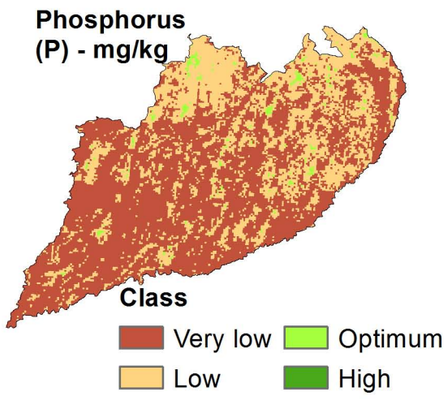


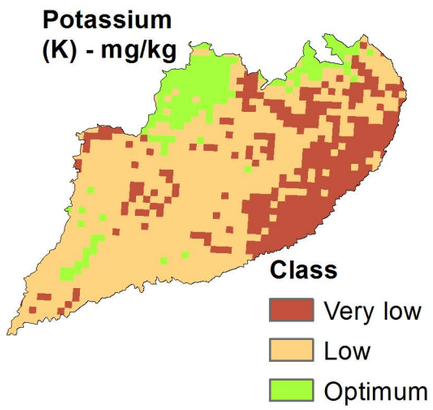


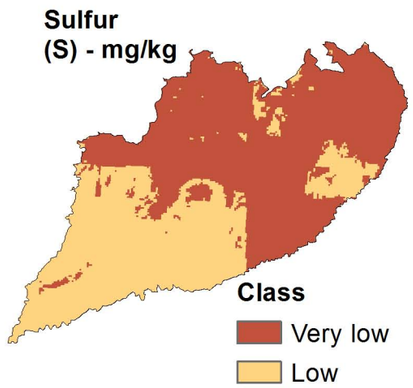


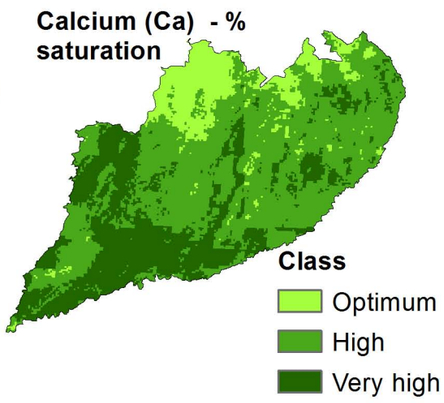


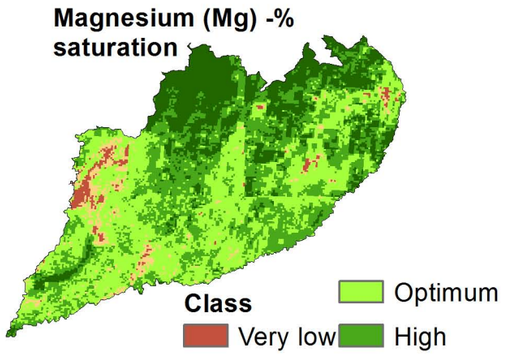


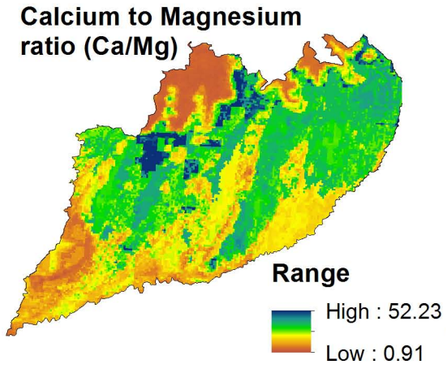


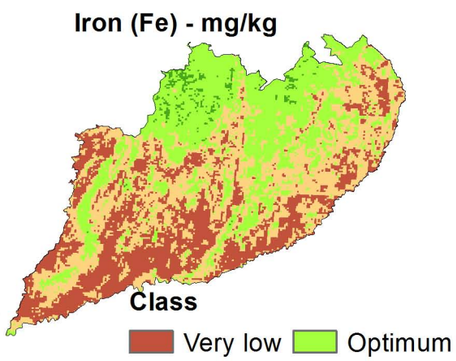


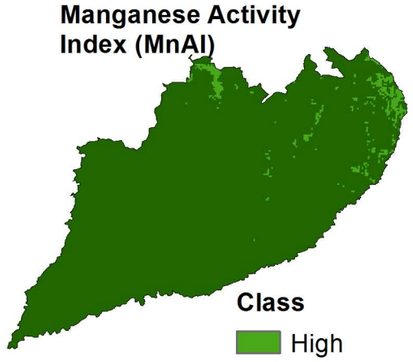


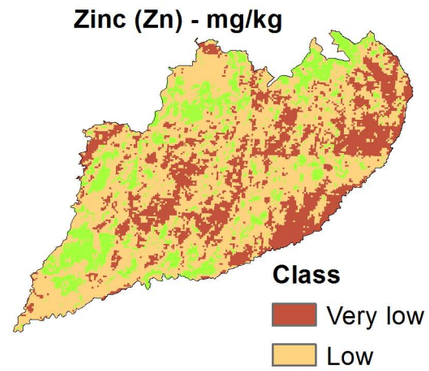


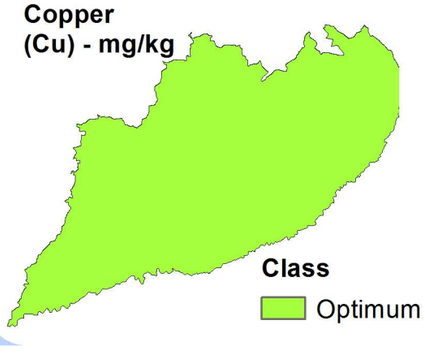


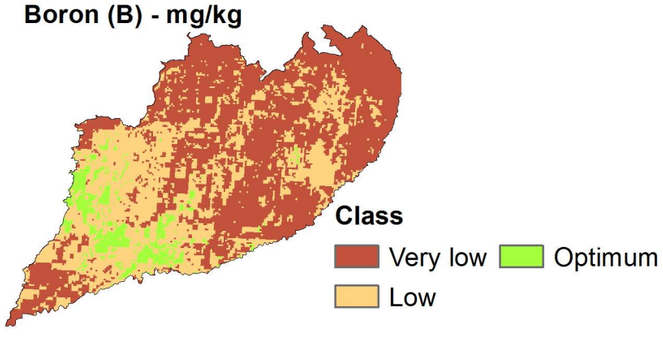




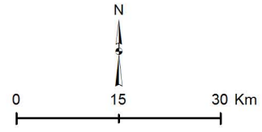




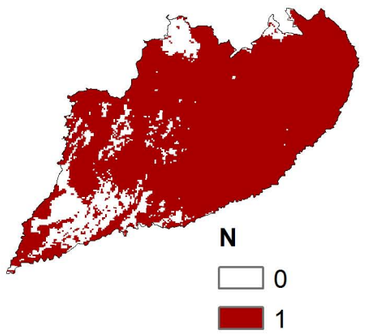


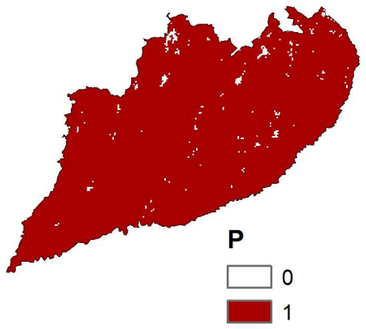


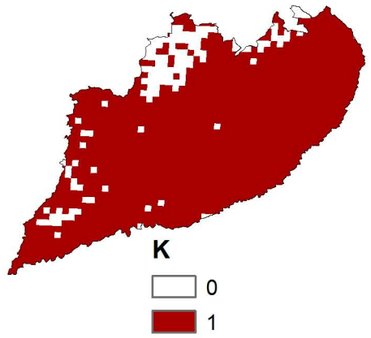
Seven soil nutrients are found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

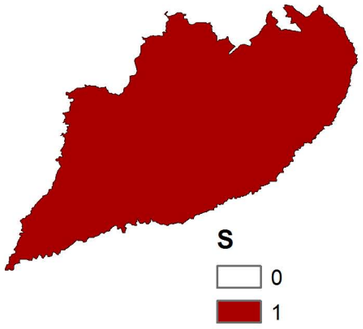


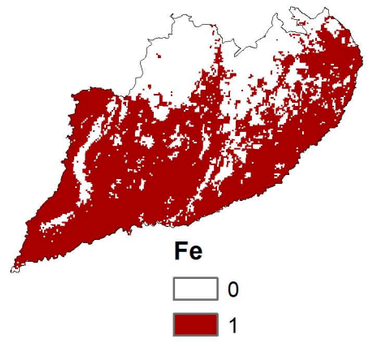
Fertilizer Type Requirement of Wereilehi Woreda

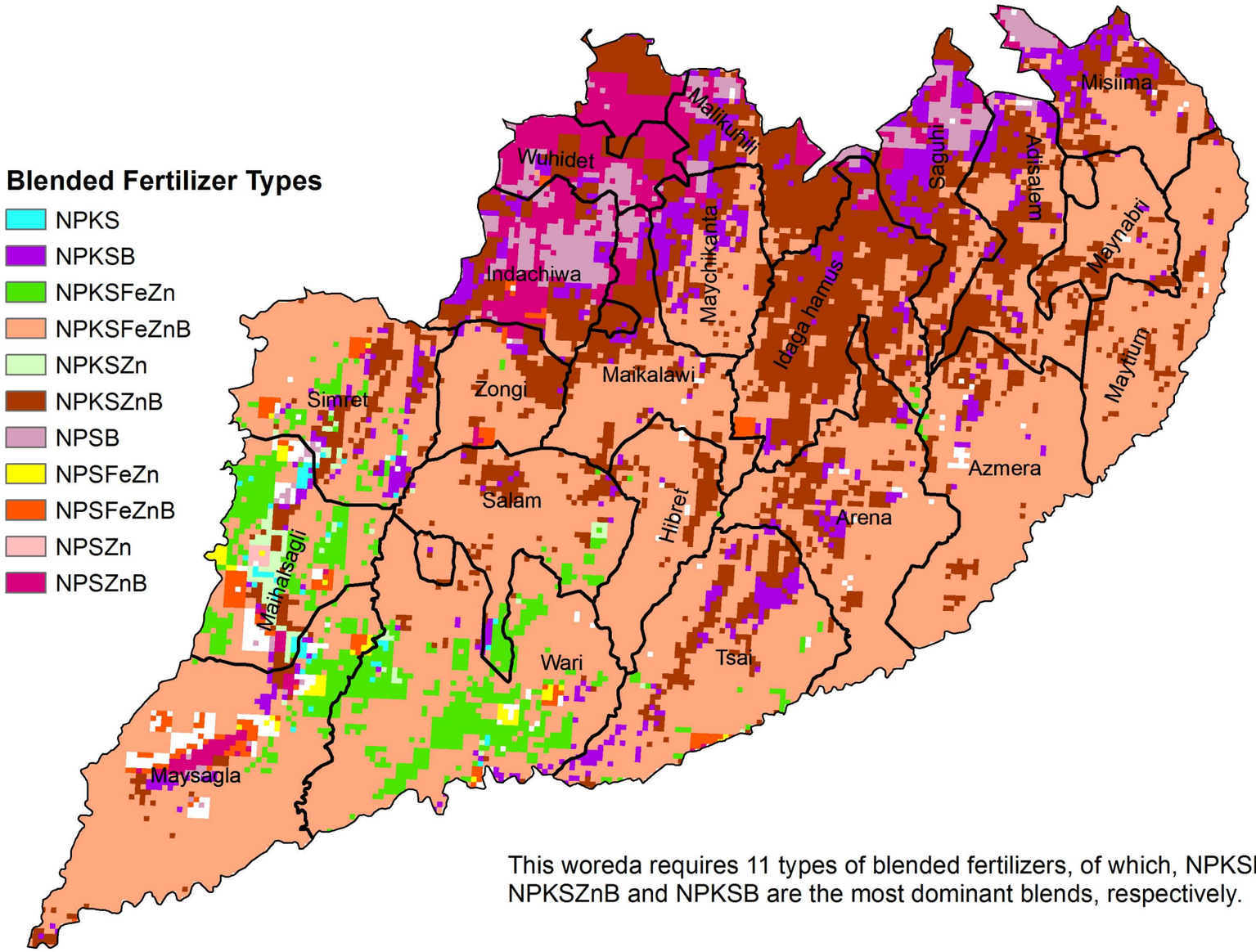


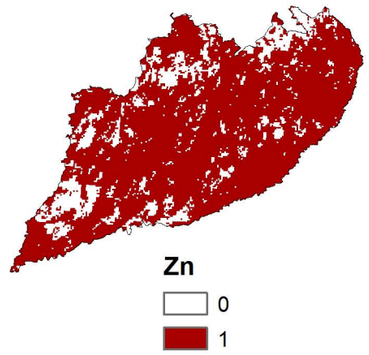


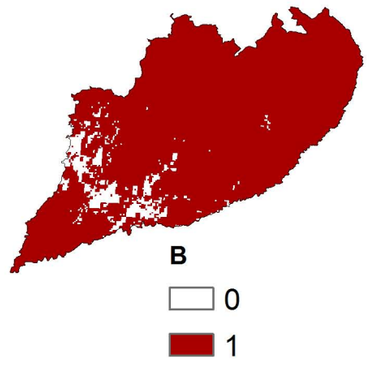




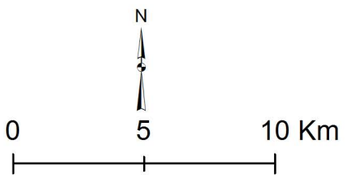






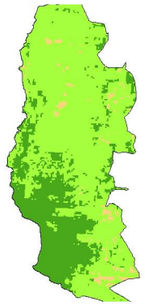


This woreda requires 11 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.



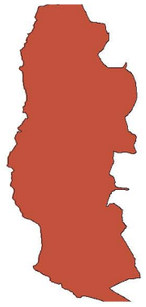
Soil Fertility Status of Atsbi Wonberta Woreda

Soil pH



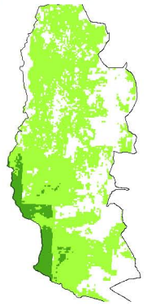
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



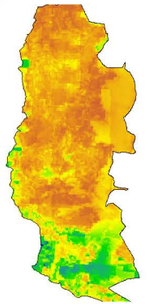
Class
- Salt free

Calsium Carbonate (CaCO3) - %



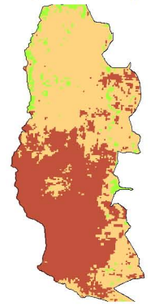
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



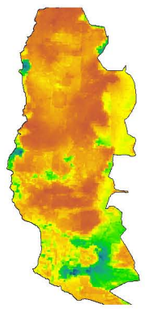
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



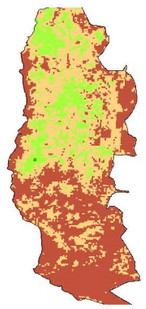
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



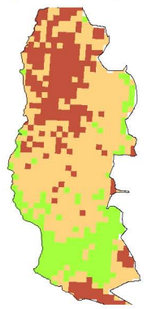
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



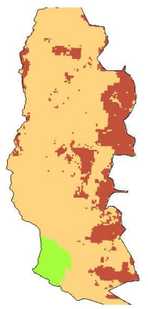
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg

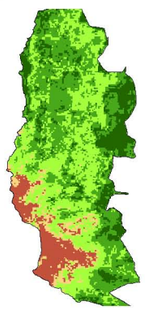


Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation

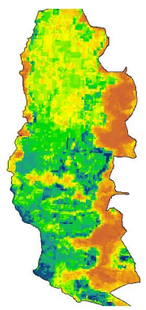
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



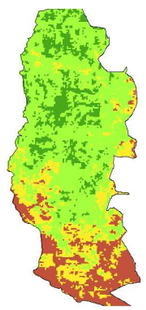
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg

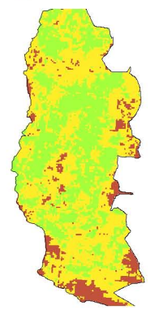


Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)

Class
- High
- Very high

Zinc (Zn) - mg/kg

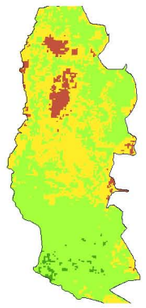


Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg

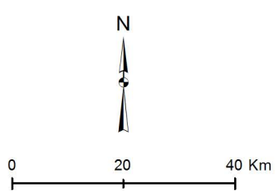
Class
- Optimum

Boron (B) - mg/kg

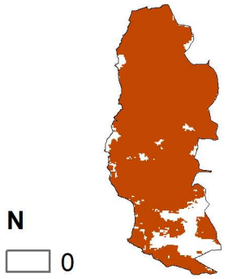


Class
- Very low
- Low
- Optimum
- High

In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.



Fertilizer Requirement of Atsbi Wonberta Woreda

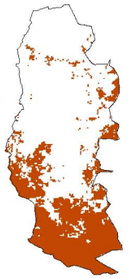


N
0
1

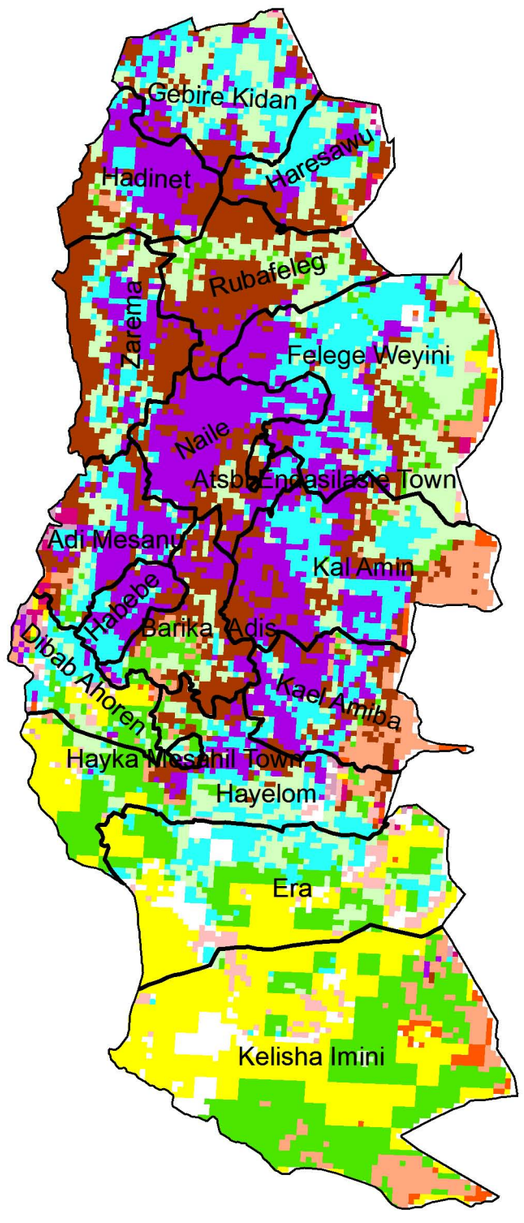
P
0
1

K
0
1

S
0
1



Fe
0
1



Blended Fertilizer Types

- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB

Zn
0
1

B
0
1

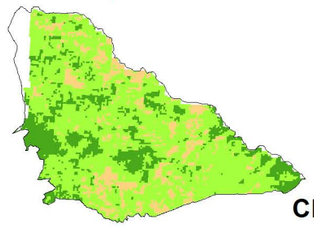
This woreda requires 11 types of blended fertilizers, of which, NPKSB, NPKSZnB and NPKSZn are the most dominant blends, respectively.

N

0 5 10 Km

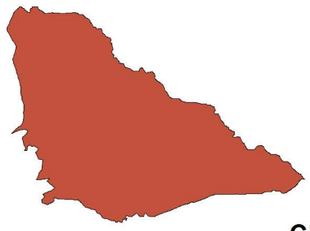
Soil Fertility Status of Erob Woreda

Soil pH



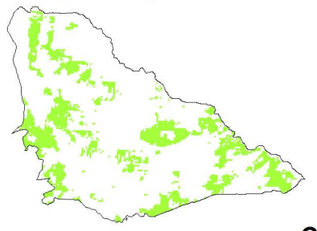
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



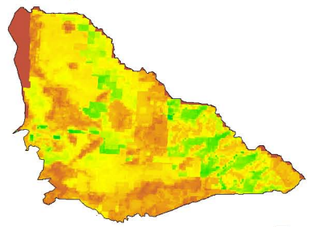
Class
- Salt free

Calsium Carbonate (CaCO3) - %



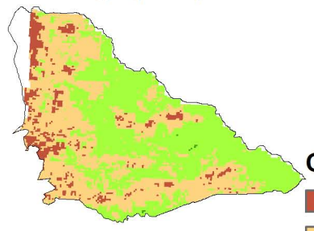
Class
- No CaCO3
- Medium

Organic Matter (OM) - %



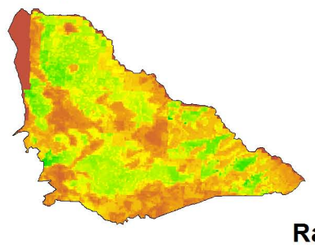
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



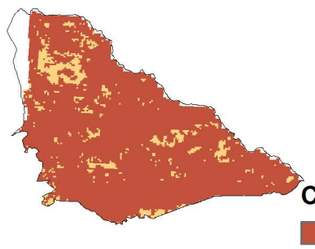
Class
- Very low
- Low
- Optimum
- High

Total Nitrogen (N) - %



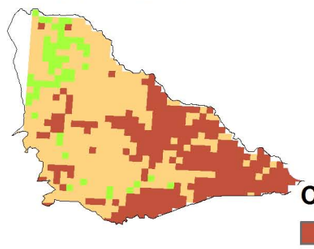
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



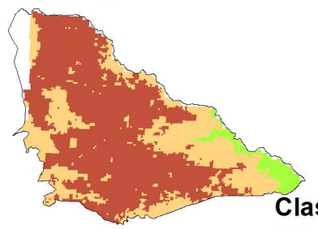
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



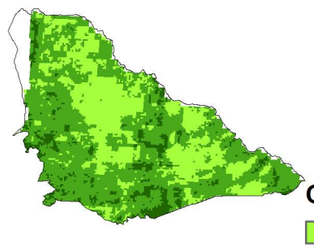
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



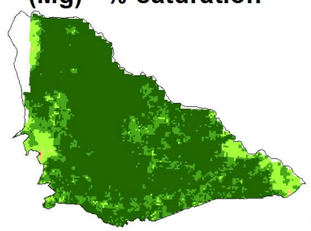
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



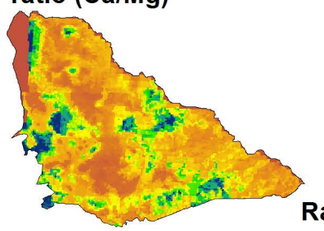
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



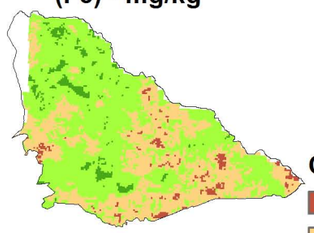
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



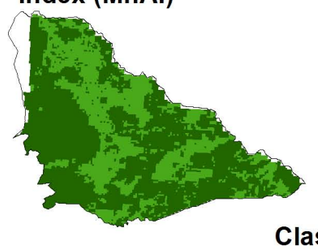
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



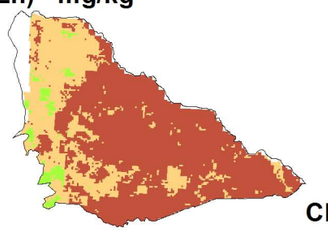
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



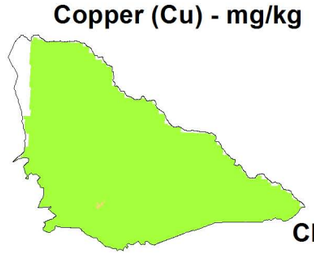
Class
- High
- Very high

Zinc (Zn) - mg/kg



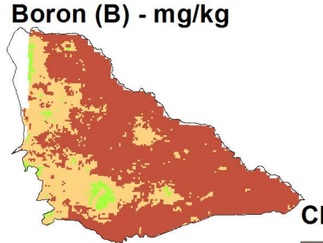
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



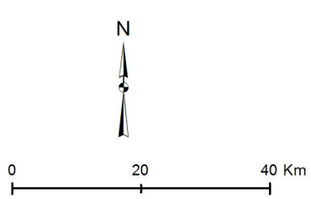
Class
- Low
- Optimum

Boron (B) - mg/kg

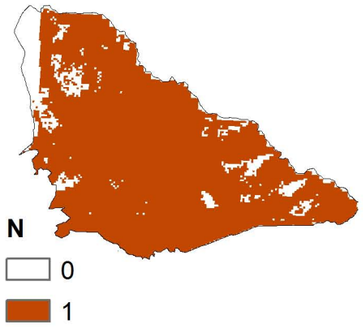


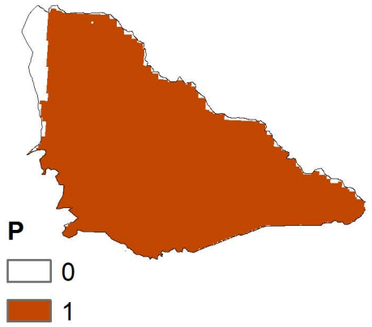
Class
- Very low
- Low
- Optimum

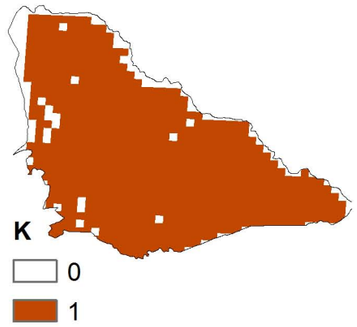
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

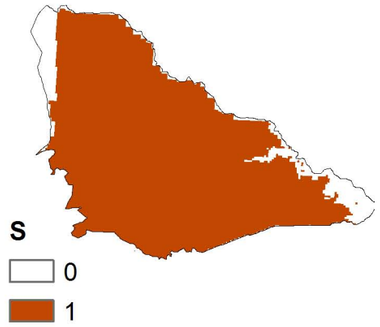


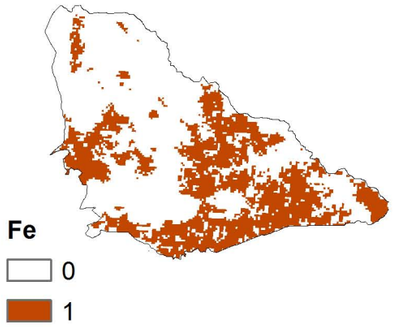
Fertilizer Type Requirement of Erob Woreda

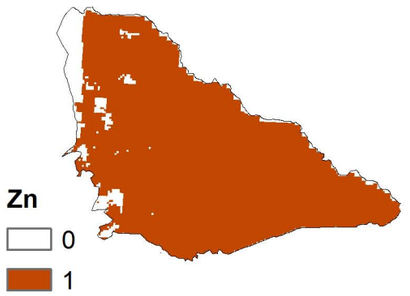




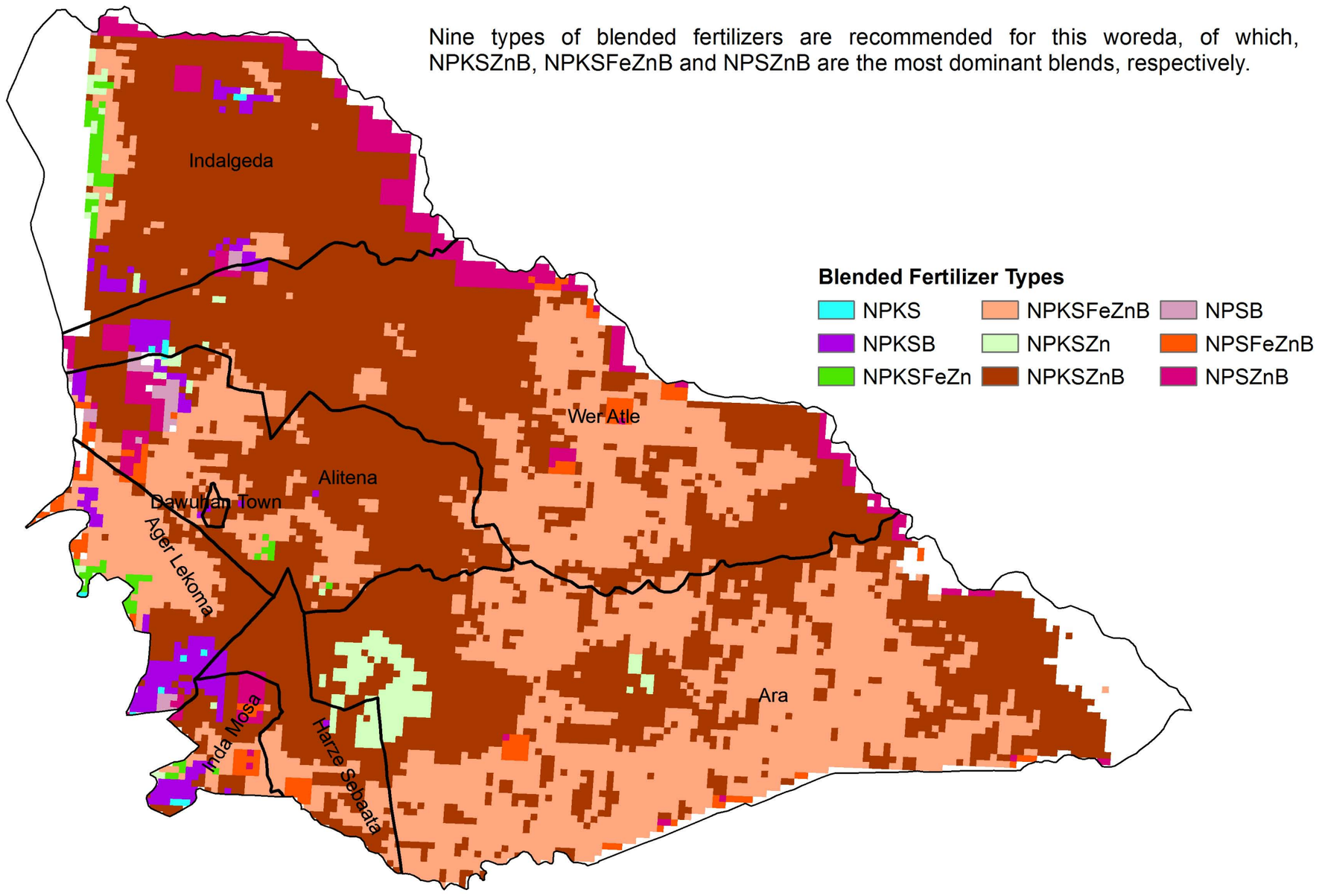


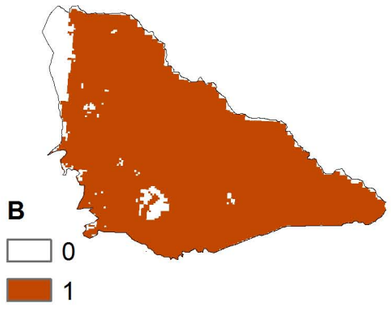


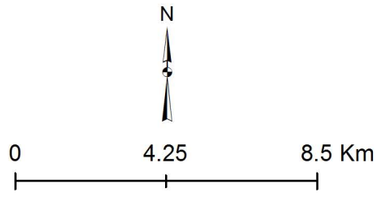




Nine types of blended fertilizers are recommended for this woreda, of which, NPKSZnB, NPKSFeZnB and NPSZnB are the most dominant blends, respectively.

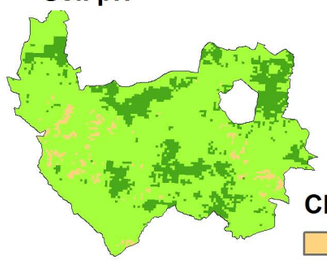






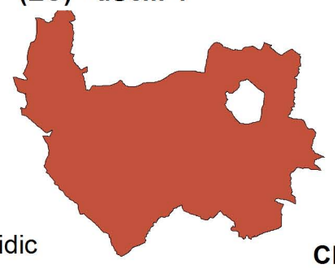
Soil Fertility Status of Ganta Afeshum Woreda

Soil pH



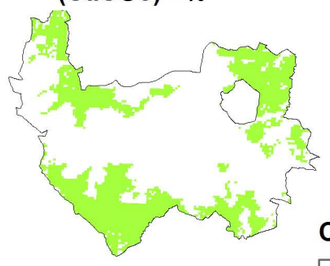
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



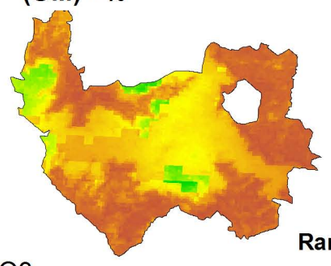
Class
- Salt free

Calsium Carbonate (CaCO3) - %



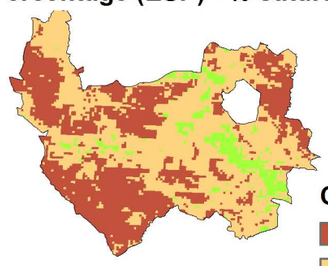
Class
- No CaCO3
- Medium

Organic Matter (OM) - %



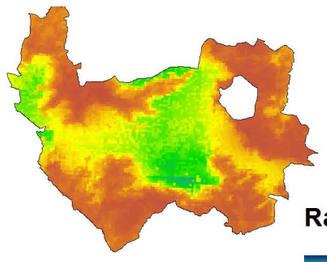
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



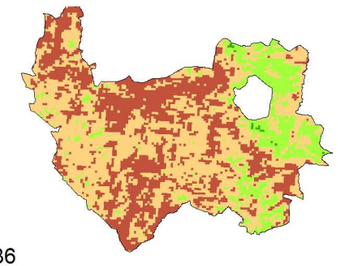
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



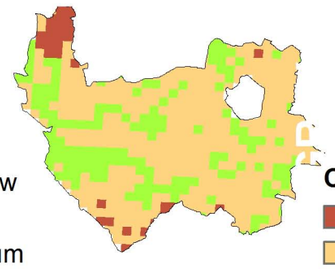
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



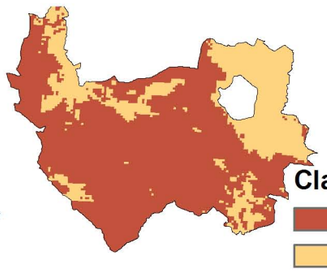
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



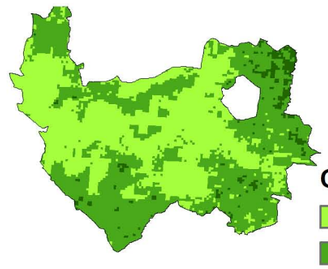
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



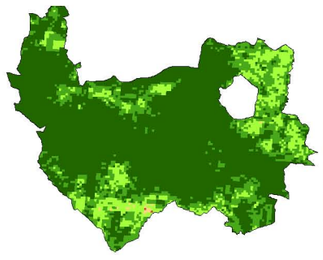
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



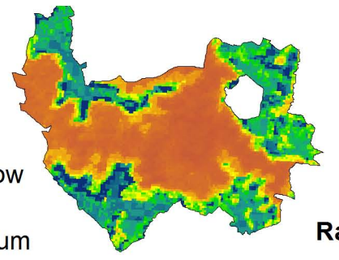
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



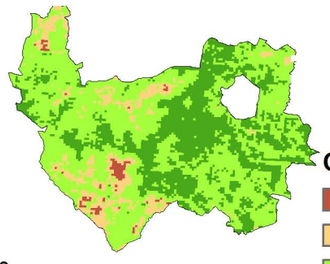
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



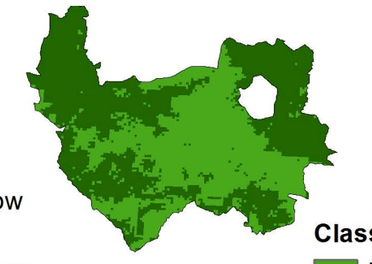
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



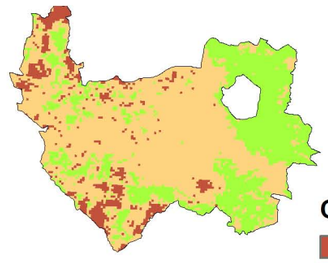
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



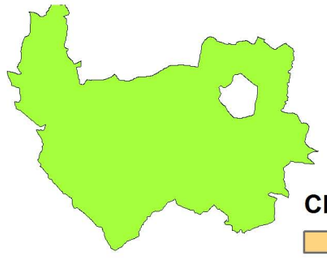
Class
- High
- Very high

Zinc (Zn) - mg/kg



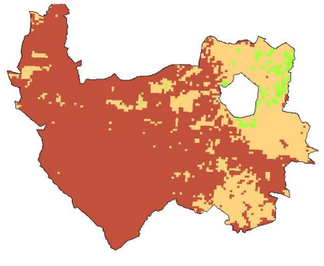
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



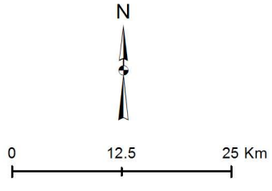
Class
- Low
- Optimum

Boron (B) - mg/kg

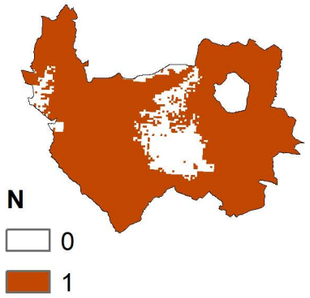


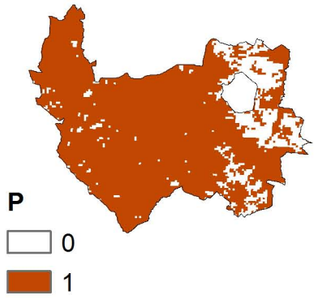
Class
- Very low
- Low
- Optimum

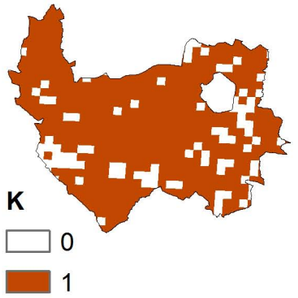
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

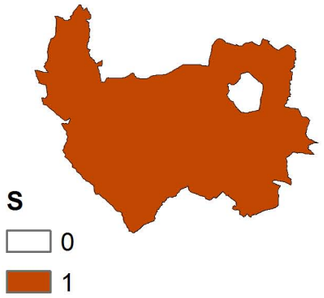


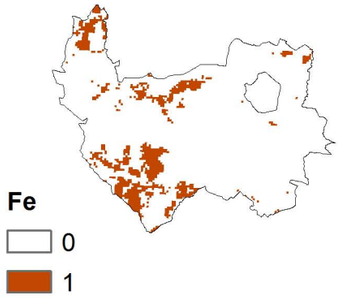
Fertilizer Type Requirement of Ganta Afeshum Woreda

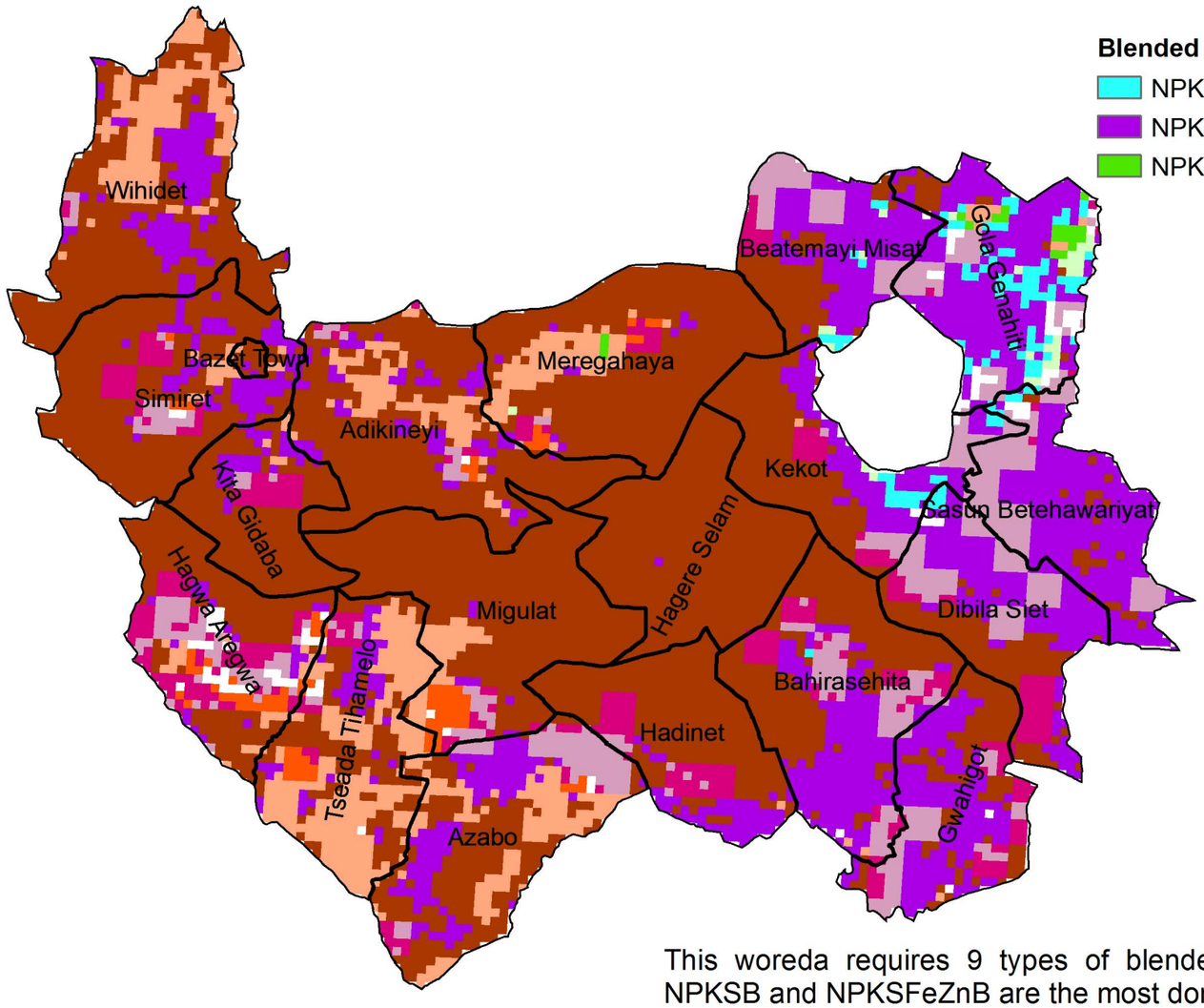


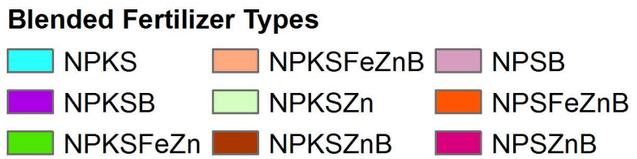


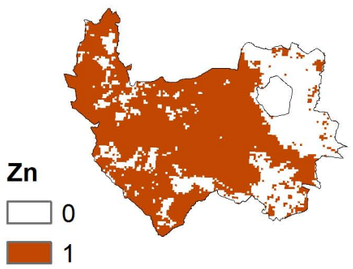


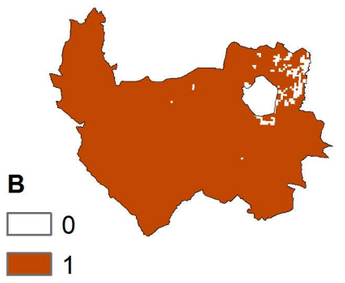




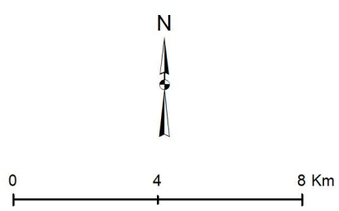






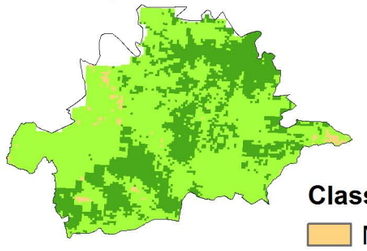


This woreda requires 9 types of blended fertilizers, of which, NPKSZnB, NPKSB and NPKSFeZnB are the most dominant blends, respectively.



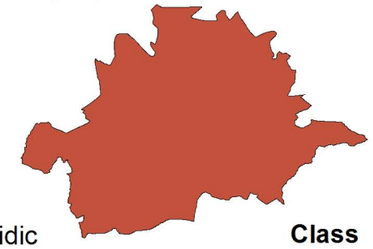
Soil Fertility Status of Gulo Meheda Woreda

Soil pH



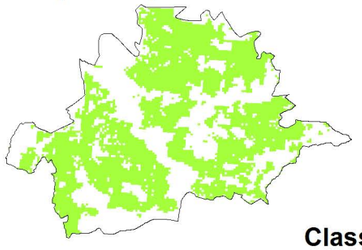
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



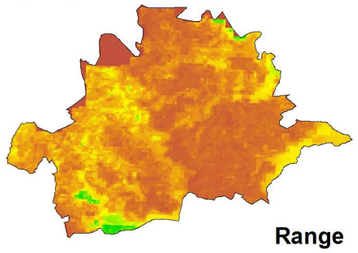
Class
- Salt free

Calsium Carbonate (CaCO3) - %



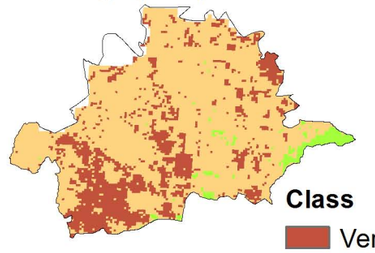
Class
- No CaCO3
- Medium

Organic Matter (OM) - %



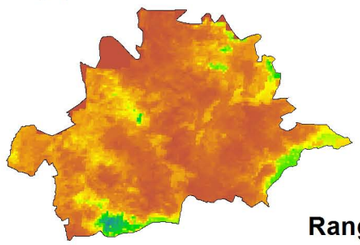
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



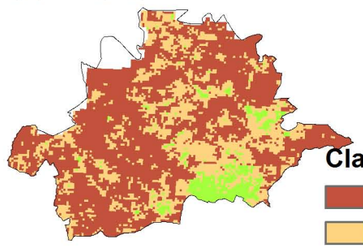
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



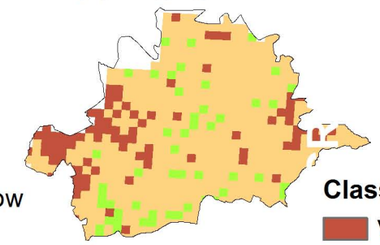
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



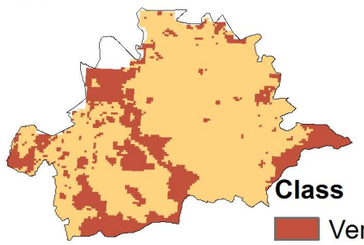
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



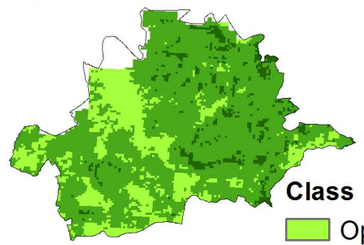
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



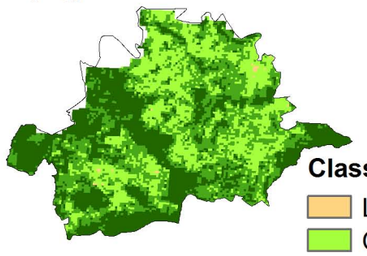
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



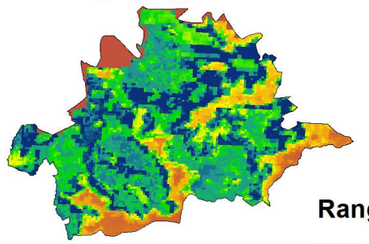
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



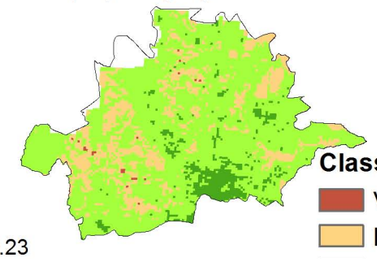
Class
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



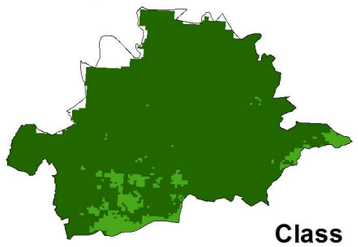
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



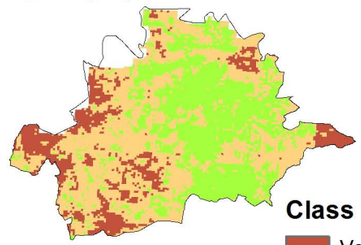
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



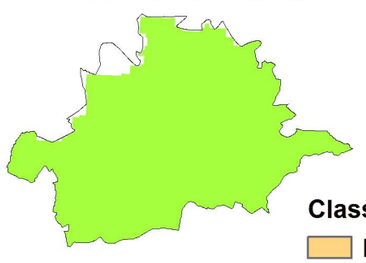
Class
- High
- Very high

Zinc (Zn) - mg/kg



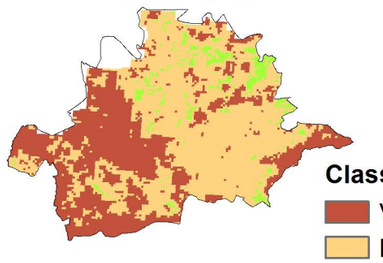
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



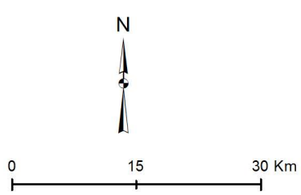
Class
- Low
- Optimum

Boron (B) - mg/kg

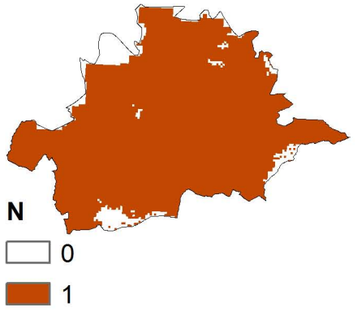


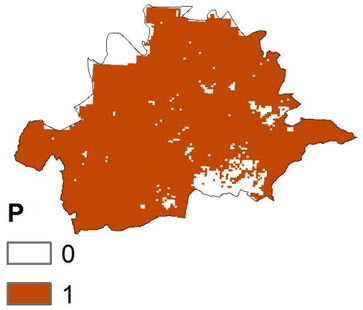
Class
- Very low
- Low
- Optimum

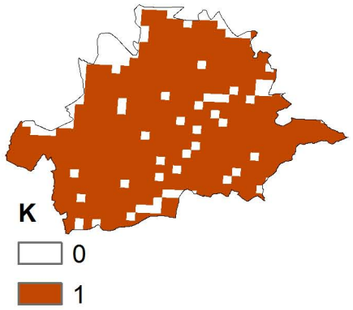
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

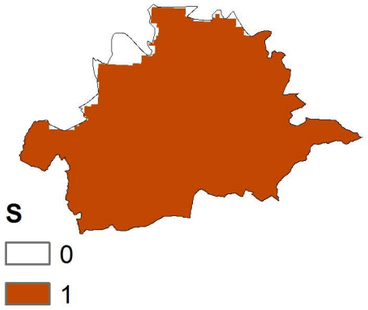


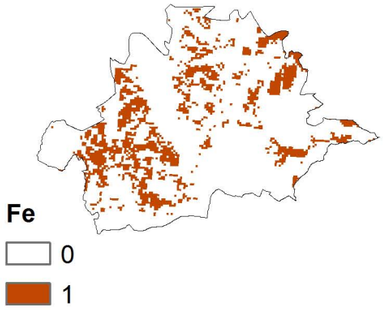
Fertilizer Type Requirement of Gulo Meheda Woreda

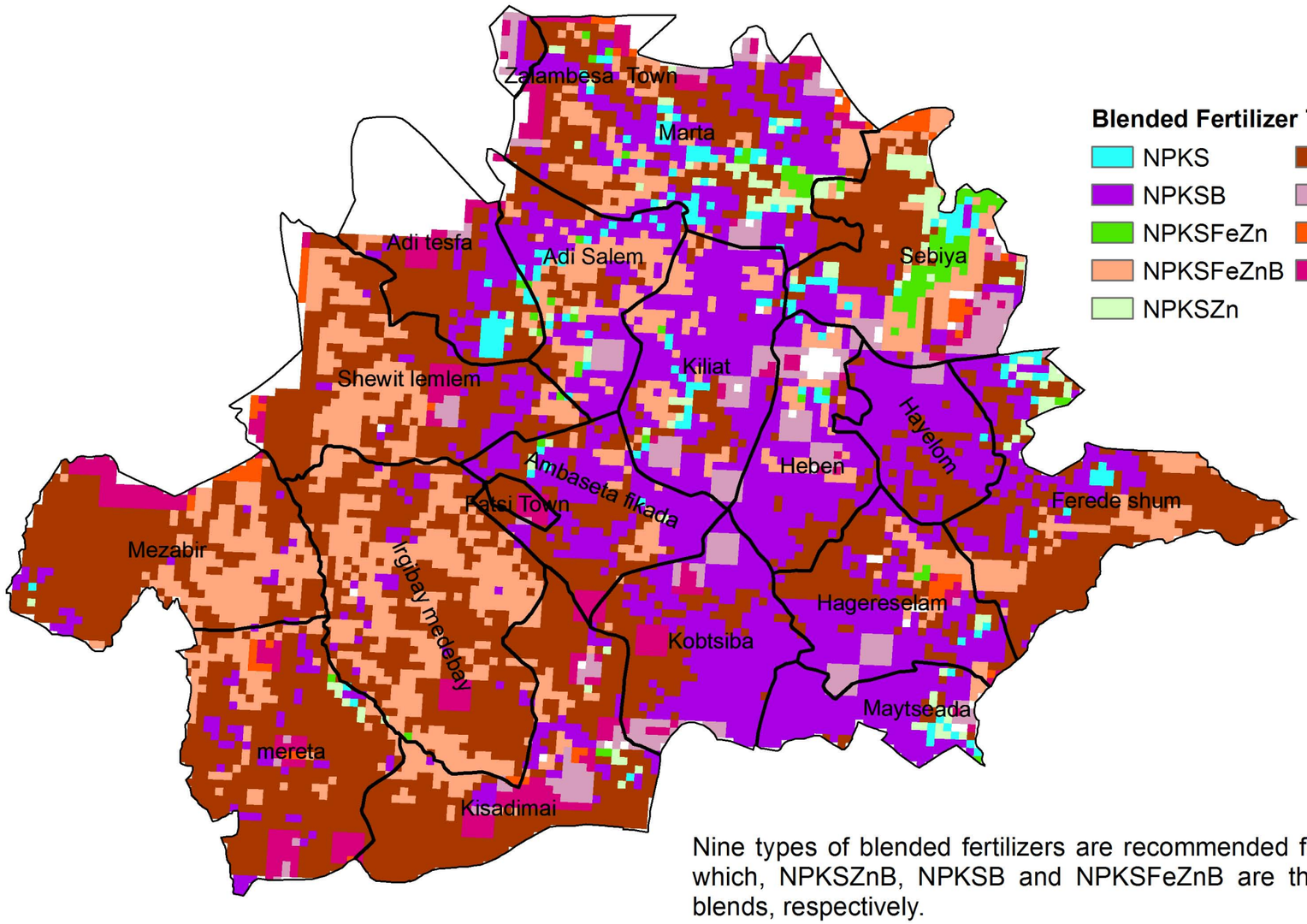






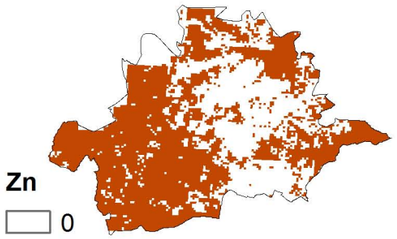


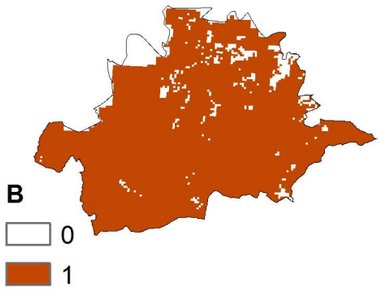




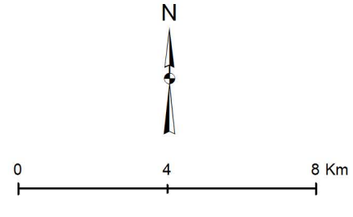
Blended Fertilizer Types

- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZnB
- NPSZnB



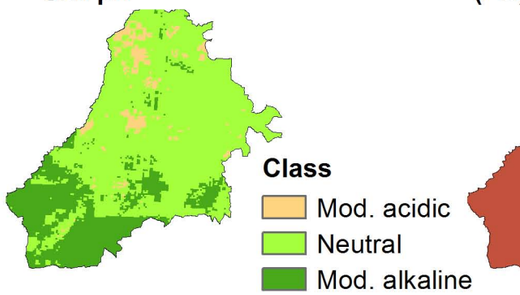


Nine types of blended fertilizers are recommended for this woreda, of which, NPKSZnB, NPKSB and NPKSFeZnB are the most dominant blends, respectively.



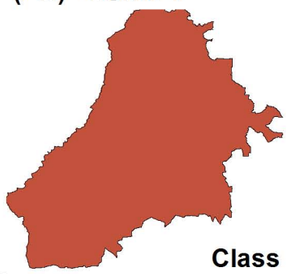
Soil Fertility Status of Hawzen Woreda

Soil pH



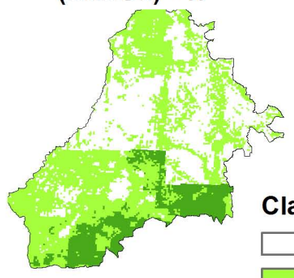
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



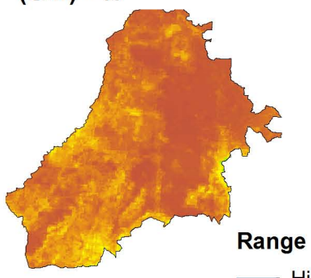
Class
- Salt free

Calsium Carbonate (CaCO3) - %



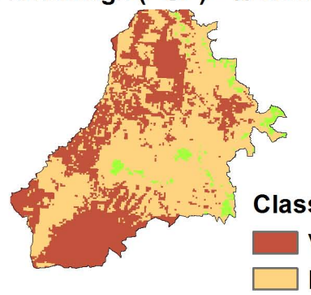
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



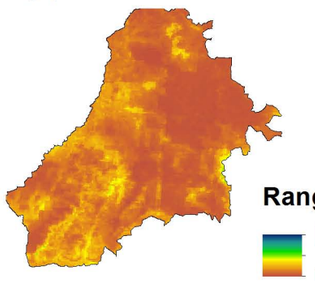
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



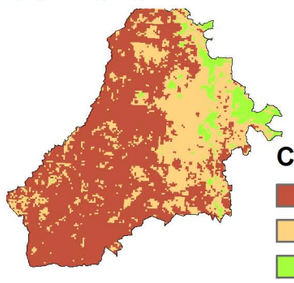
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



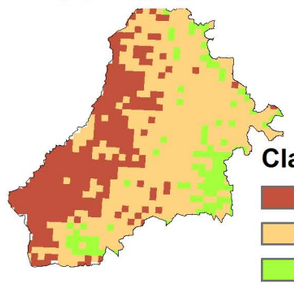
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



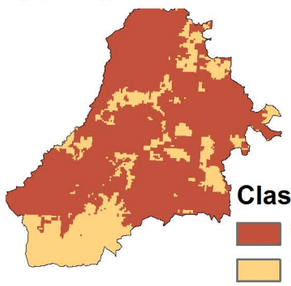
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



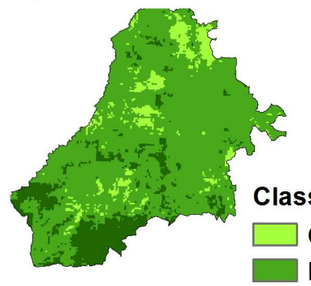
Class
- Very low
- Low
- Optimum
- High

Sulfur (S) - mg/kg



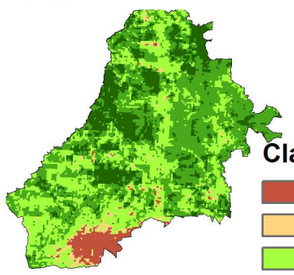
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



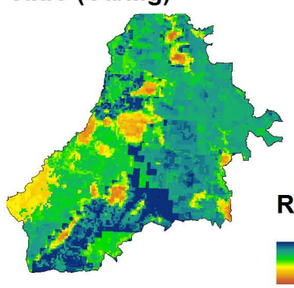
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



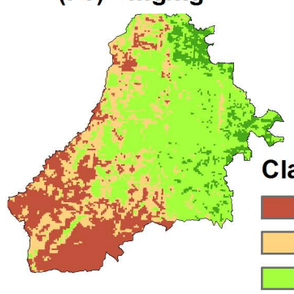
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



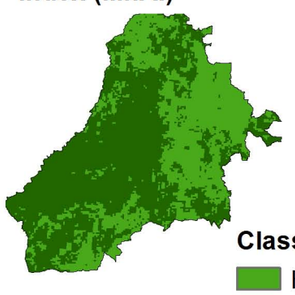
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



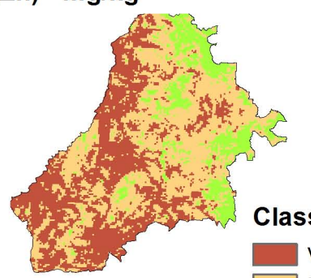
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



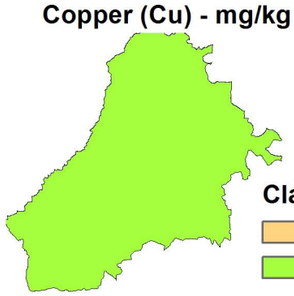
Class
- High
- Very high

Zinc (Zn) - mg/kg



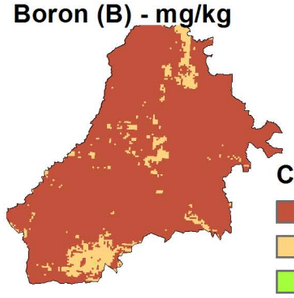
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



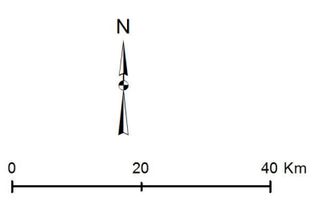
Class
- Low
- Optimum

Boron (B) - mg/kg

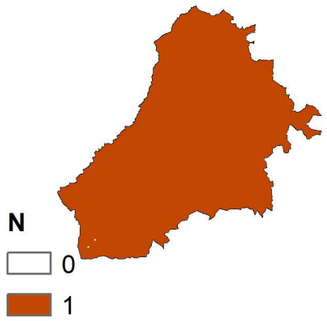


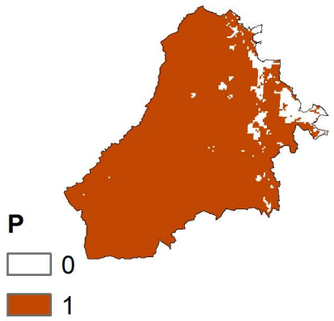
Class
- Very low
- Low
- Optimum

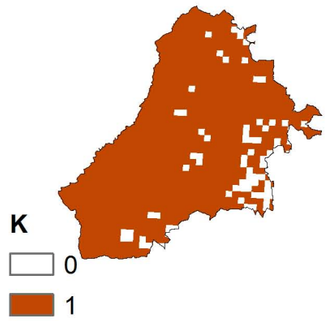
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

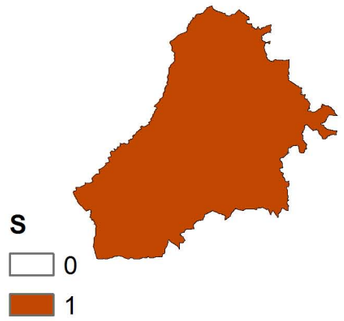


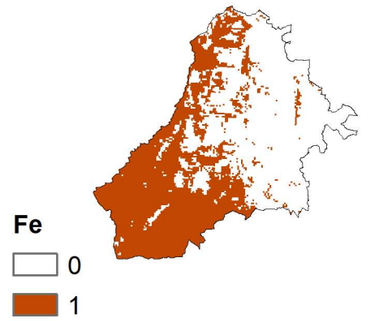
Fertilizer Type Requirement of Hawzen Woreda

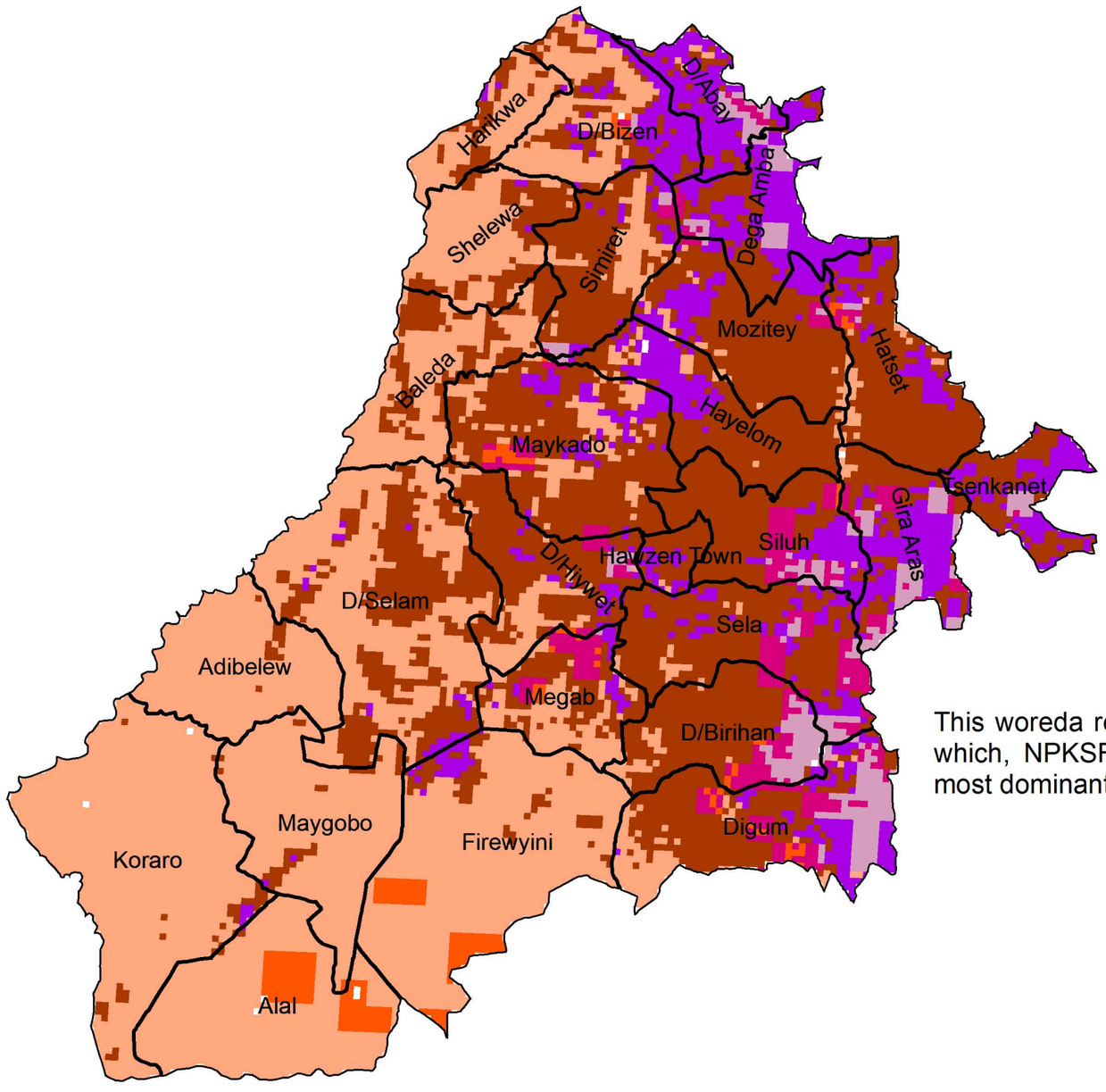






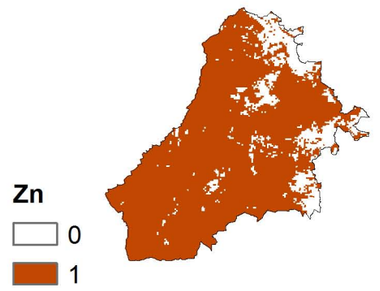


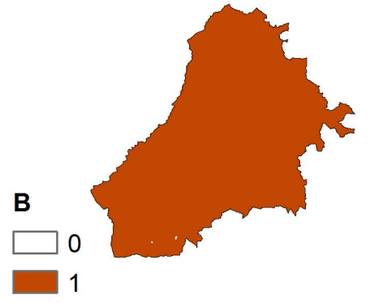




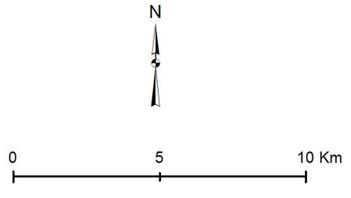
Blended Fertilizer Types

- NPKSB
- NPKSFeZnB
- NPKSZnB
- NPSB
- NPSFeZnB
- NPSZnB



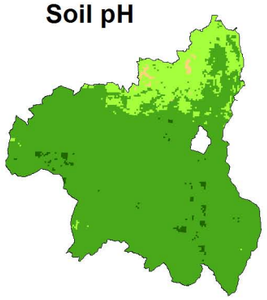


This woreda requires 6 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPKSB are the most dominant blends, respectively.



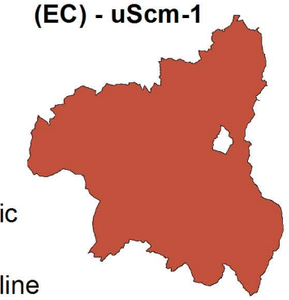
Soil Fertility Status of Klite Awlalo Woreda

Soil pH



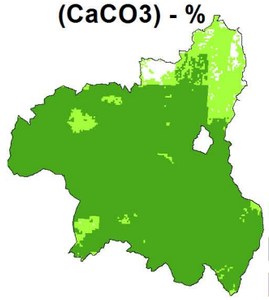
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



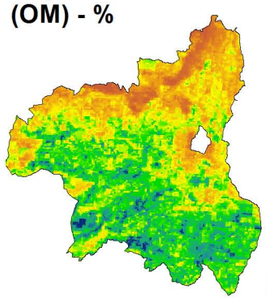
Class
- Salt free

Calsium Carbonate (CaCO3) - %



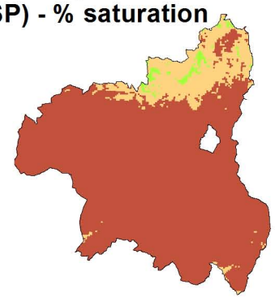
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



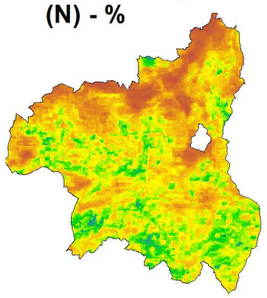
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



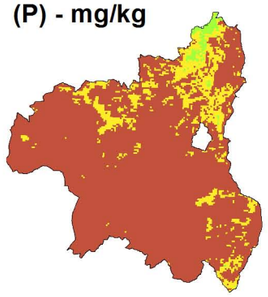
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



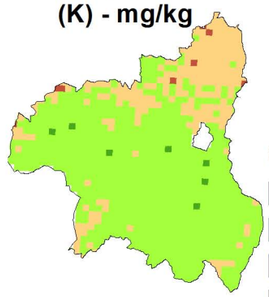
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



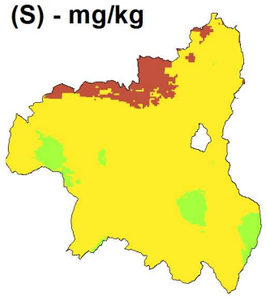
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



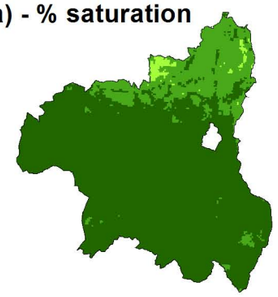
Class
- Very low
- Low
- Optimum
- High

Sulfur (S) - mg/kg



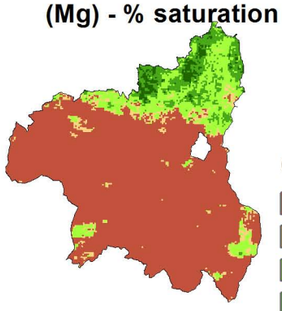
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



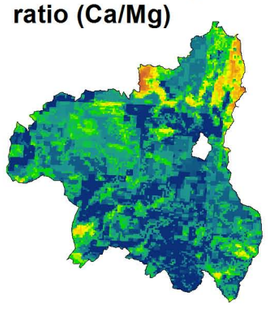
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



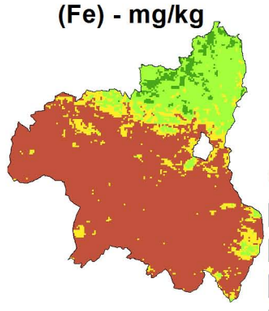
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg

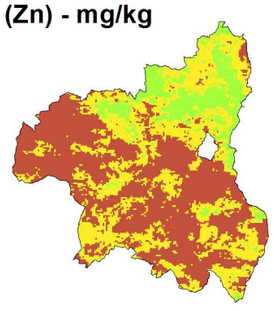


Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)

Class
- High
- Very high

Zinc (Zn) - mg/kg

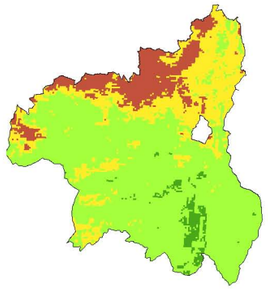


Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg

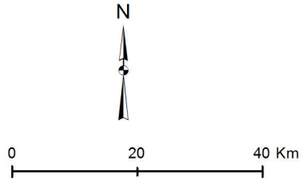
Class
- Optimum

Boron (B) - mg/kg

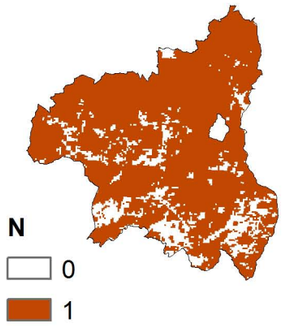


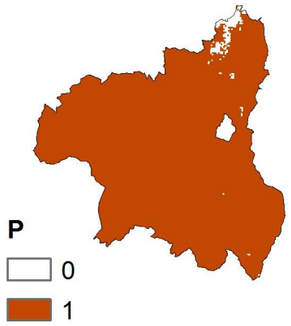
Class
- Very low
- Low
- Optimum
- High

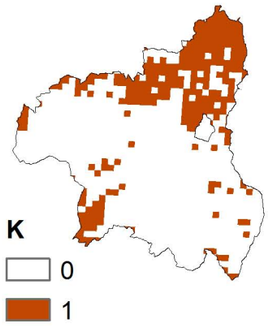
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

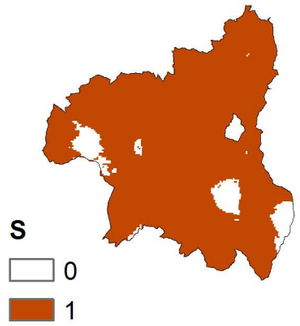


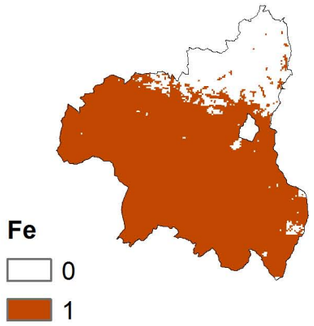
Fertilizer Type Requirement of Klite Awlalo Woreda

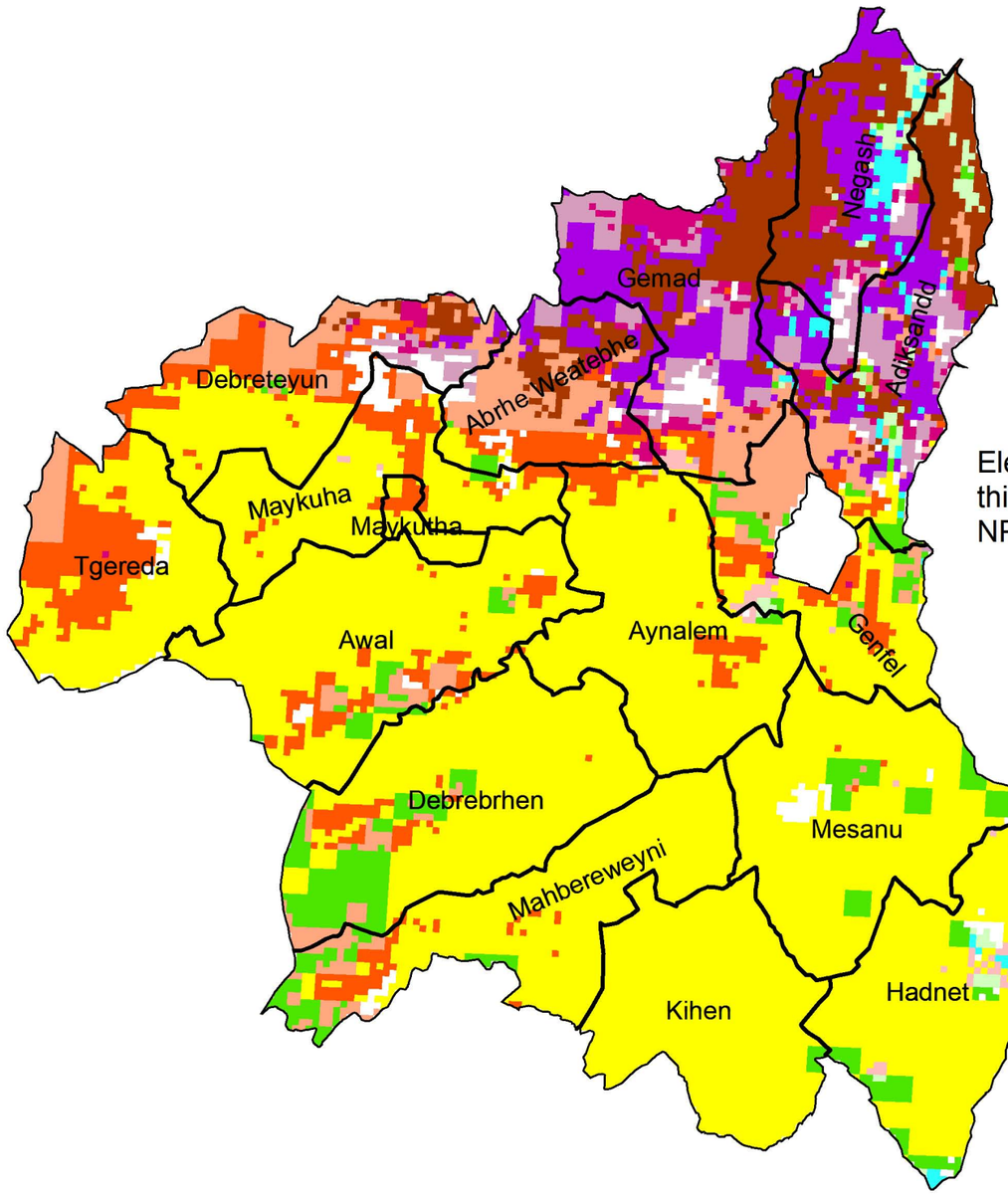








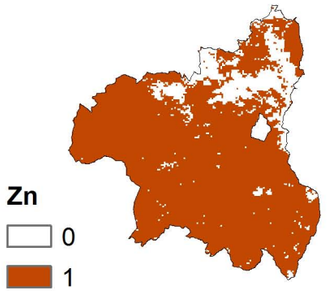


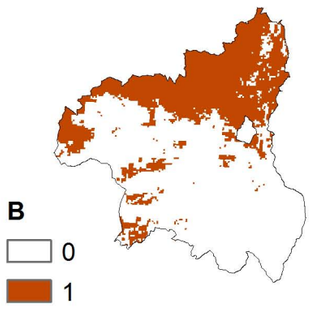


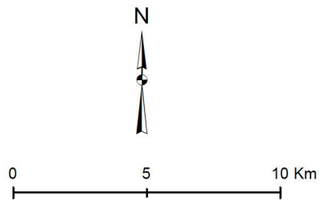
Blended Fertilizer Types

- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB

Eleven types of blended fertilizers are recommended for this woreda, of which, NPSFeZn, NPSFeZnB and NPKSZnB are the most dominant blends, respectively.

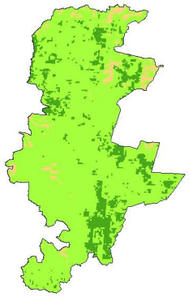






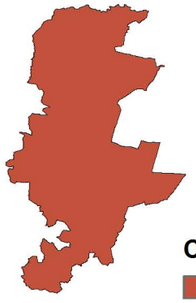
Soil Fertility Status of Saesi Tsadamba Woreda

Soil pH



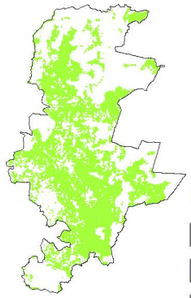
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



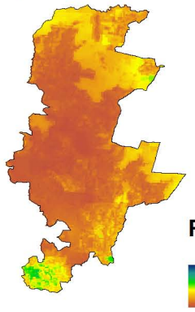
Class
- Salt free

Calsium Carbonate (CaCO3) - %



Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %

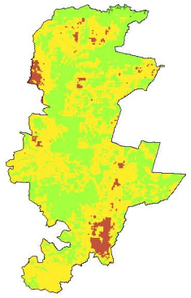


Range

High : 7.56

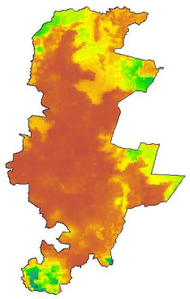
Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



Class
- Very low
- Low
- Optimum
- High

Total Nitrogen (N) - %

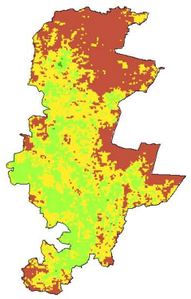


Range

High : 0.36

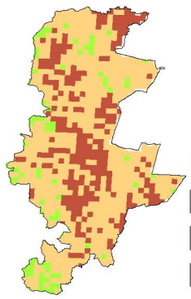
Low : 0.011

Phosphorus (P) - mg/kg



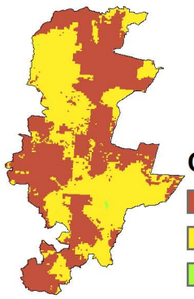
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



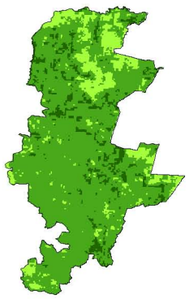
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



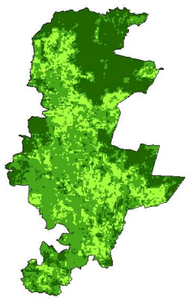
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



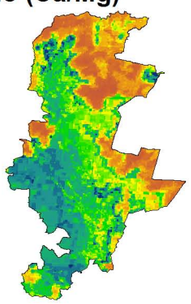
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



Class
- Low
- Optimum
- High
- Very High

Calcium to Magnesium ratio (Ca/Mg)

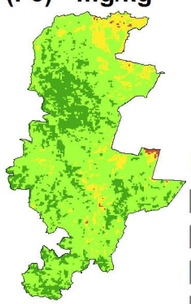


Range

High : 52.23

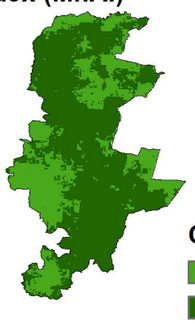
Low : 0.91

Iron (Fe) - mg/kg



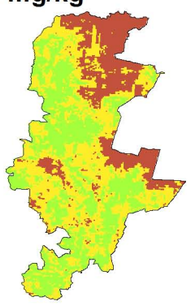
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



Class
- High
- Very high

Zinc (Zn) - mg/kg

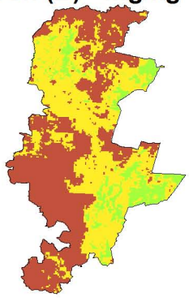


Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg

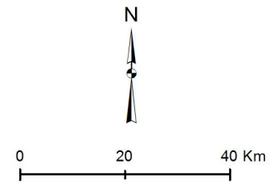
Class
- Low
- Optimum

Boron (B) - mg/kg

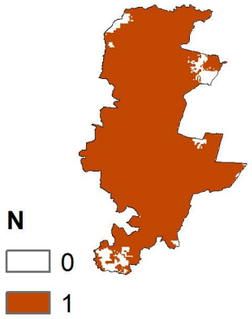


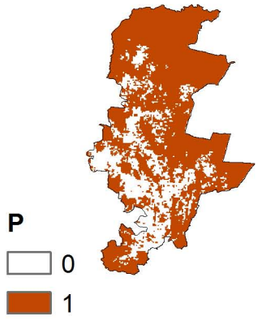
Class
- Very low
- Low
- Optimum

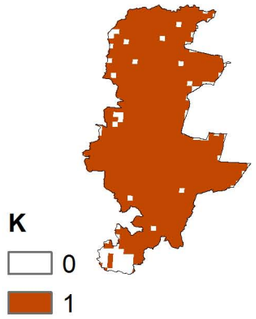
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

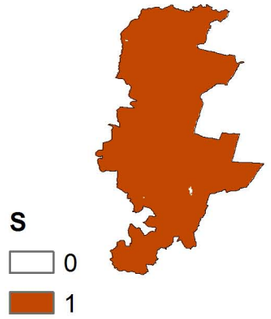


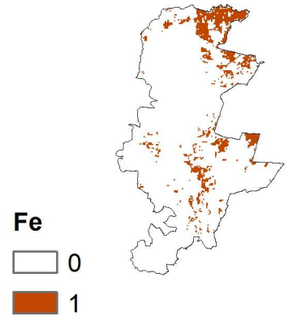
Fertilizer Type Requirement of Saesi Tsadamba Woreda

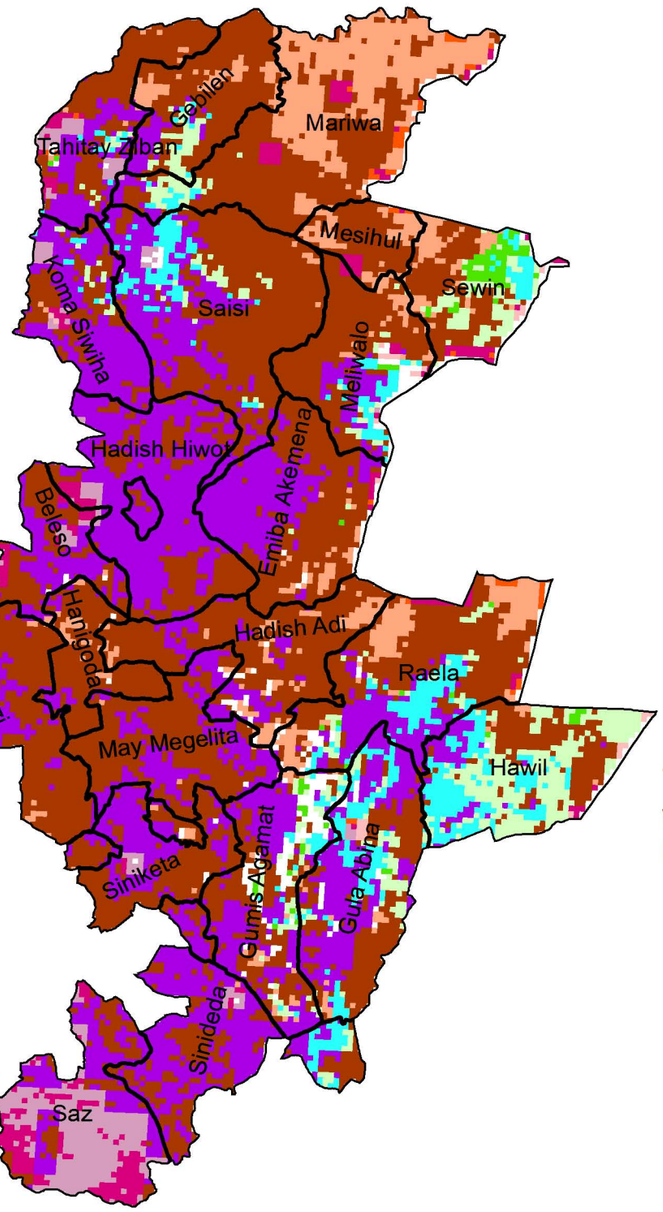






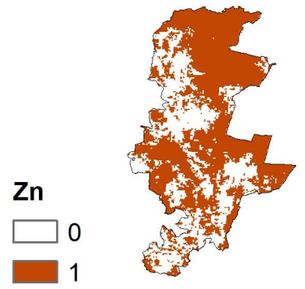


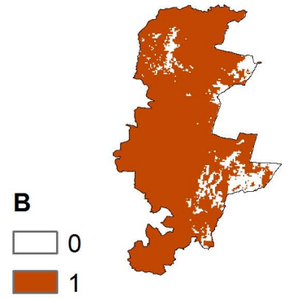




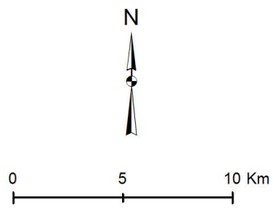
Blended Fertilizer Types

- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZnB
- NPSZn
- NPSZnB



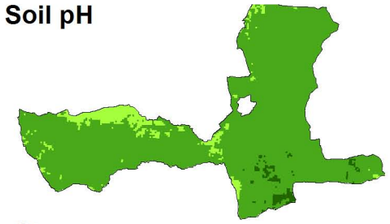


This woreda requires 10 types of blended fertilizers, of which, NPKSZnB, NPKSB and NPKSFeZnB are the most dominant blends, respectively.



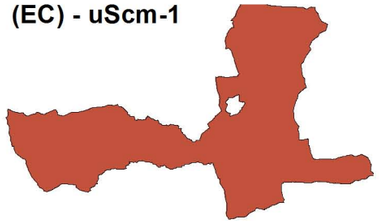
Soil Fertility Status of Alamata Woreda

Soil pH



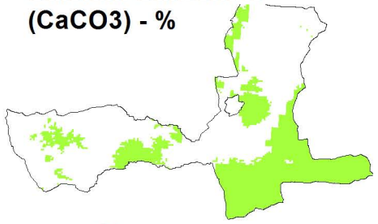
Class
- Mod. acidic
- Mod. alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



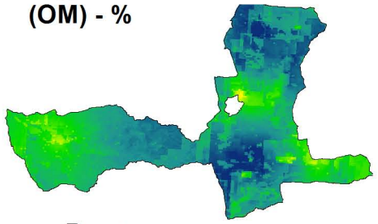
Class
- Salt free

Calsium Carbonate (CaCO3) - %



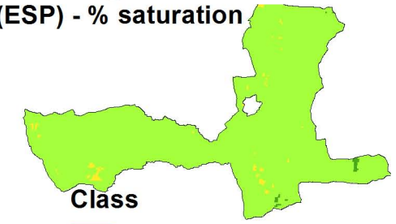
Class
- No CaCO3
- High
- Medium

Organic Matter (OM) - %



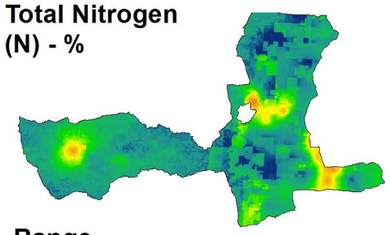
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



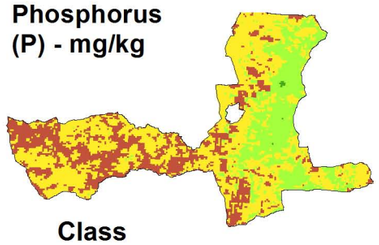
Class
- Low
- Optimum
- High

Total Nitrogen (N) - %



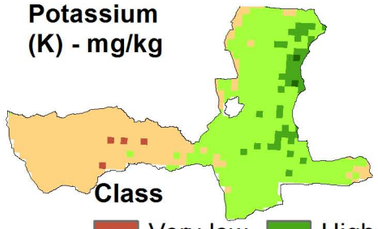
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



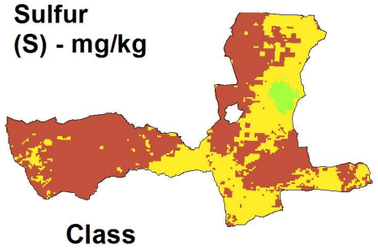
Class
- Very low
- Optimum
- Low
- High

Potassium (K) - mg/kg



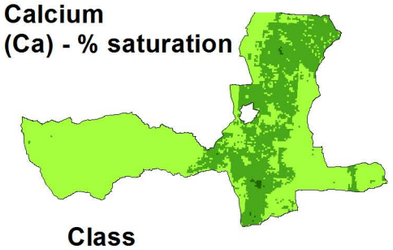
Class
- Very low
- High
- Low
- Very high
- Optimum

Sulfur (S) - mg/kg



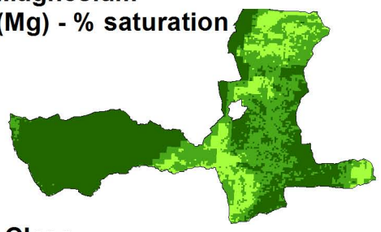
Class
- Very low
- Optimum
- Low

Calcium (Ca) - % saturation



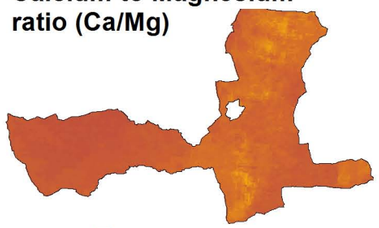
Class
- Low
- High
- Optimum
- Very high

Magnesium (Mg) - % saturation



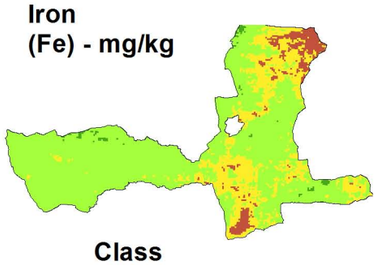
Class
- Low
- High
- Optimum
- Very high

Calcium to Magnesium ratio (Ca/Mg)



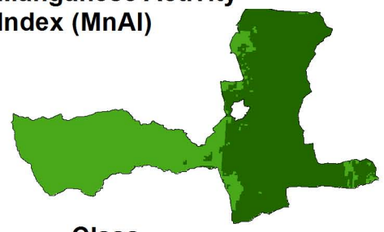
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



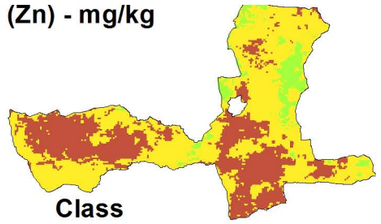
Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)



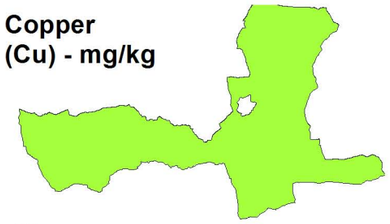
Class
- High
- Very high

Zinc (Zn) - mg/kg



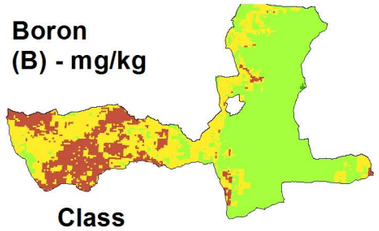
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



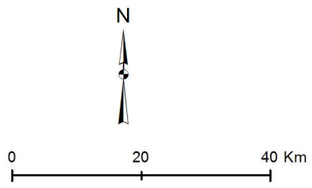
Class
- Optimum

Boron (B) - mg/kg

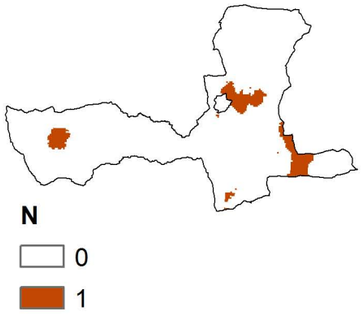


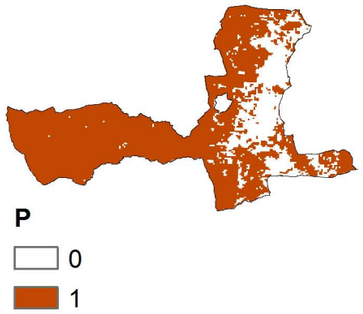
Class
- Very low
- Optimum
- Low
- High

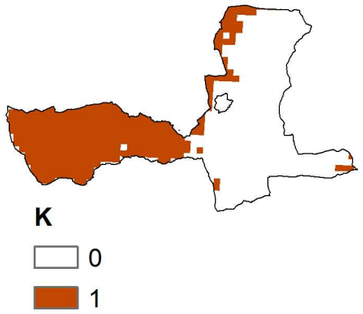
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

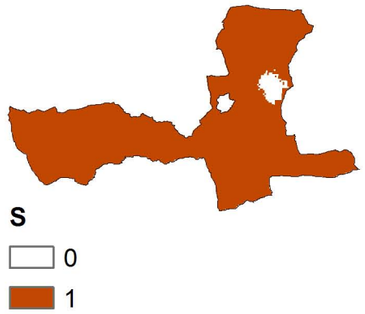


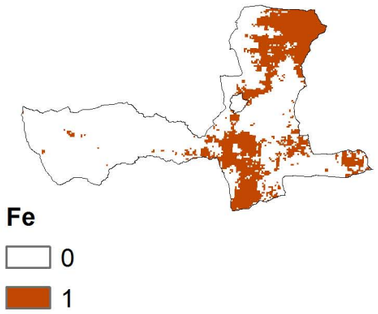
Fertilizer Type Requirement of Alamata Woreda





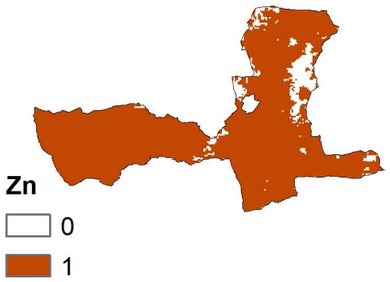




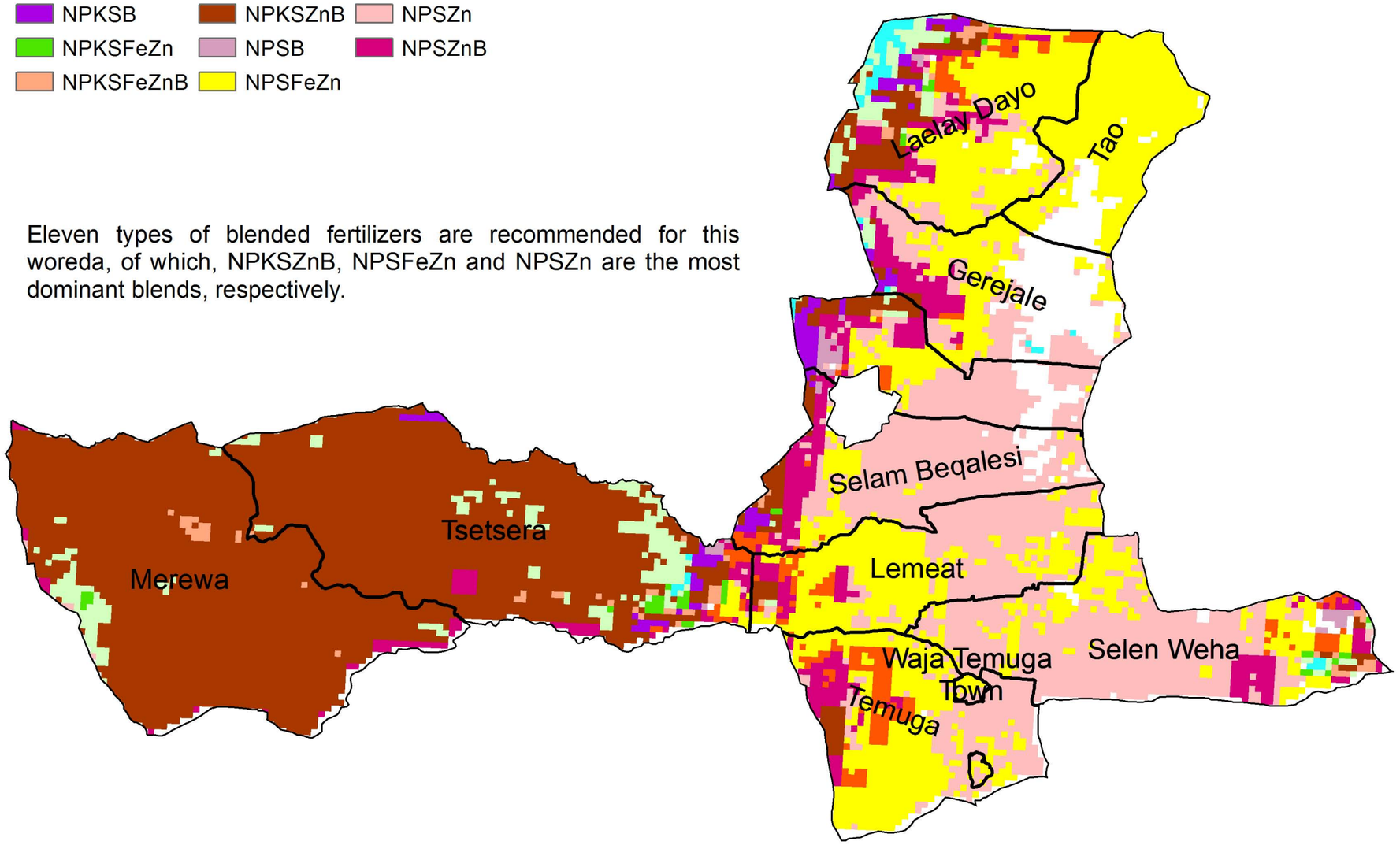


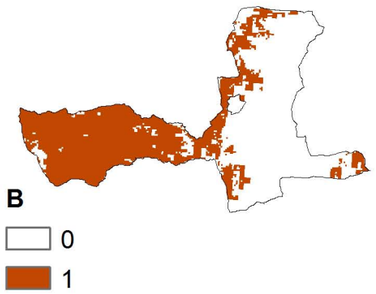
Blended Fertilizer Types

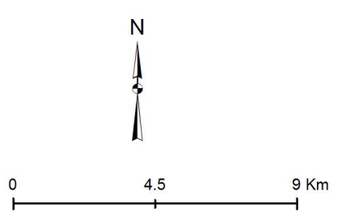
- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB



Eleven types of blended fertilizers are recommended for this woreda, of which, NPKSZnB, NPSFeZn and NPSZn are the most dominant blends, respectively.

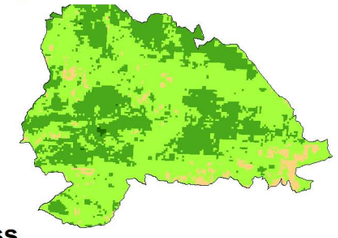






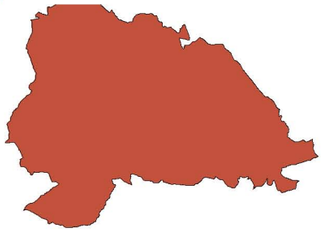
Soil Fertility Status of Ambalage Woreda

Soil pH



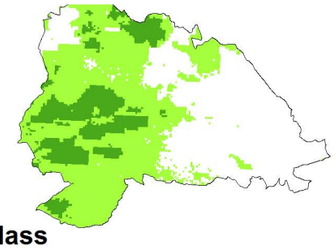
Class
- Mod. acidic
- Mod. alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



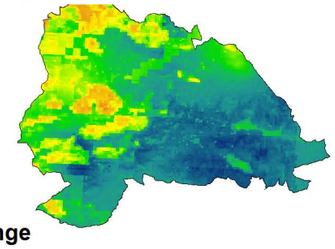
Class
- Salt free

Calsium Carbonate (CaCO3) - %



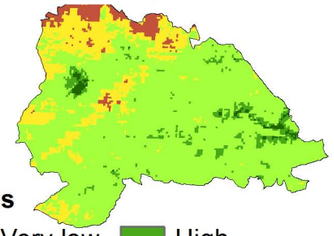
Class
- No CaCO3
- High
- Medium

Organic Matter (OM) - %



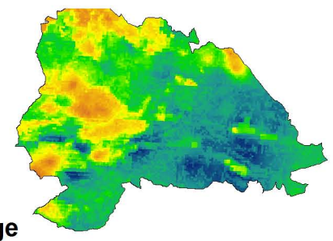
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



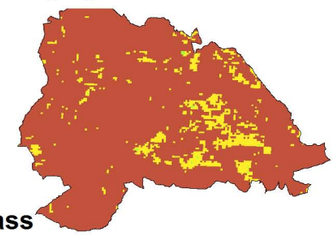
Class
- Very low
- High
- Low
- Very high
- Optimum

Total Nitrogen (N) - %



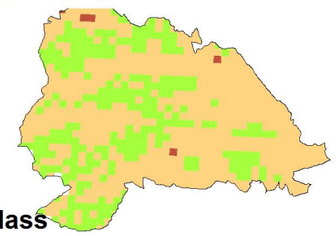
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



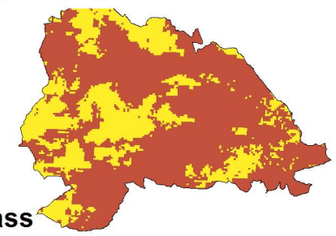
Class
- Very low
- Optimum
- Low

Potassium (K) - mg/kg



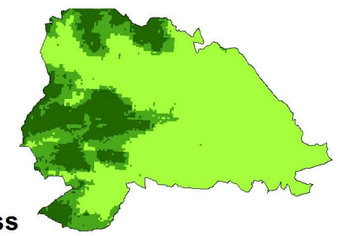
Class
- Very low
- Optimum
- Low

Sulfur (S) - mg/kg



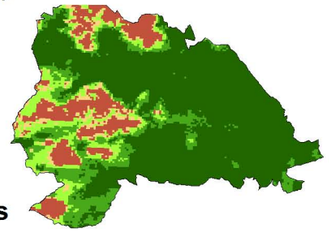
Class
- Very low
- Low

Calcium (Ca) - % saturation



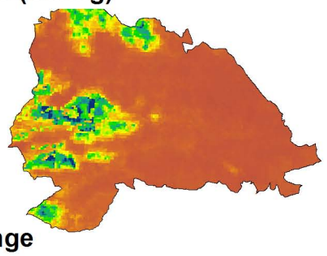
Class
- Optimum
- Very high
- High

Magnesium (Mg) - % saturation



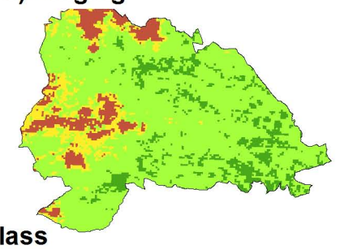
Class
- Very low
- High
- Low
- Very high
- Optimum

Calcium to Magnesium ratio (Ca/Mg)



Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg

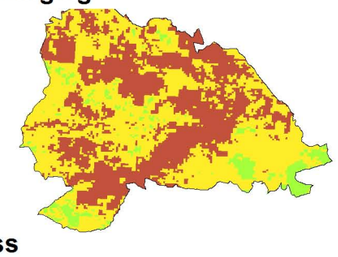


Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)

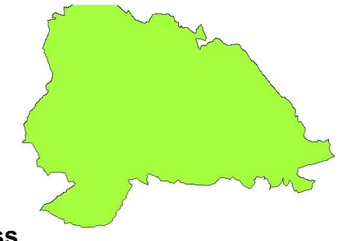
Class
- High
- Very high

Zinc (Zn) - mg/kg



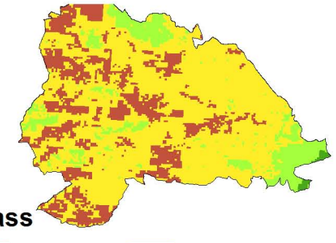
Class
- Very low
- Optimum
- Low

Copper (Cu) - mg/kg



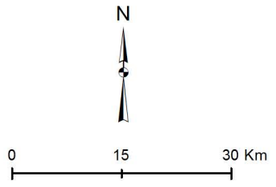
Class
- Optimum

Boron (B) - mg/kg

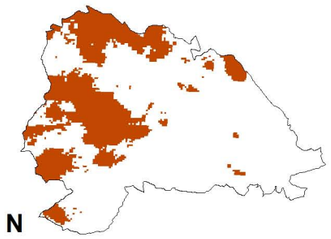


Class
- Very low
- Optimum
- Low
- High

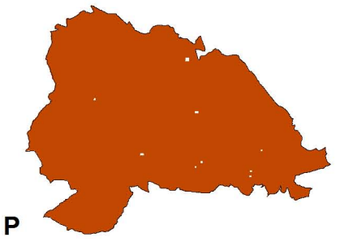
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.



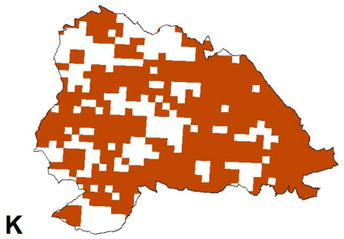
Fertilizer Type Requirement of Ambalage Woreda



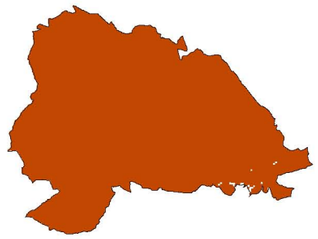
N
0
1



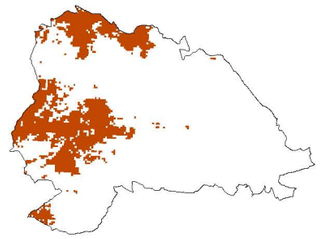
P
0
1



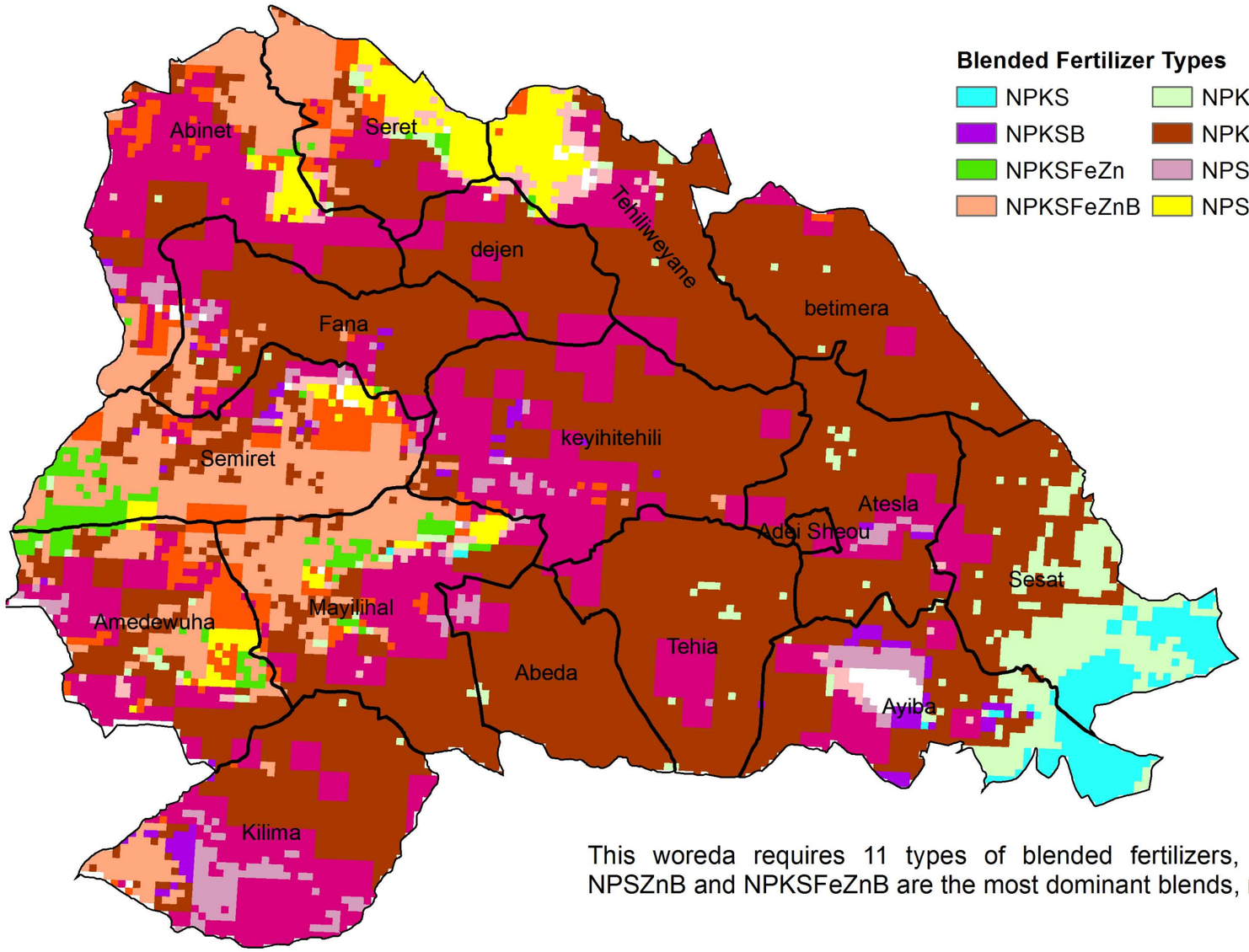
K
0
1



S
0
1

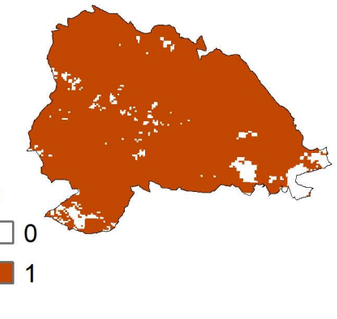


Fe
0
1

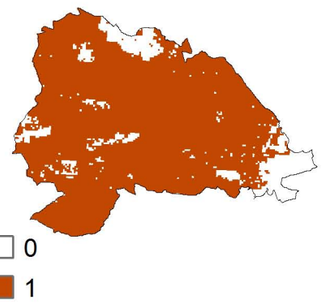


Blended Fertilizer Types

- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB



Zn
0
1



B
0
1

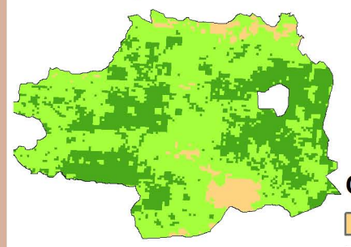
This woreda requires 11 types of blended fertilizers, of which, NPKSZnB, NPSZnB and NPKSFeZnB are the most dominant blends, respectively.

N

0 4 8 Km

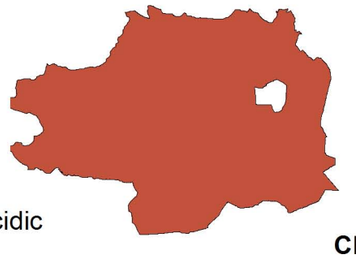
Soil Fertility Status of Endamehone Woreda

Soil pH



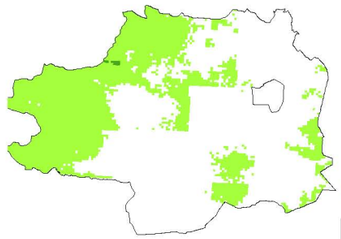
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



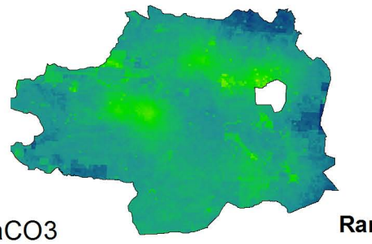
Class
- Salt free

Calsium Carbonate (CaCO3) - %



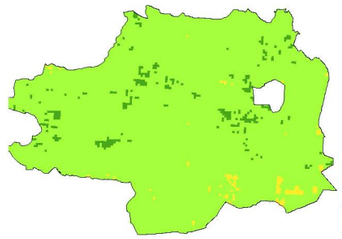
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



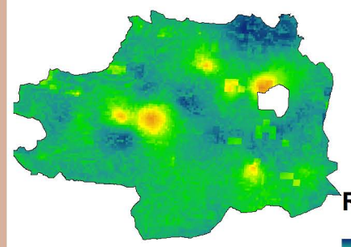
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



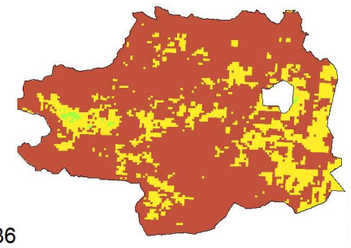
Class
- Low
- Optimum
- High

Total Nitrogen (N) - %



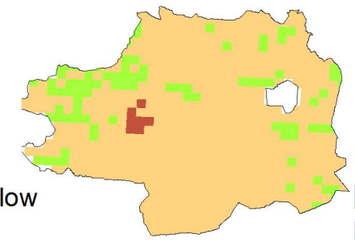
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



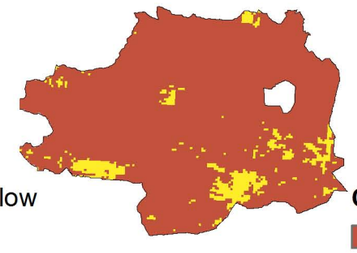
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



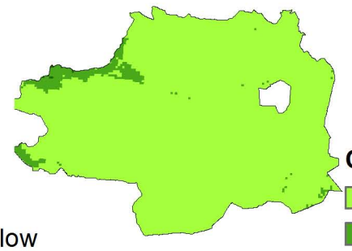
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



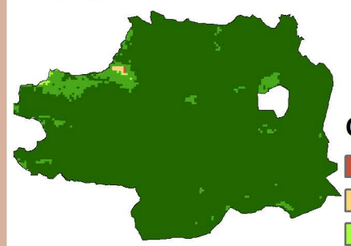
Class
- Very low
- Low

Calcium (Ca) - % saturation



Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation

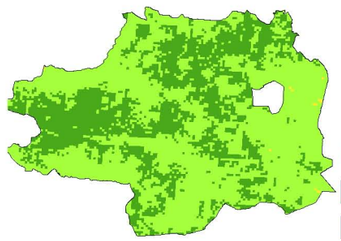


Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)

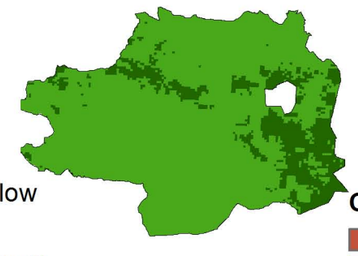
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



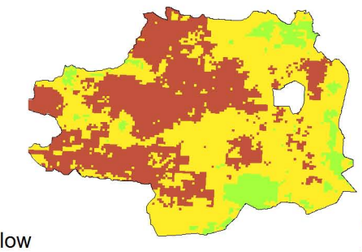
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



Class
- Very low
- Low
- Optimum

Zinc (Zn) - mg/kg

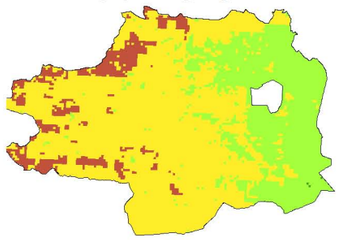


Class
- High
- Very High

Copper (Cu) - mg/kg

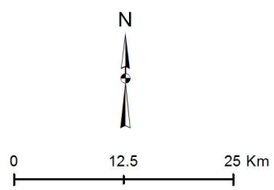
Class
- Low
- Optimum

Boron (B) - mg/kg

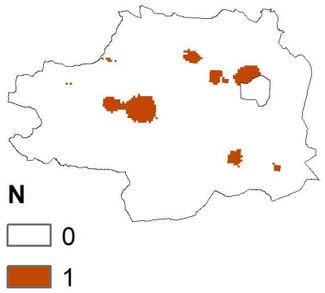


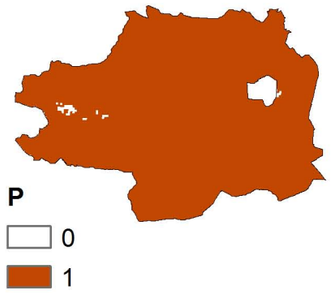
Class
- Very low
- Low
- Optimum
- High

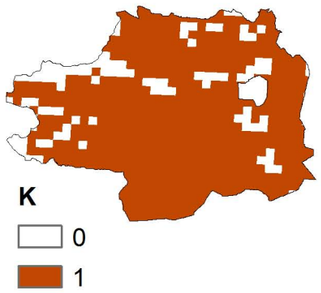
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

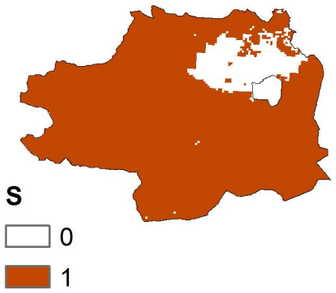


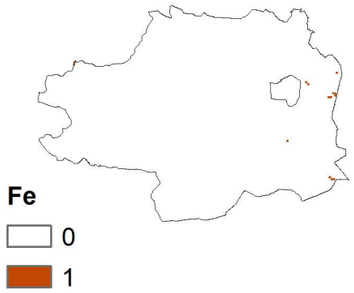
Fertilizer Type Requirement of Endamehone Woreda

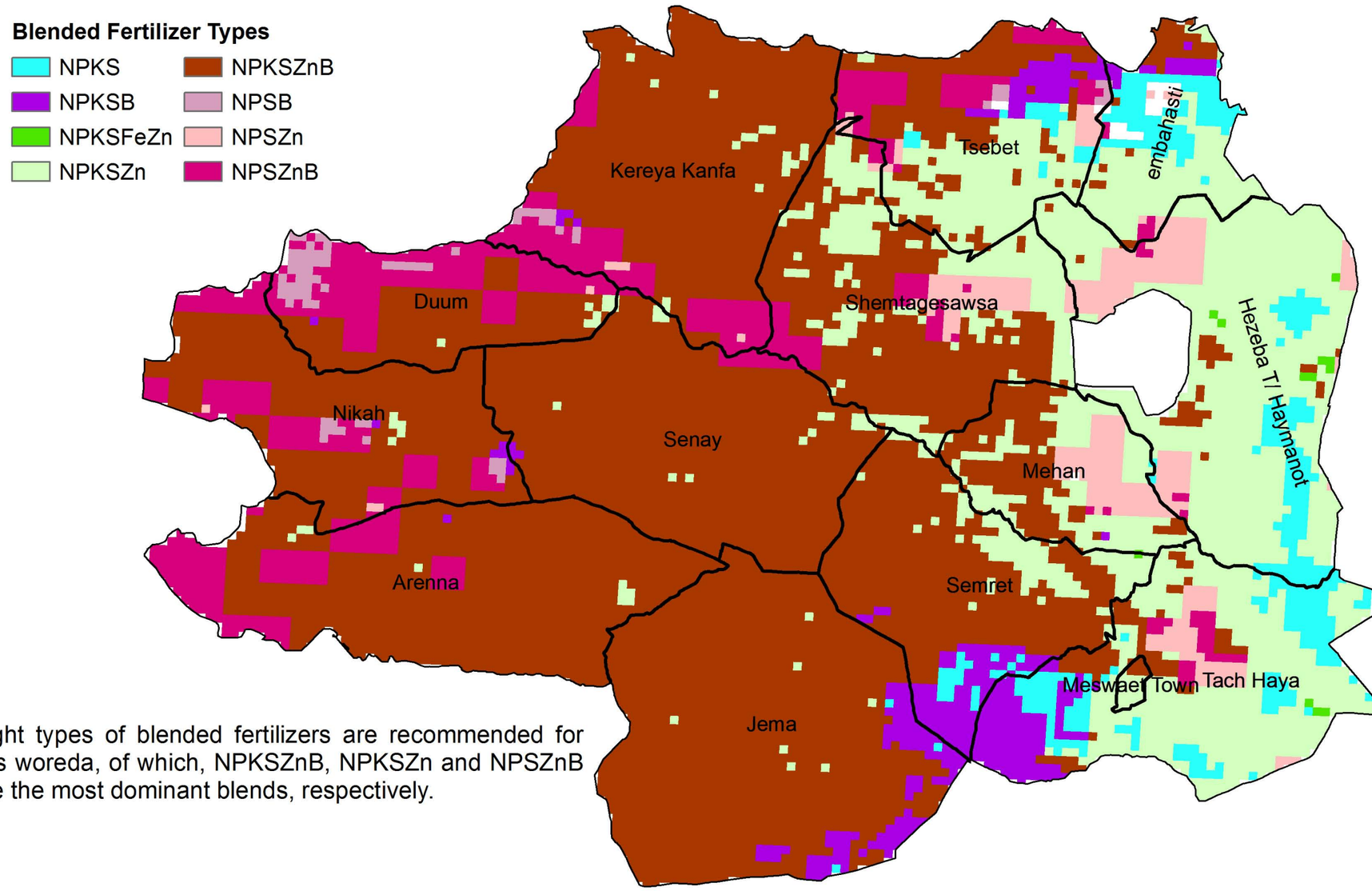


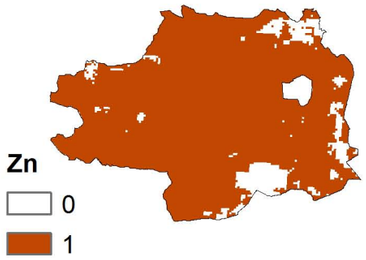


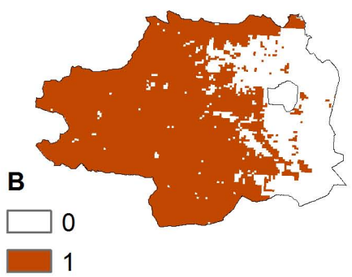




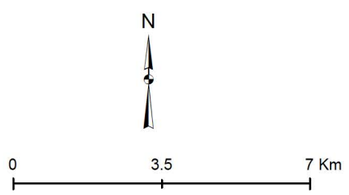






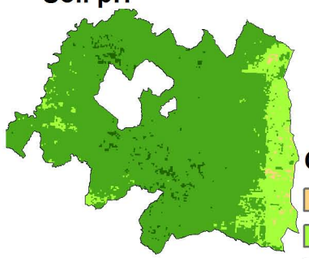


Eight types of blended fertilizers are recommended for this woreda, of which, NPKSZnB, NPKSZn and NPSZnB are the most dominant blends, respectively.



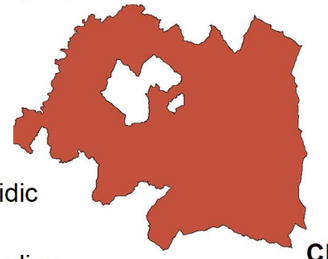
Soil Fertility Status of Enderta Woreda

Soil pH



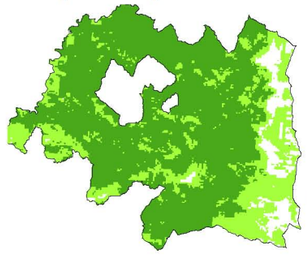
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



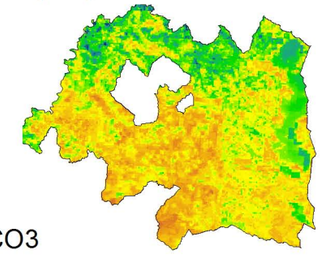
Class
- Salt free

Calsium Carbonate (CaCO3) - %



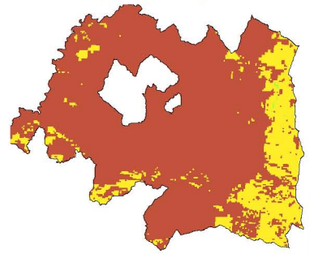
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



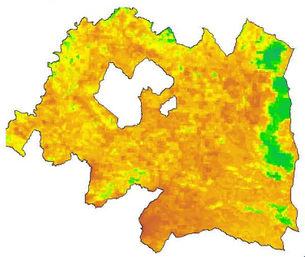
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



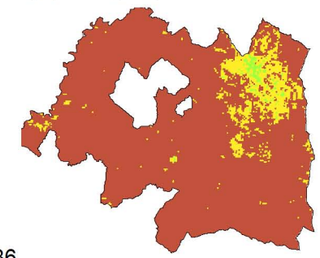
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



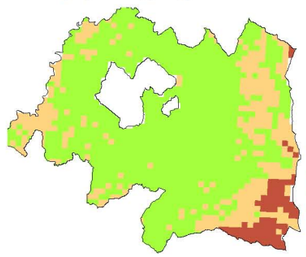
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



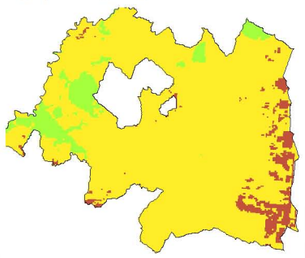
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



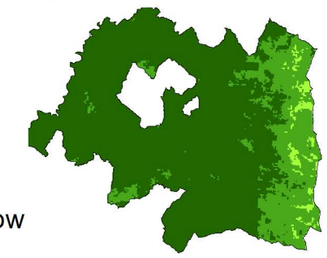
Class
- Very low
- Low
- Optimum
- High

Sulfur (S) - mg/kg



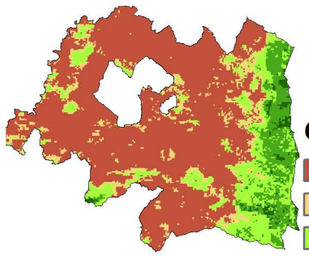
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



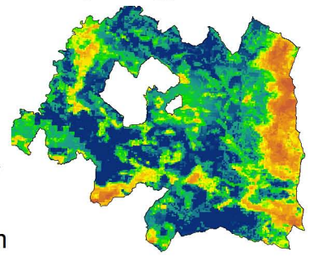
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



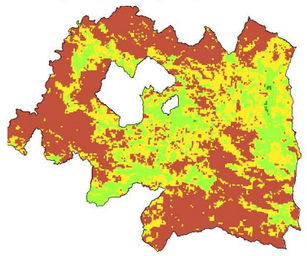
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



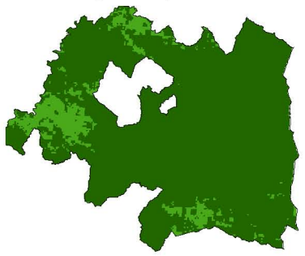
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



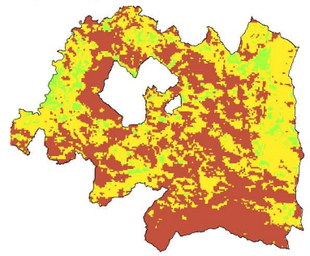
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



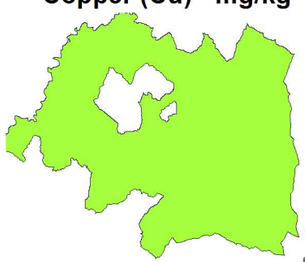
Class
- High
- Very High

Zinc (Zn) - mg/kg



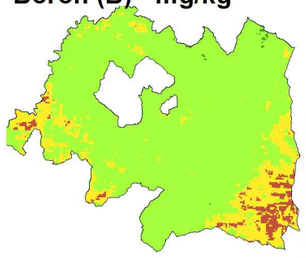
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



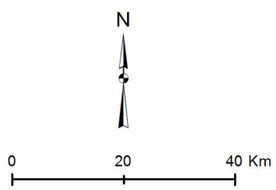
Class
- Optimum

Boron (B) - mg/kg

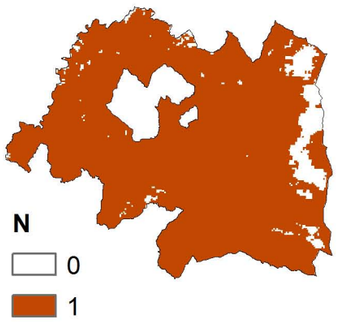


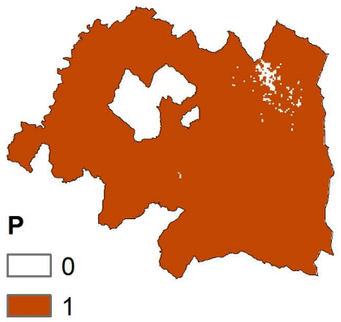
Class
- Very low
- Low
- Optimum
- High

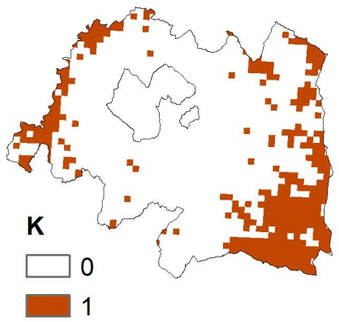
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

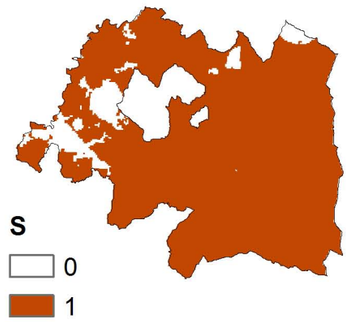


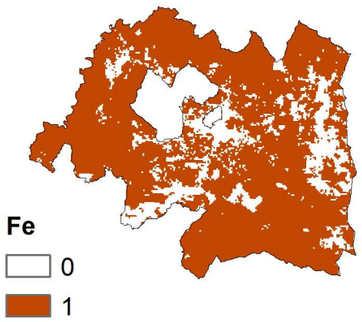
Fertilizer Type Requirement of Enderta Woreda

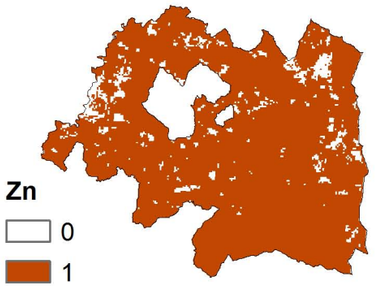


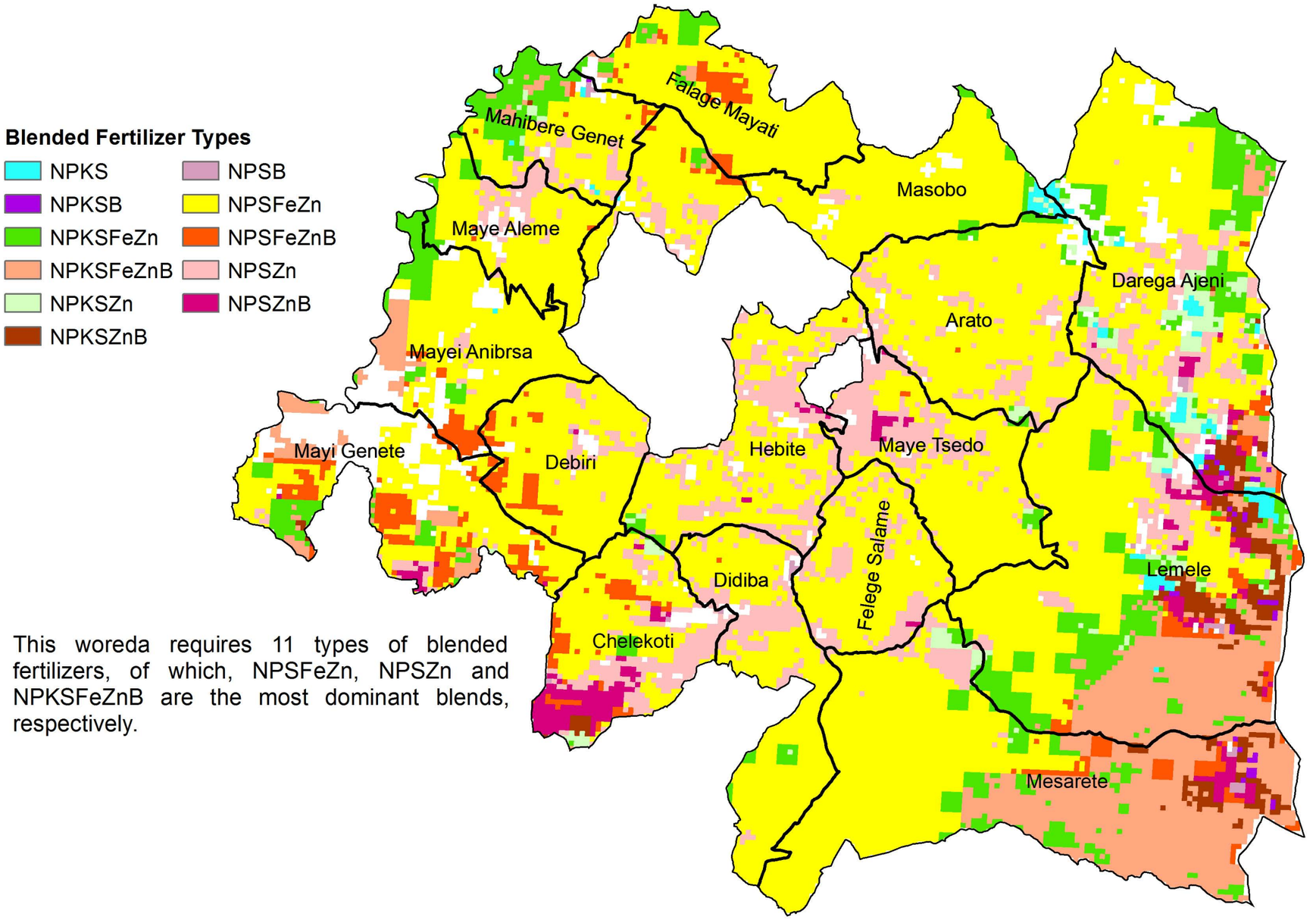


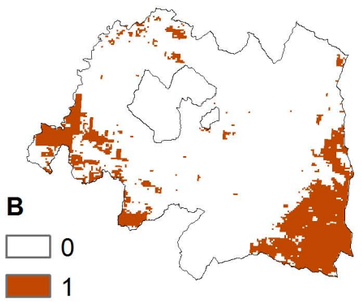




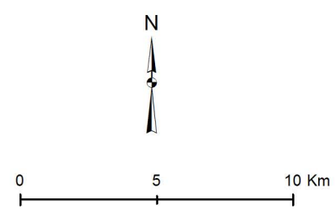






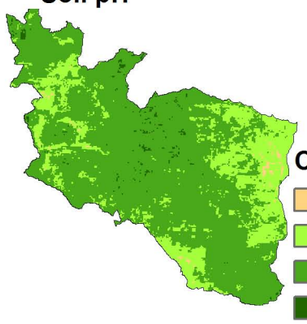


This woreda requires 11 types of blended fertilizers, of which, NPSFeZn, NPSZn and NPKSFeZnB are the most dominant blends, respectively.



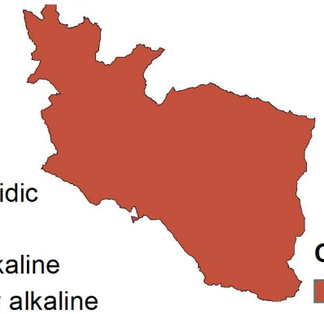
Soil Fertility Status of Hintalo Wajirat Woreda

Soil pH



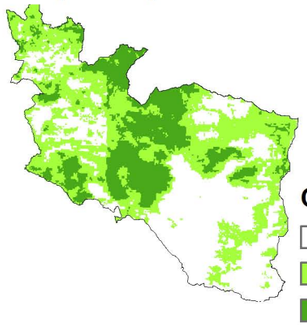
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



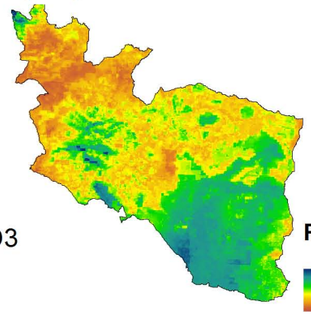
Class
- Salt free

Calsium Carbonate (CaCO3) - %



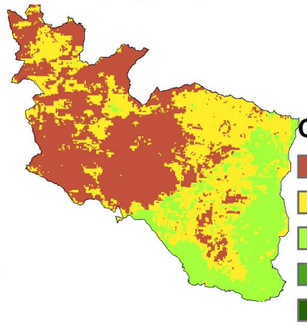
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



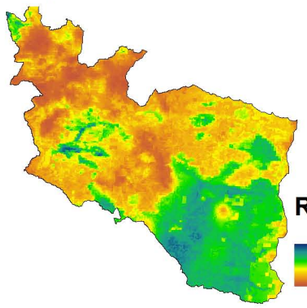
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



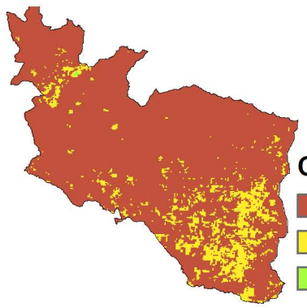
Class
- Very low
- Low
- Optimum
- High
- Very high

Total Nitrogen (N) - %



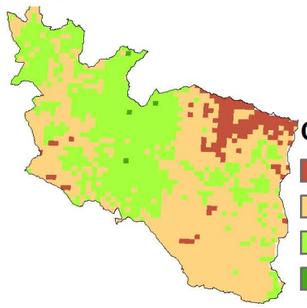
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



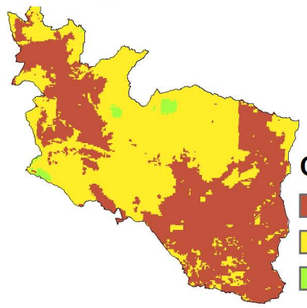
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



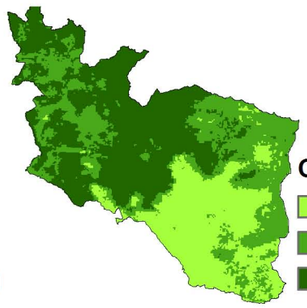
Class
- Very low
- Low
- Optimum
- High

Sulfur (S) - mg/kg



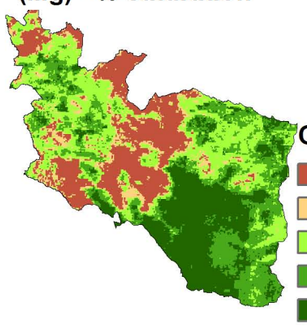
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



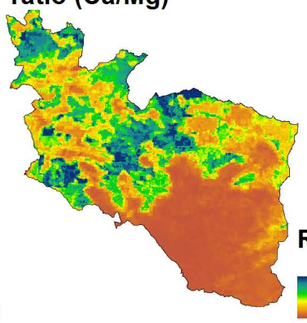
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



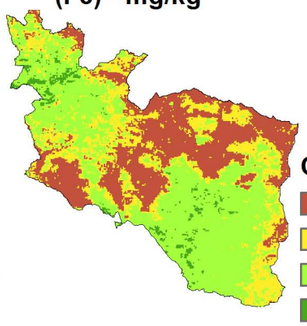
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



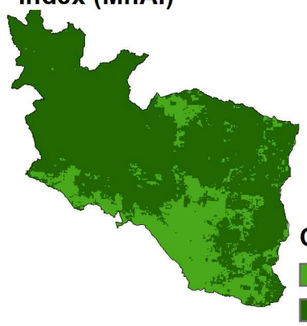
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



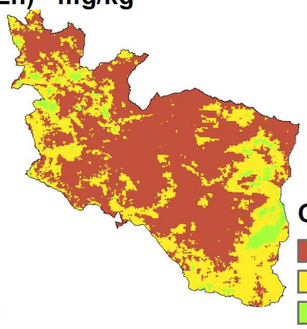
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



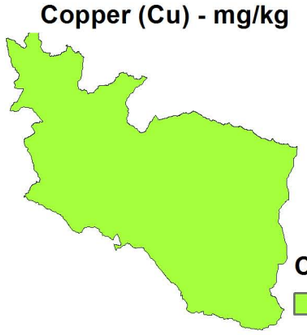
Class
- High
- Very high

Zinc (Zn) - mg/kg



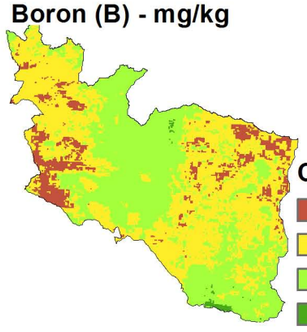
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



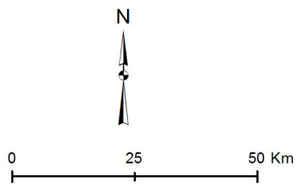
Class
- Optimum

Boron (B) - mg/kg

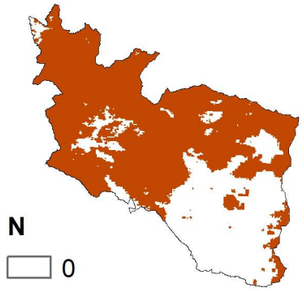


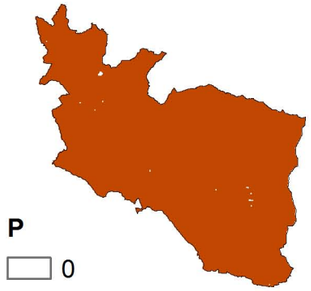
Class
- Very low
- Low
- Optimum
- High

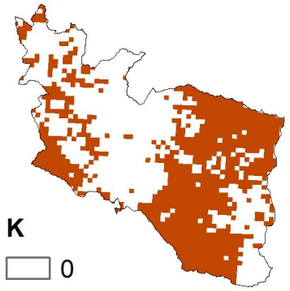
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

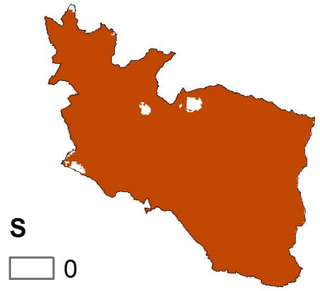


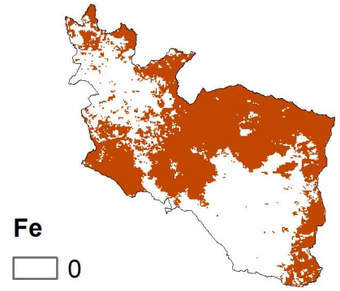
Fertilizer Type Requirement of Hintalo Wajirat Woreda

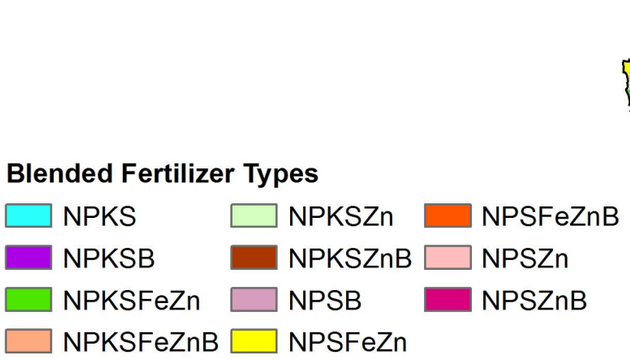


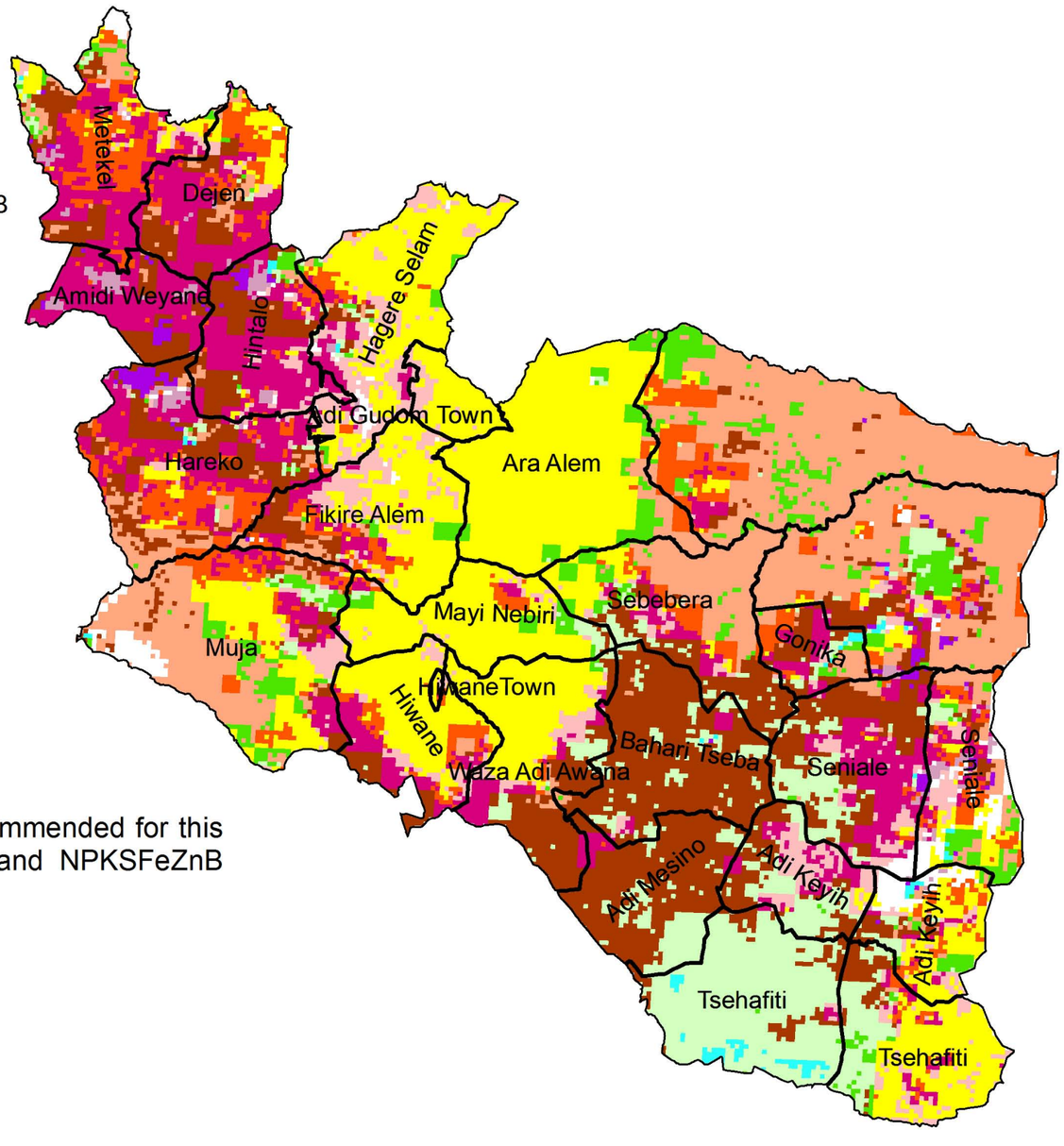


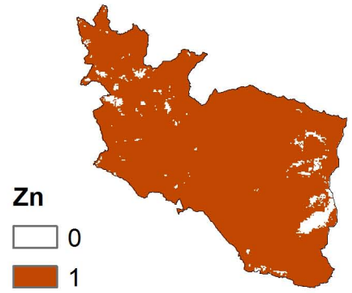


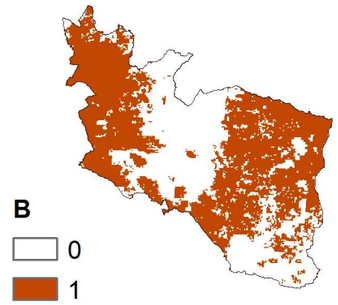


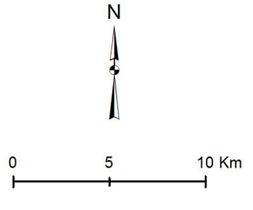








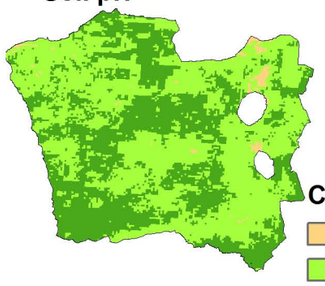




Eleven types of blended fertilizers are recommended for this woreda, of which, NPSFeZn, NPKSZnB and NPKSFeZnB are the most dominant blends, respectively.

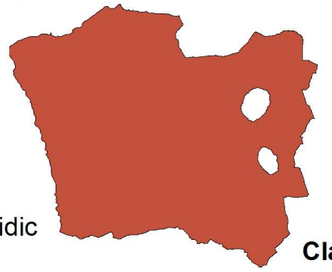
Soil Fertility Status of Ofla Woreda

Soil pH



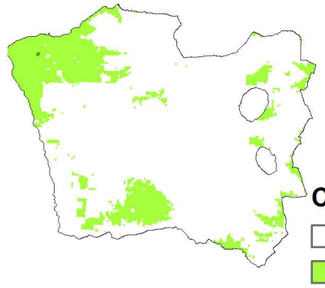
Class
- Mod. acidic
- Neutral
- Mod. alkaline

Electrical Conductivity (EC) - uScm-1



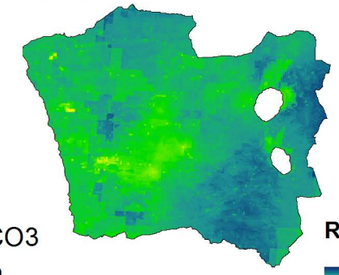
Class
- Salt free

Calsium Carbonate (CaCO3) - %



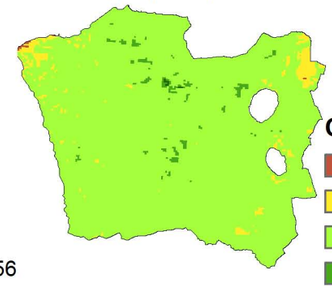
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



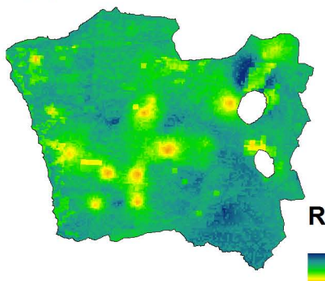
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



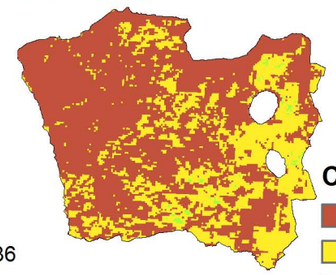
Class
- Very low
- Low
- Optimum
- High
- Very high

Total Nitrogen (N) - %



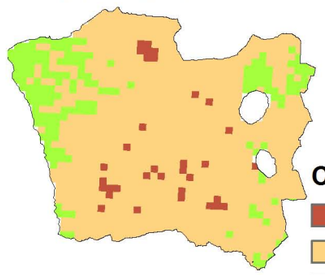
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



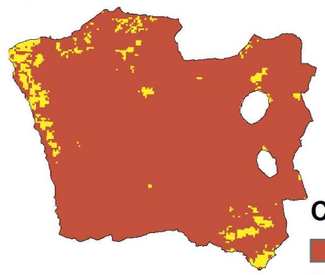
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



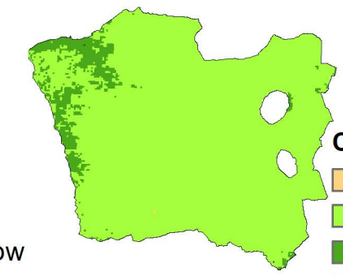
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



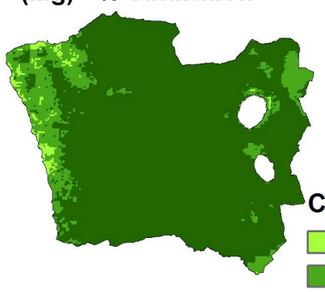
Class
- Very low
- Low

Calcium (Ca) - % saturation



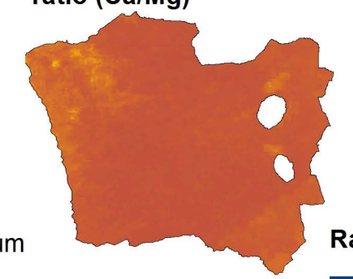
Class
- Low
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



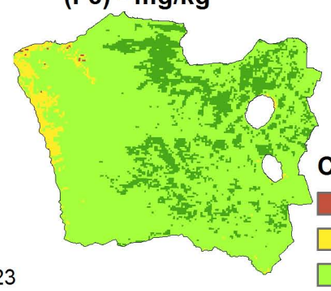
Class
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



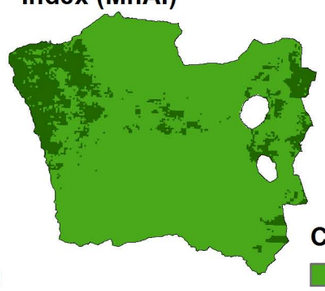
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



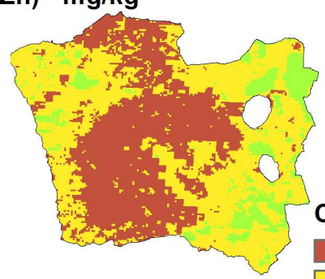
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



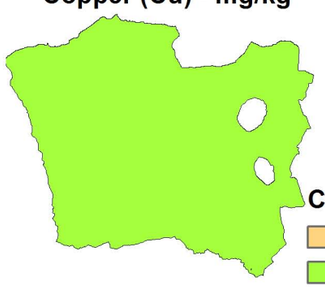
Class
- High
- Very High

Zinc (Zn) - mg/kg



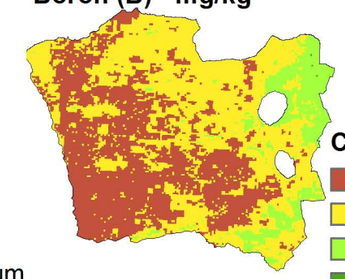
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



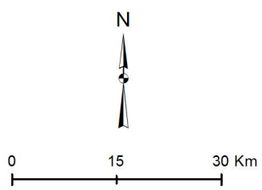
Class
- Low
- Optimum

Boron (B) - mg/kg

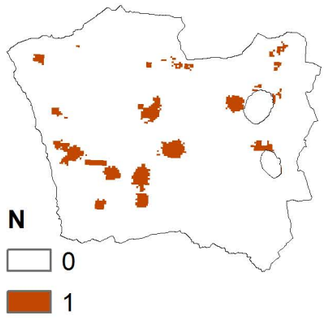


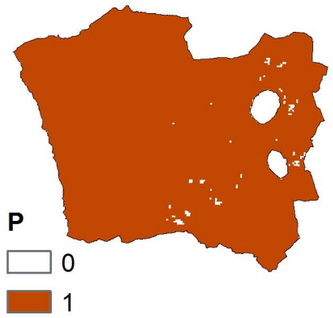
Class
- Very low
- Low
- Optimum
- High

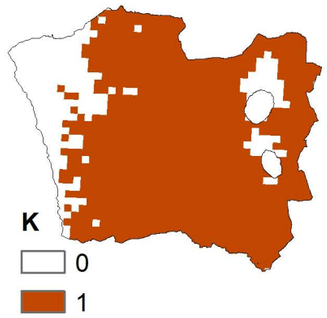
In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

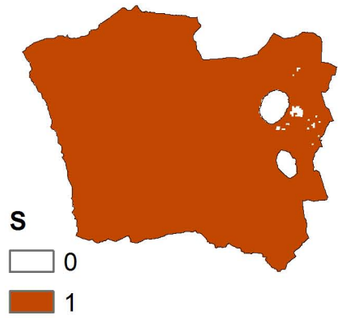


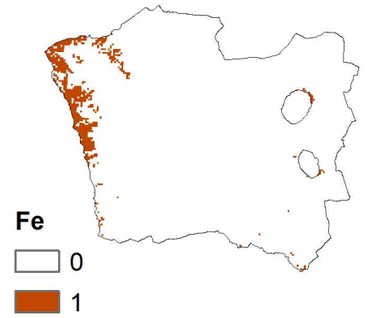
Fertilizer Type Requirement of Ofla Woreda





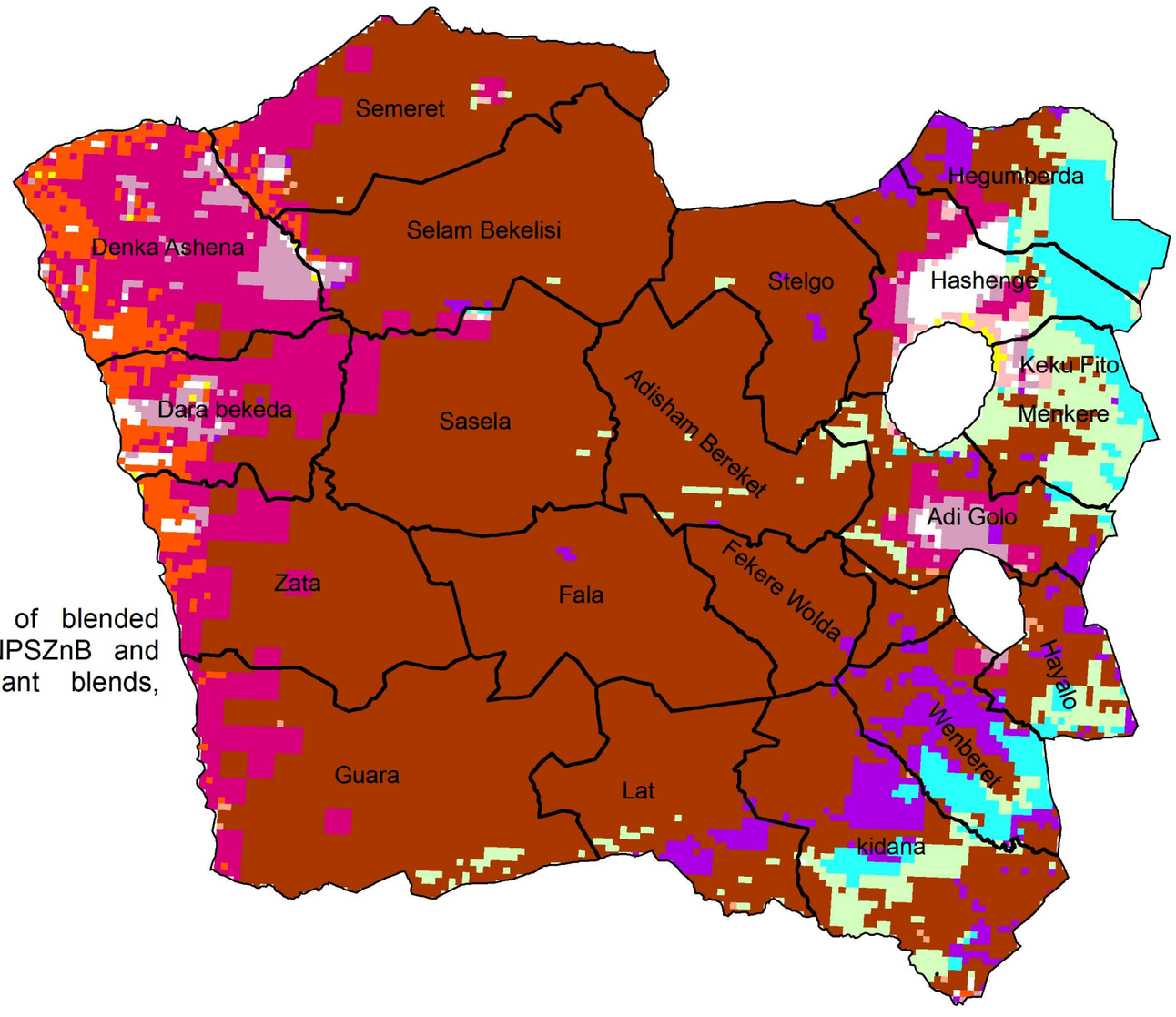


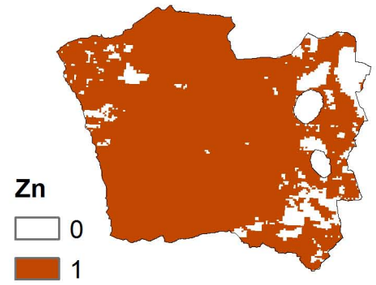


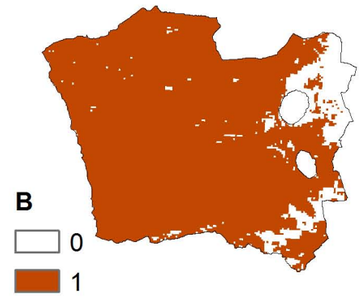


Blended Fertilizer Types

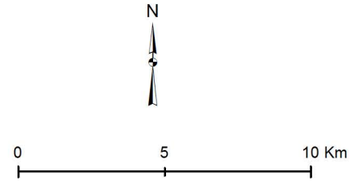
- NPKS
- NPKSB
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB





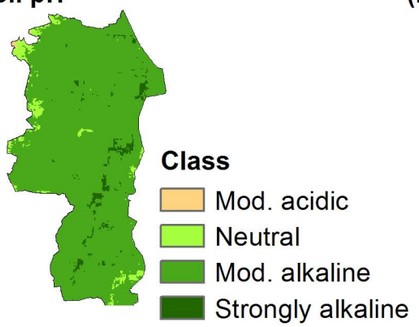


This woreda requires 10 types of blended fertilizers of which, NPKSZnB, NPSZnB and NPKSZn are the most dominant blends, respectively.

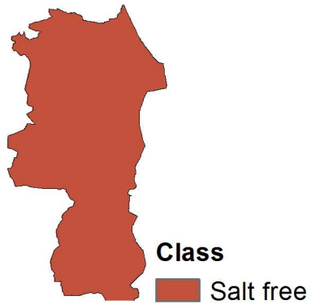


Soil Fertility Status of Raya Azebo Woreda

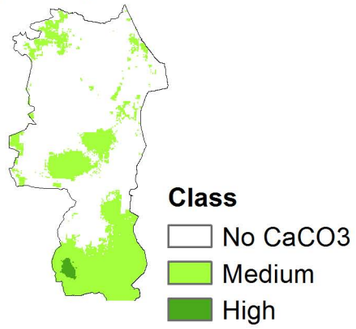
Soil pH



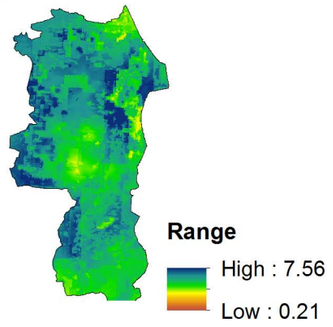
Electrical Conductivity (EC) - uScm-1



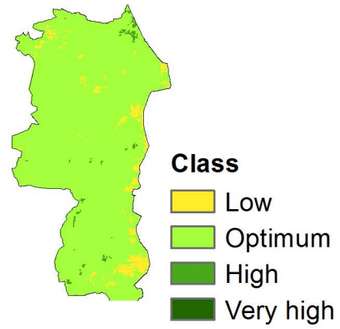
Calsium Carbonate (CaCO3) - %



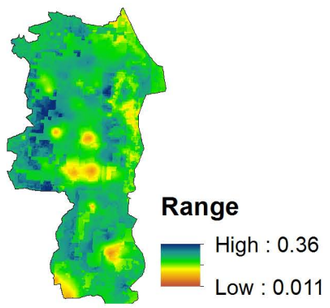
Organic Matter (OM) - %



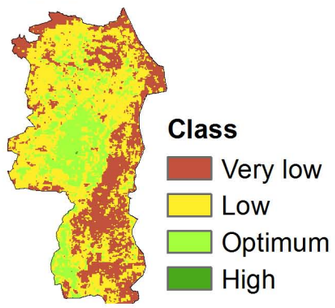
Exchangeable Sodium Percentage (ESP) - % saturation



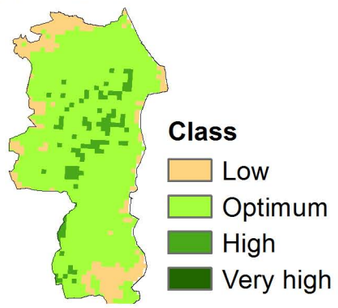
Total Nitrogen (N) - %



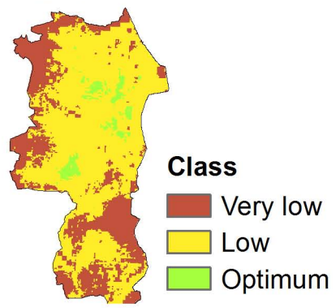
Phosphorus (P) - mg/kg



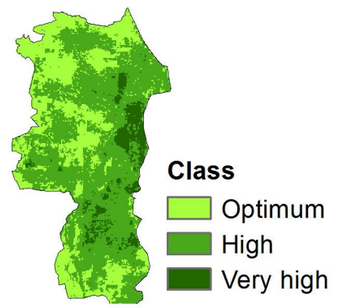
Potassium (K) - mg/kg



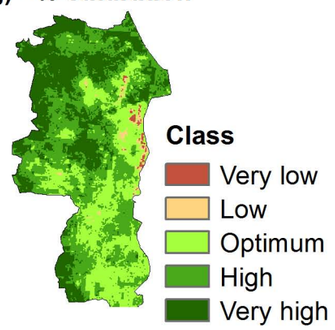
Sulfur (S) - mg/kg



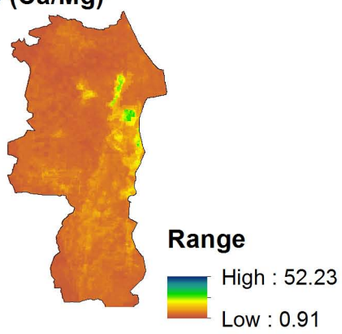
Calcium (Ca) - % saturation



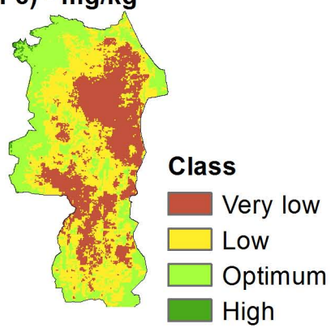
Magnesium (Mg) - % saturation



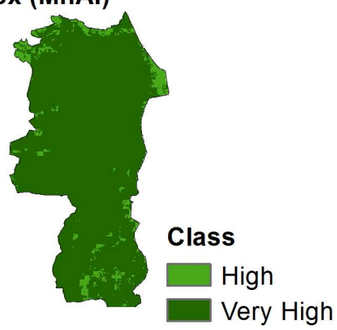
Calcium to Magnesium ratio (Ca/Mg)



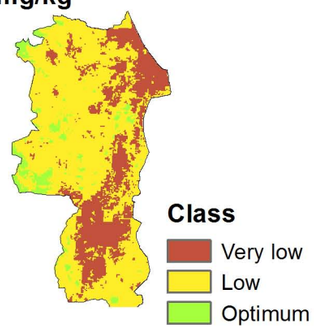
Iron (Fe) - mg/kg



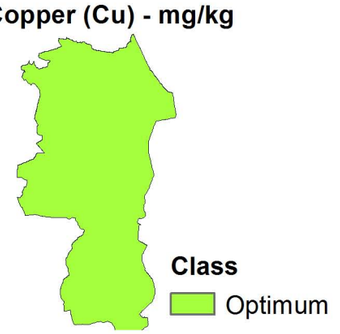
Manganese Activity Index (MnAI)



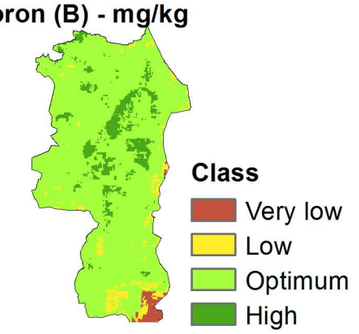
Zinc (Zn) - mg/kg



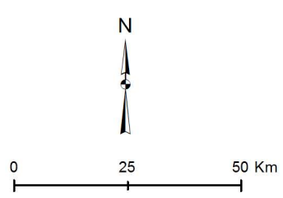
Copper (Cu) - mg/kg



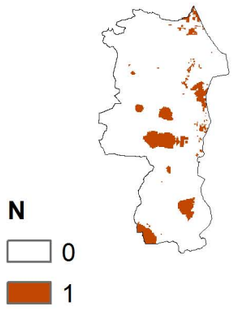
Boron (B) - mg/kg

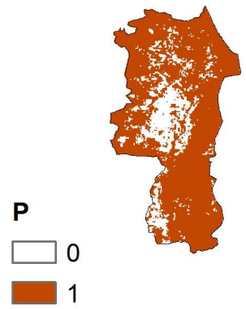


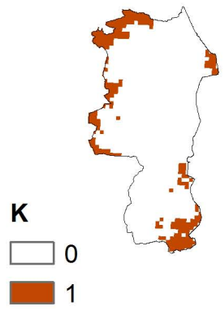
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

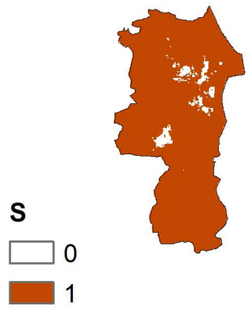


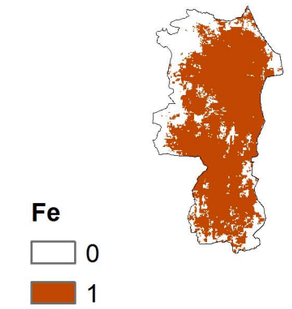
Fertilizer Type Requirement of Raya Azebo Woreda

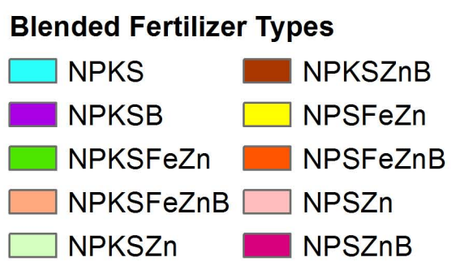


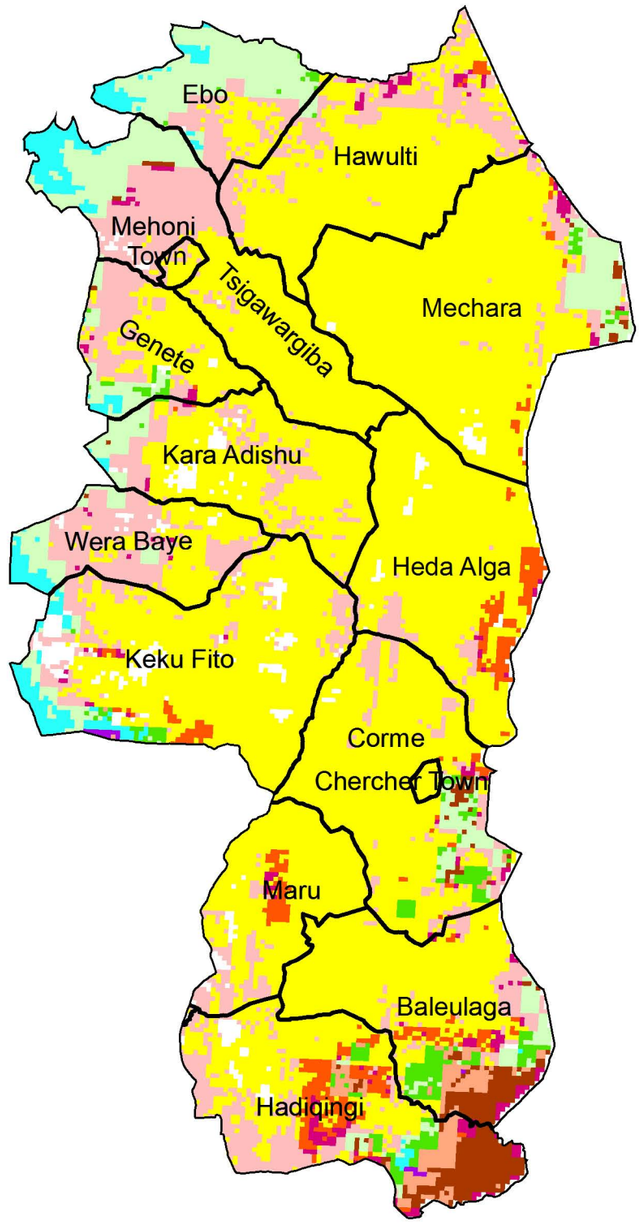


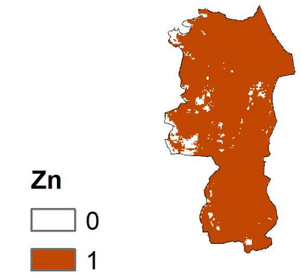


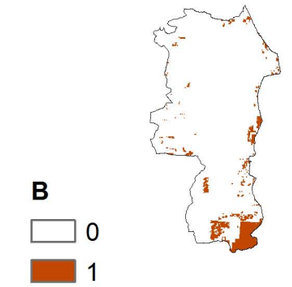




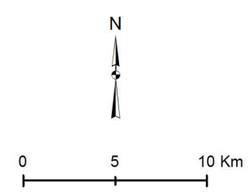






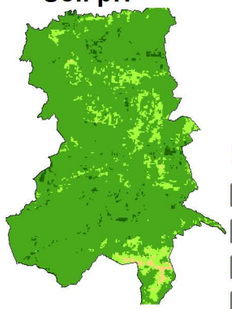


Ten types of blended fertilizers are recommended for this woreda, of which, NPSFeZn, NPSZn and NPKSZn are the most dominant blends, respectively.



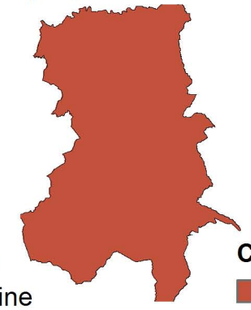
Soil Fertility Status of Seharti Samre Woreda

Soil pH



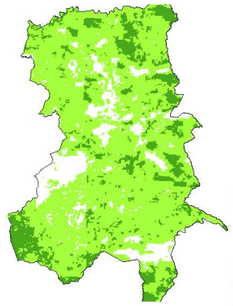
Class
- Mod. acidic
- Neutral
- Mod. alkaline
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



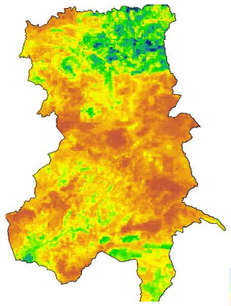
Class
- Salt free

Calsium Carbonate (CaCO3) - %



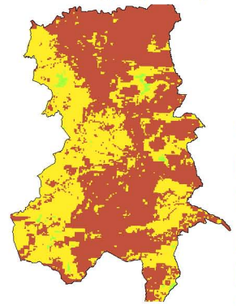
Class
- No CaCO3
- Medium
- High

Organic Matter (OM) - %



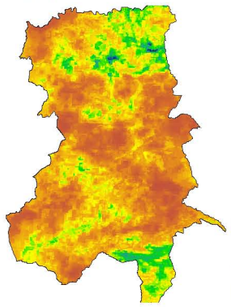
Range
- High : 7.56
- Low : 0.21

Exchangeable Sodium Percentage (ESP) - % saturation



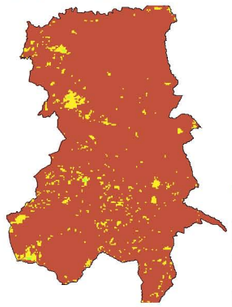
Class
- Very low
- Low
- Optimum
- High
- Very high

Total Nitrogen (N) - %



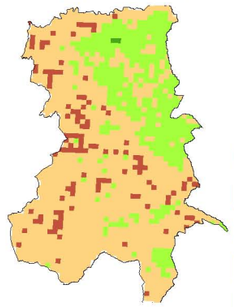
Range
- High : 0.36
- Low : 0.011

Phosphorus (P) - mg/kg



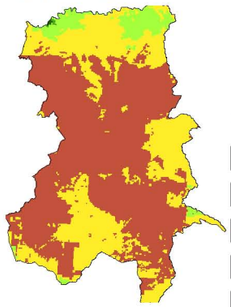
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



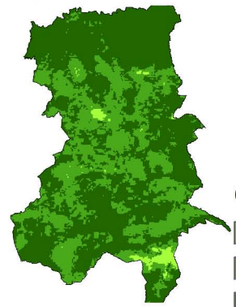
Class
- Very low
- Low
- Optimum
- High

Sulfur (S) - mg/kg



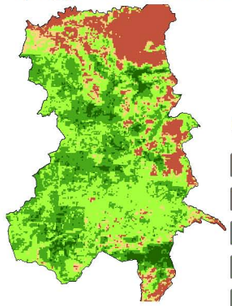
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium (Ca) - % saturation



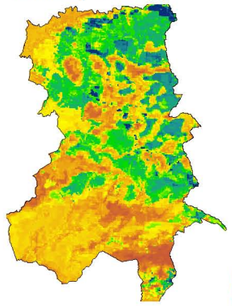
Class
- Optimum
- High
- Very high

Magnesium (Mg) - % saturation



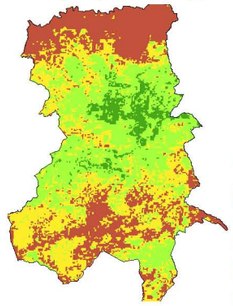
Class
- Very low
- Low
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



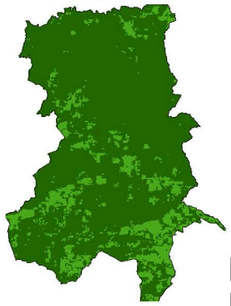
Range
- High : 52.23
- Low : 0.91

Iron (Fe) - mg/kg



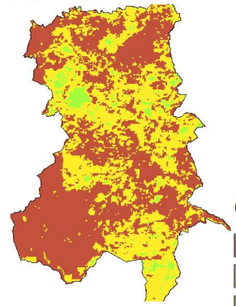
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



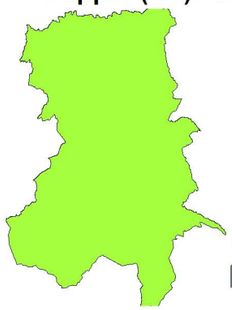
Class
- High
- Very High

Zinc (Zn) - mg/kg



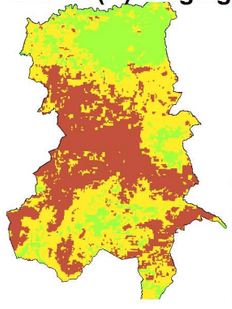
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



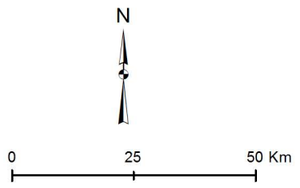
Class
- Optimum

Boron (B) - mg/kg

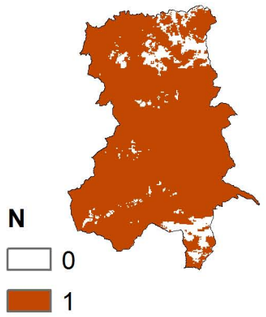


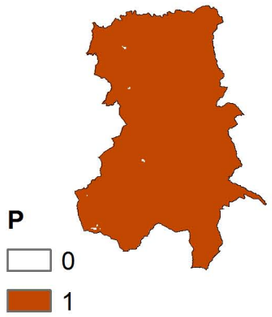
Class
- Very low
- Low
- Optimum

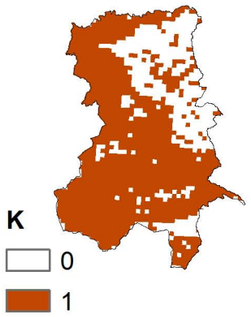
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

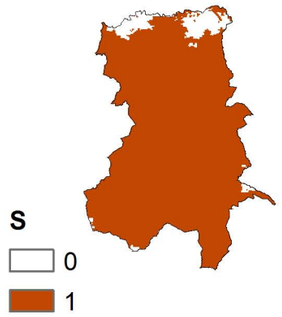


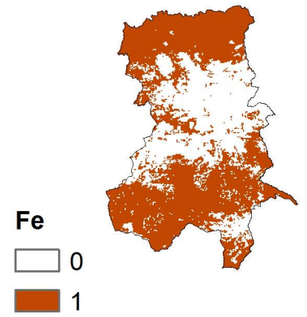
Fertilizer Type Requirement of Seharti Samre Woreda





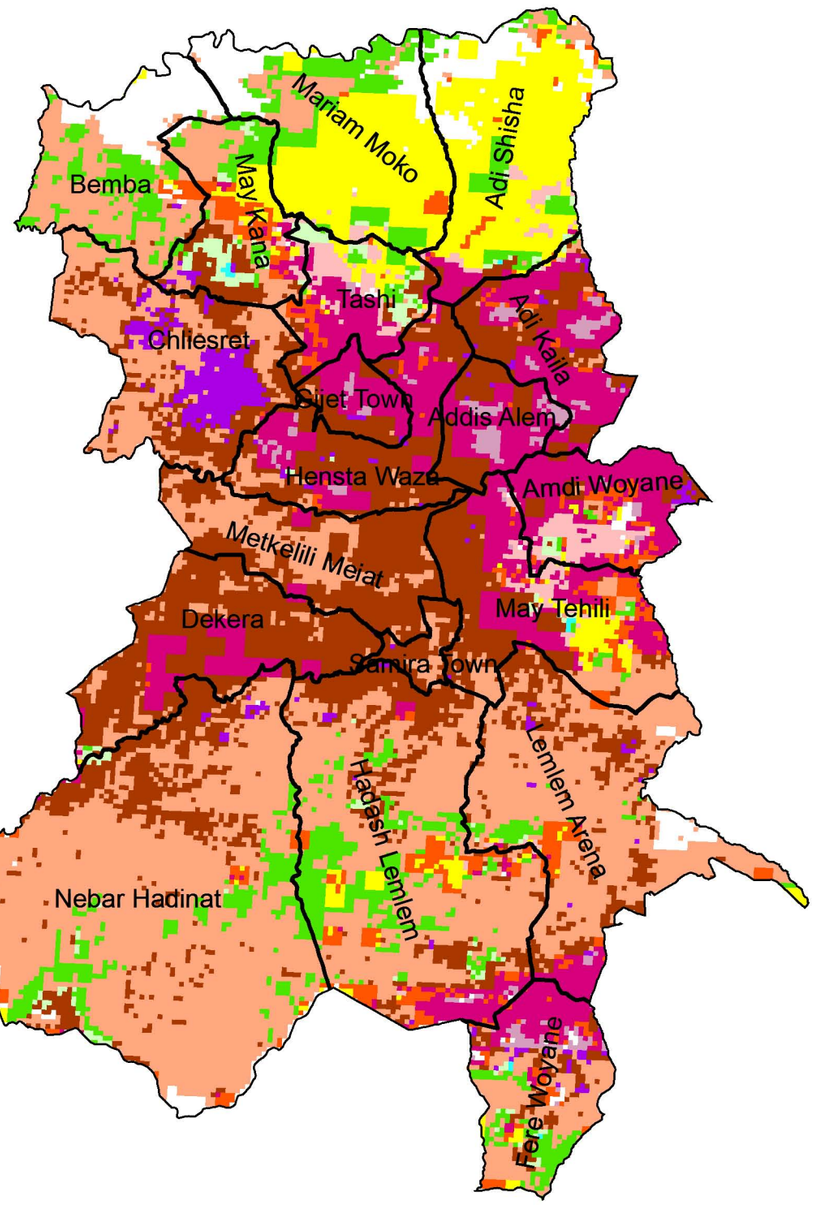


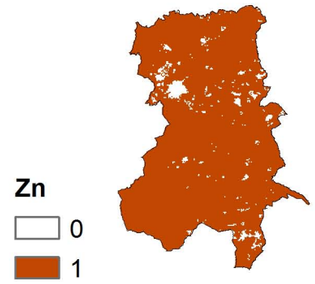


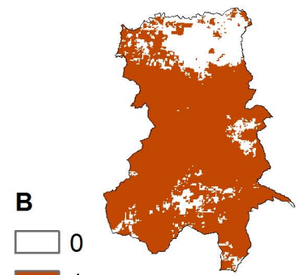


Blended Fertilizer Types

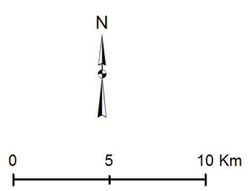
- NPKS
- NPKSB
- NPKSFeZn
- NPKSFeZnB
- NPKSZn
- NPKSZnB
- NPSB
- NPSFeZn
- NPSFeZnB
- NPSZn
- NPSZnB





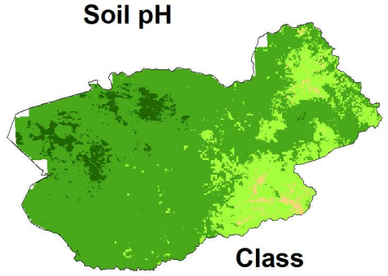


This woreda requires 11 types of blended fertilizers, of which, NPKSFeZnB, NPKSZnB and NPSZnB are the most dominant blends, respectively.



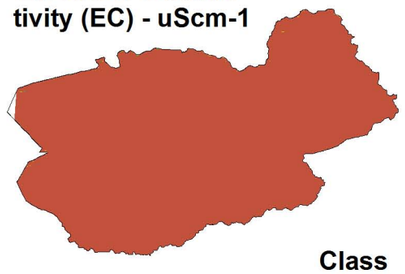
Soil Fertility Status of Quafta Humera Woreda

Soil pH



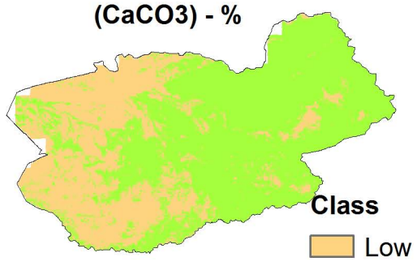
Class
- Mod acidic
- Mod alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



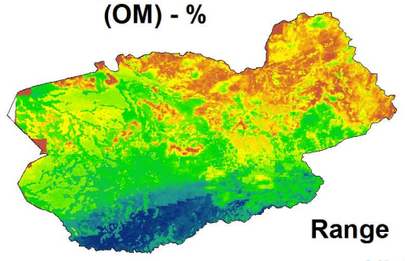
Class
- Salt free

Calsium Carbonate (CaCO3) - %



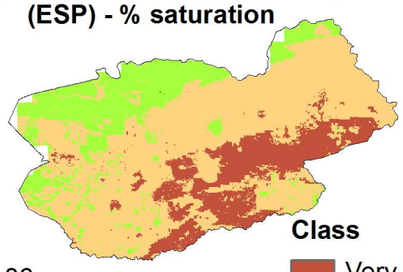
Class
- Low
- Medium
- High

Organic Matter (OM) - %



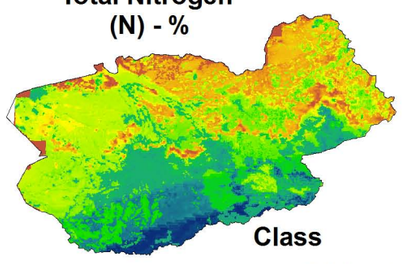
Range
- High : 4.86
- Low : 1.36

Exchangeable Sodium Percentage (ESP) - % saturation



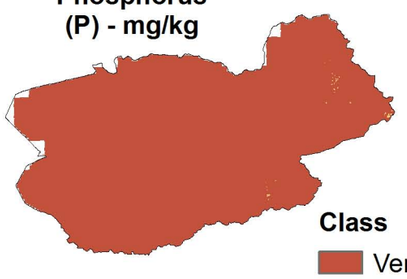
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



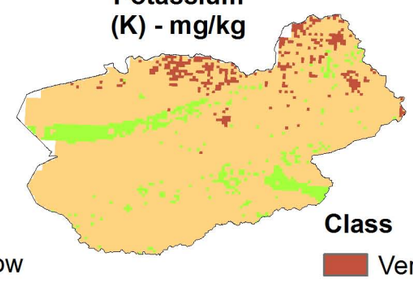
Class
- High : 0.28
- Low : 0.05

Phosphorus (P) - mg/kg



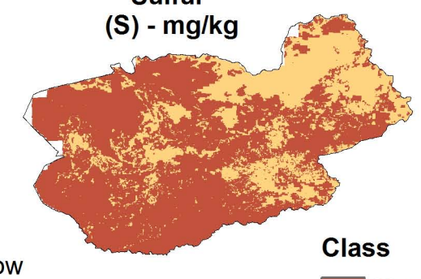
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



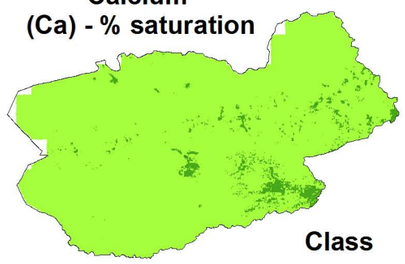
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



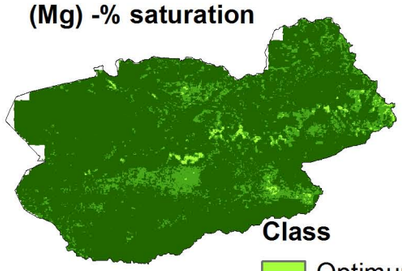
Class
- Very low
- Low

Calcium (Ca) - % saturation



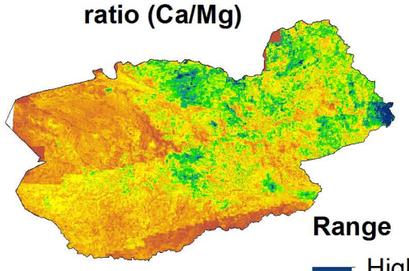
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



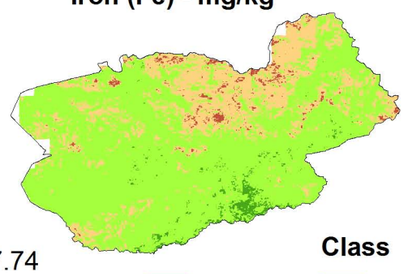
Class
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



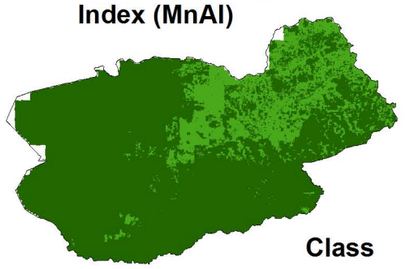
Range
- High : 7.74
- Low : 0.92

Iron (Fe) - mg/kg



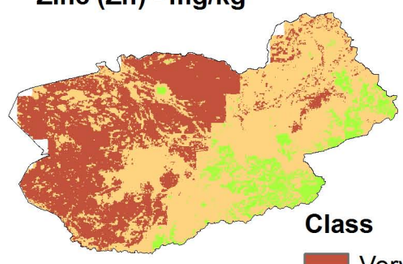
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



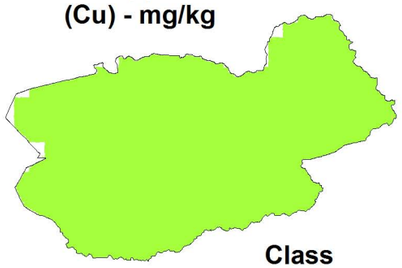
Class
- High
- Very high

Zinc (Zn) - mg/kg



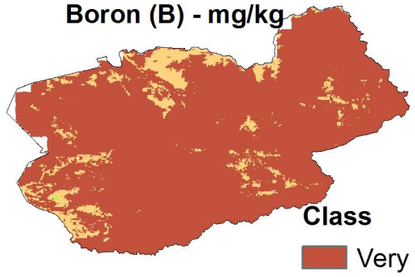
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



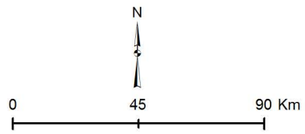
Class
- Low
- Optimum

Boron (B) - mg/kg

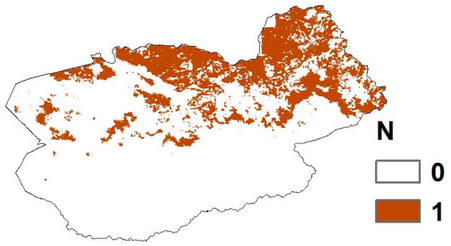


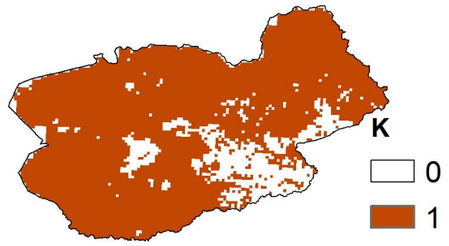
Class
- Very low
- Low
- Optimum

In the woreda, 7 soil nutrients were found to be deficient. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

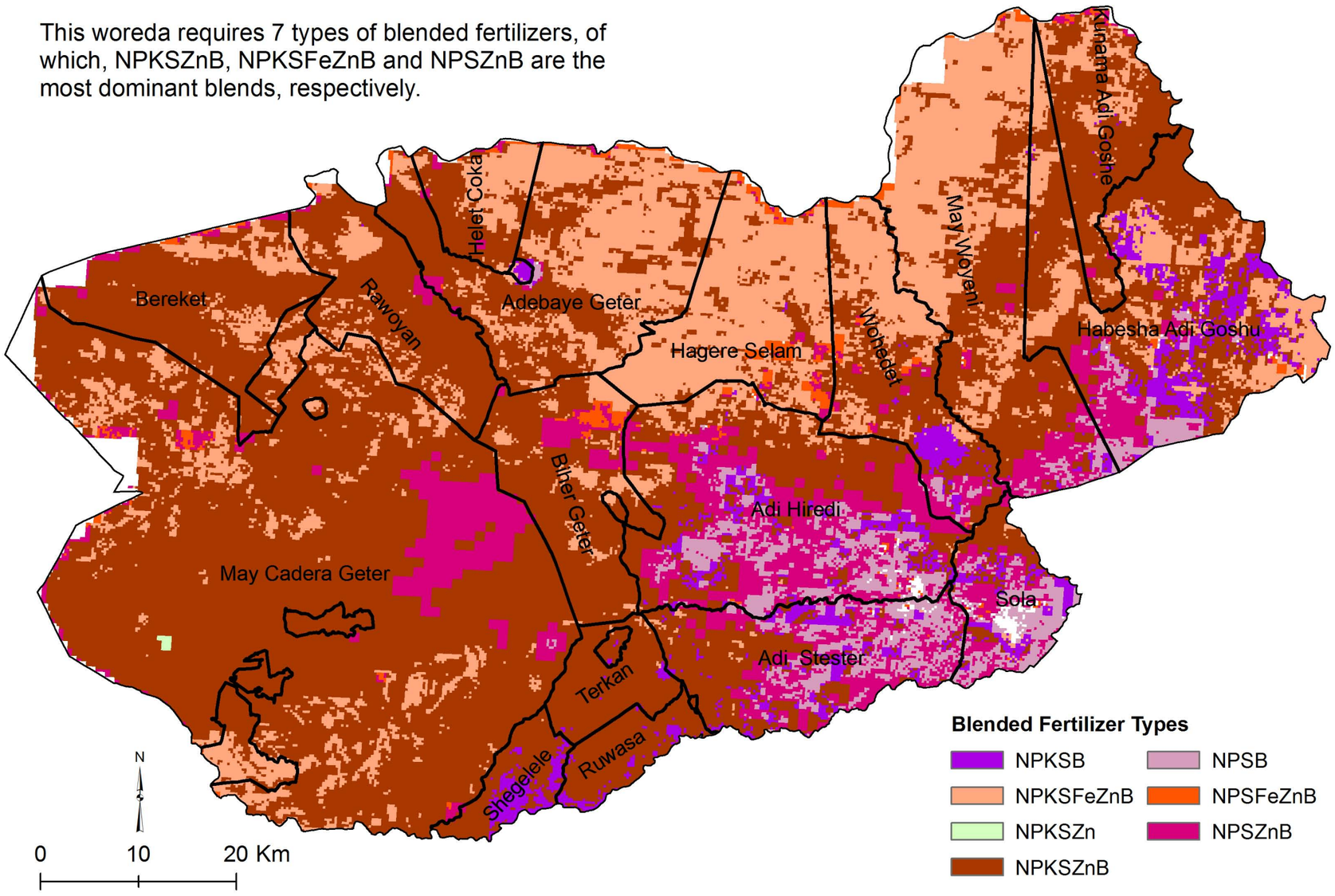


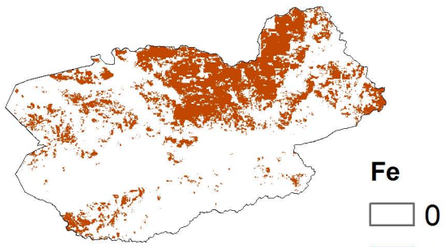
Fertilizer Type Requirement of Qafta Humera Woreda

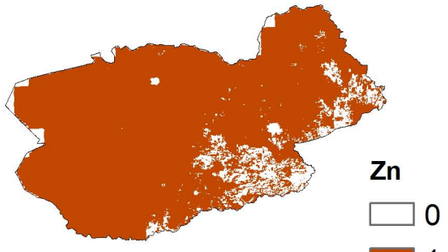




This woreda requires 7 types of blended fertilizers, of which, NPKSZnB, NPKSFeZnB and NPSZnB are the most dominant blends, respectively.

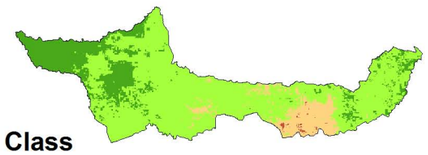






Soil Fertility Status of Tsegede Woreda

Soil pH

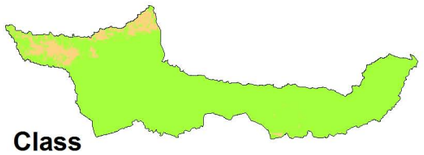


Class
- Strongly acidic
- Mod alkaline
- Mod acidic
- Strongly alkaline
- Neutral

Electrical Conductivity (EC) - uScm-1

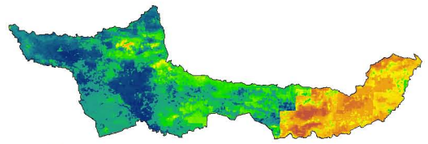
Class
- Salt free

Calsium Carbonate (CaCO3) - %



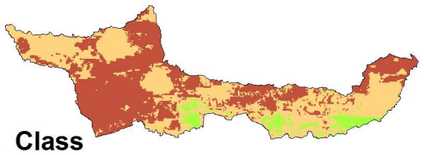
Class
- Low
- Medium
- High

Organic Matter (OM) - %



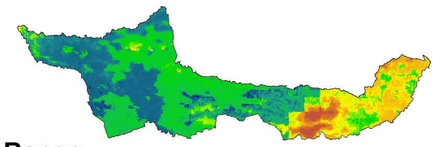
Range
- High : 5.21
- Low : 2.11

Exchangeable Sodium Percentage (ESP) - % saturation



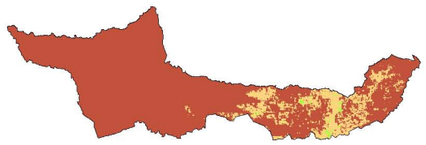
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



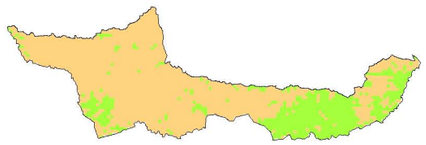
Range
- High : 0.28
- Low : 0.05

Phosphorus (P) - mg/kg



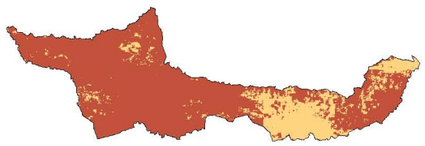
Class
- Very low
- Low
- Optimum

Potassium (K) - mg/kg



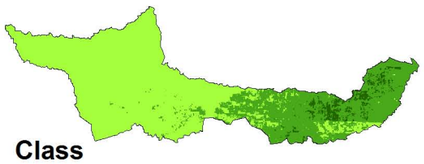
Class
- Low
- Optimum

Sulfur (S) - mg/kg



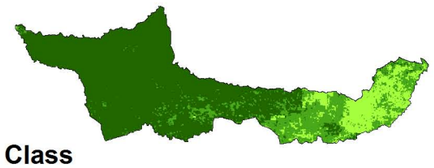
Class
- Very low
- Low

Calcium (Ca) - % saturation



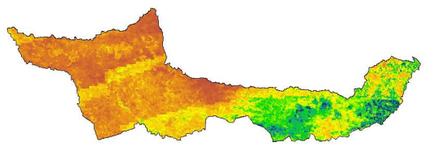
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



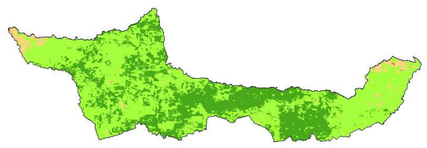
Class
- Optimum
- High
- Very high

Calcium to Magnesium ratio (Ca/Mg)



Range
- High : 5.84
- Low : 0.94

Iron (Fe) - mg/kg

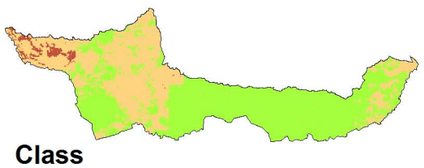


Class
- Very low
- Optimum
- Low
- High

Manganese Activity Index (MnAI)

Class
- High
- Very high

Zinc (Zn) - mg/kg



Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg

Class
- Optimum

Boron (B) - mg/kg

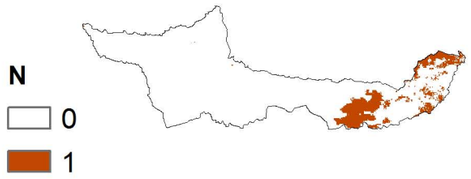
Class
- Very low
- Low

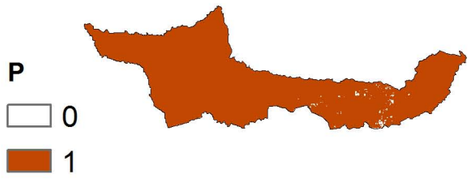
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

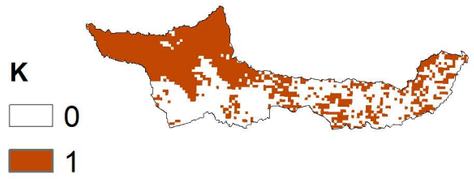
N

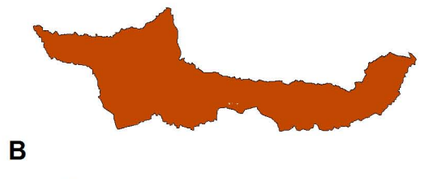
0 40 80 Km

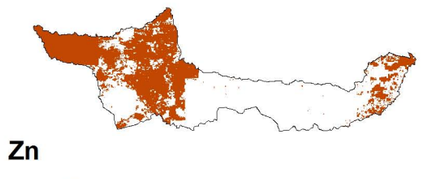
Fertilizer Type Requirement of Tsegede Woreda

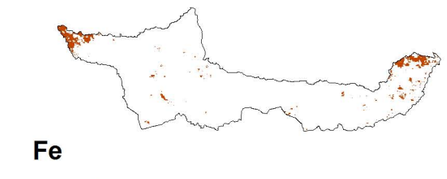












Four types of blended fertilizers are recommended for this woreda, of which, NPSB, NPKSZnB and NPKSB are the most dominant blends, respectively.

Blended Fertilizer Types

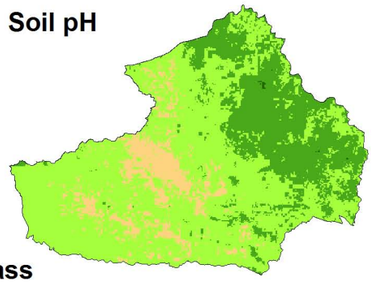
- NPSZnB
- NPSFeZn
- NPSB
- NPKSFeZnB

N

0 5 10 Km

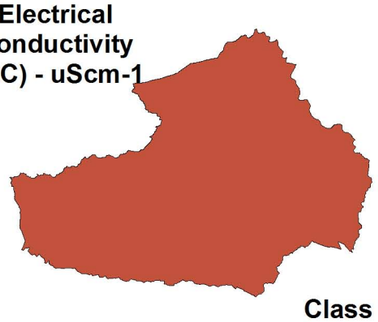
Soil Fertility Status of Welqayet Woreda

Soil pH



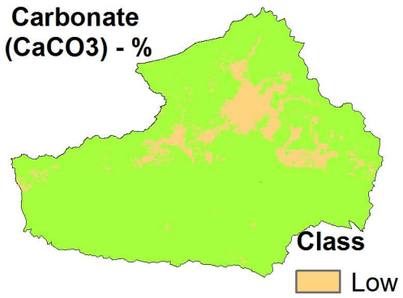
Class
- Mod. acidic
- Mod. alkaline
- Neutral
- Strongly alkaline

Electrical Conductivity (EC) - uScm-1



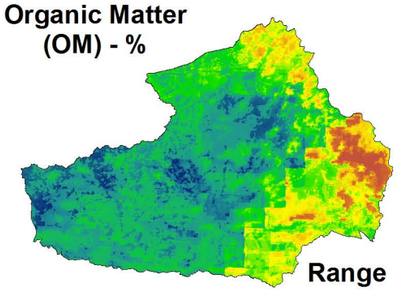
Class
- Salt free

Calsium Carbonate (CaCO3) - %



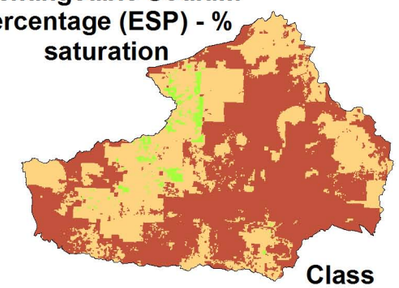
Class
- Low
- Optimum
- High

Organic Matter (OM) - %



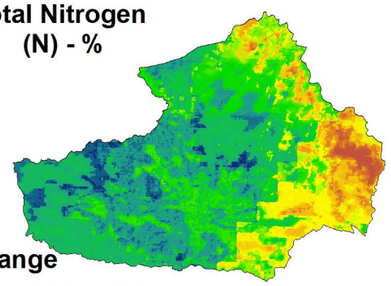
Range
- High : 5.21
- Low : 2.11

Exchangeable Sodium Percentage (ESP) - % saturation



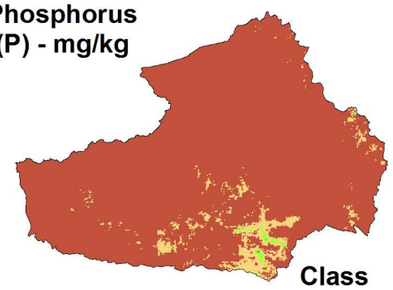
Class
- Very low
- Low
- Optimum

Total Nitrogen (N) - %



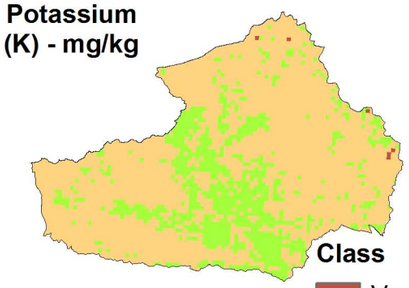
Range
- High : 0.28
- Low : 0.05

Phosphorus (P) - mg/kg



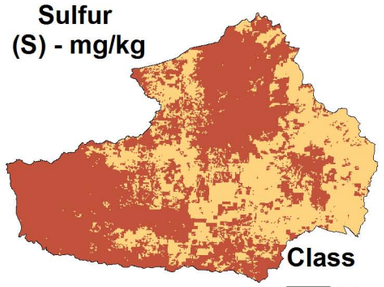
Class
- Very low
- Low
- Optimum
- High

Potassium (K) - mg/kg



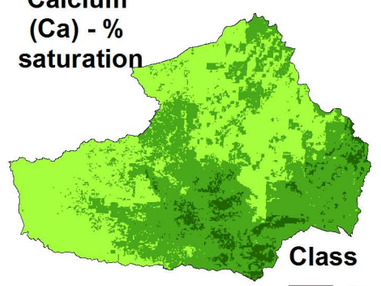
Class
- Very low
- Low
- Optimum

Sulfur (S) - mg/kg



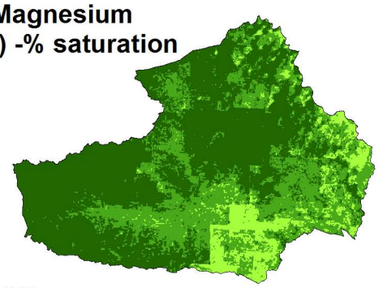
Class
- Very low
- Low
- Optimum

Calcium (Ca) - % saturation



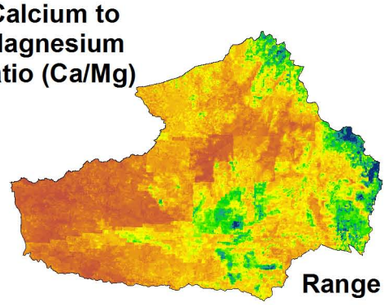
Class
- Optimum
- High
- Very high

Magnesium (Mg) -% saturation



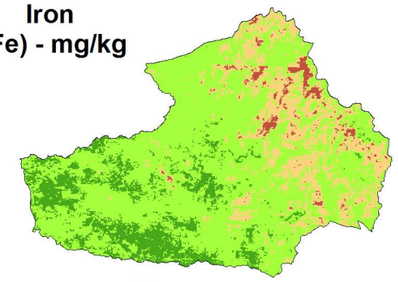
Class
- Low
- High
- Optimum
- Very high

Calcium to Magnesium ratio (Ca/Mg)



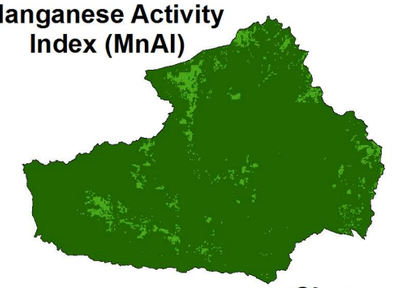
Range
- High : 12.6
- Low : 0.96

Iron (Fe) - mg/kg



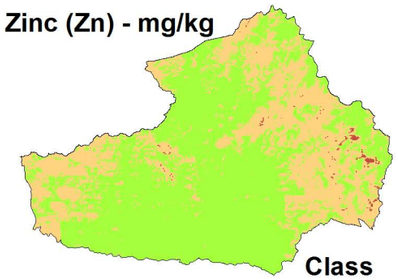
Class
- Very low
- Low
- Optimum
- High

Manganese Activity Index (MnAI)



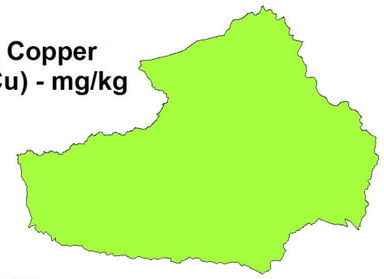
Class
- High
- Very high

Zinc (Zn) - mg/kg



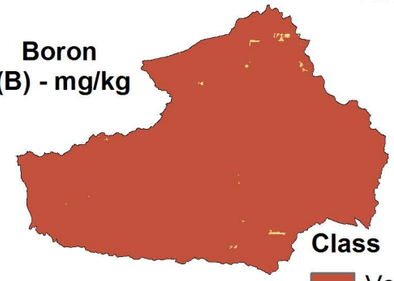
Class
- Very low
- Low
- Optimum

Copper (Cu) - mg/kg



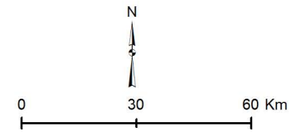
Class
- Optimum

Boron (B) - mg/kg

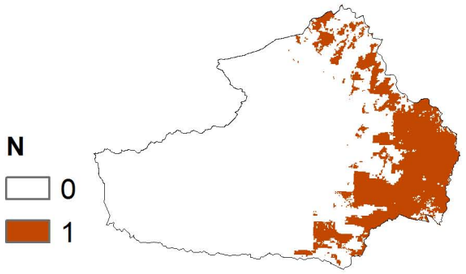


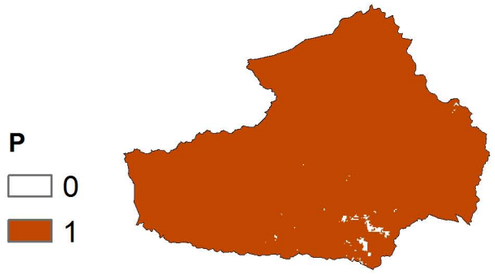
Class
- Very low
- Low

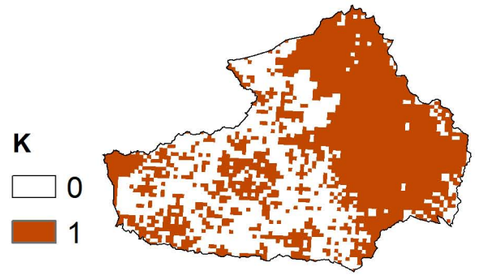
Seven soil nutrients were found to be deficient in the woreda. These are total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron.

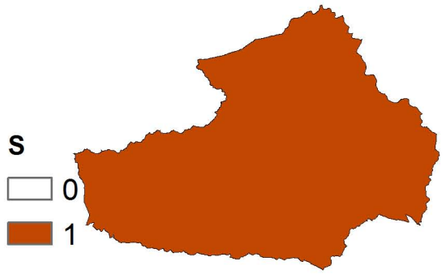


Fertilizer Type Requirement of Welqayet Woreda

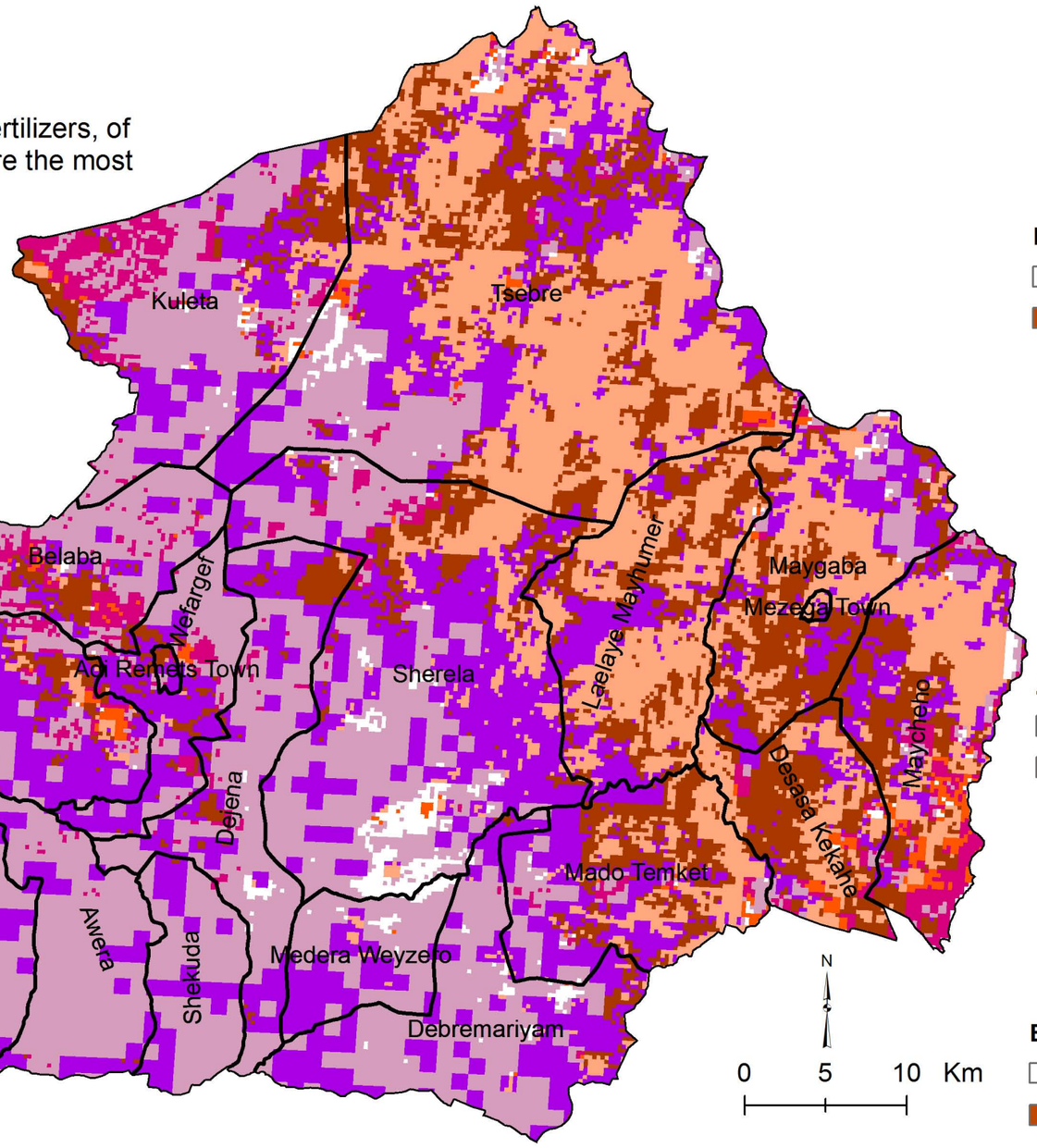


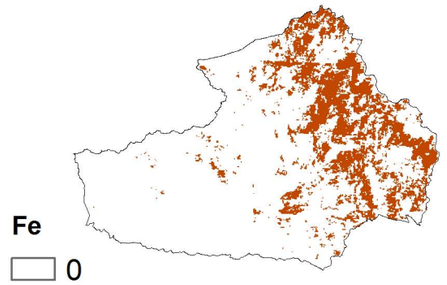


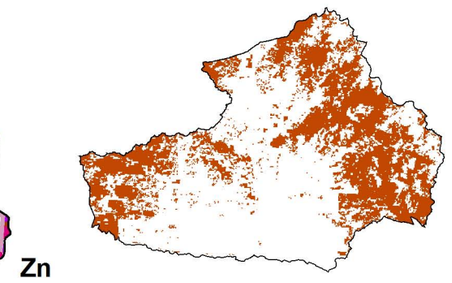


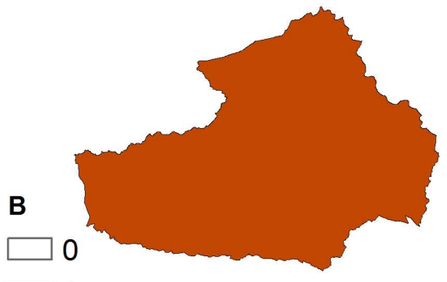


This woreda requires 6 types of blended fertilizers, of which, NPSB, NPKSB and NPKSFeZnB are the most dominant blends, respectively.

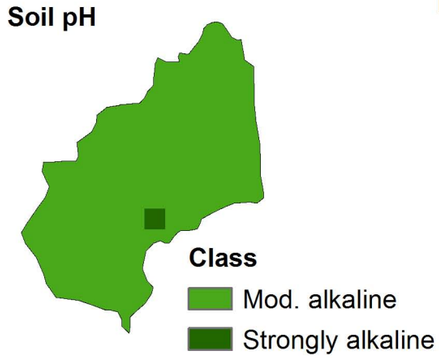


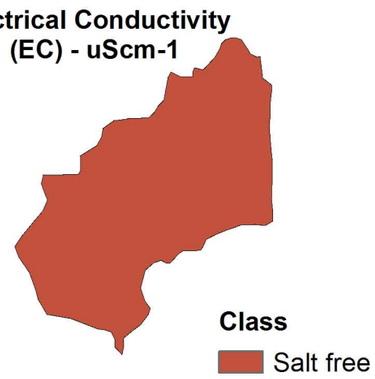


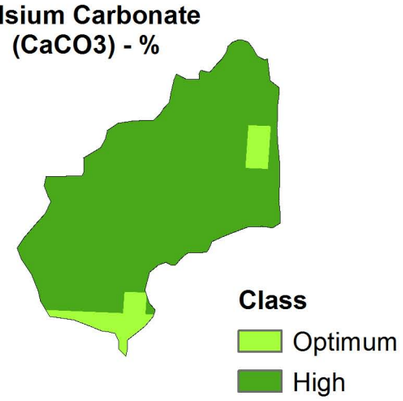


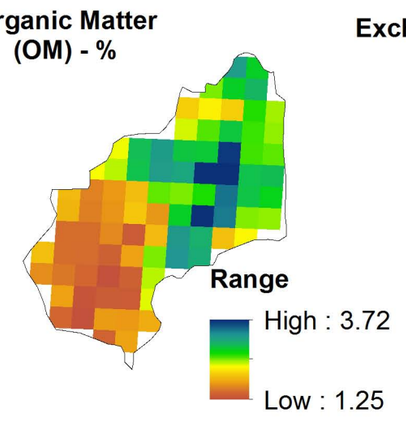


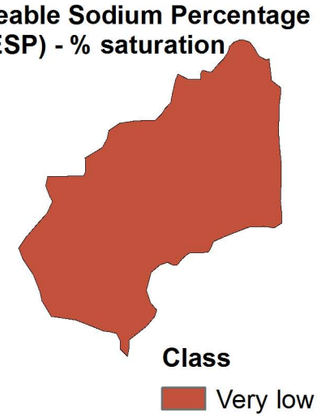
Soil Fertility Status of Quiha Woreda

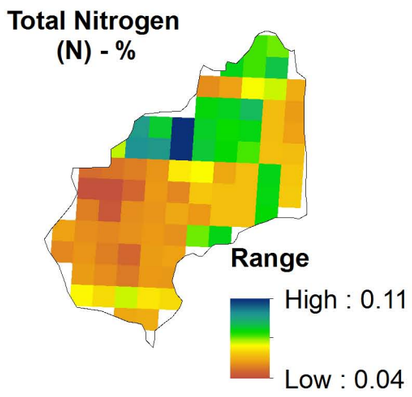


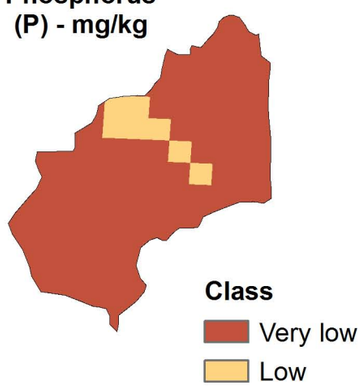


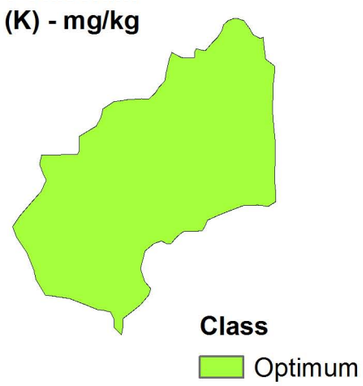


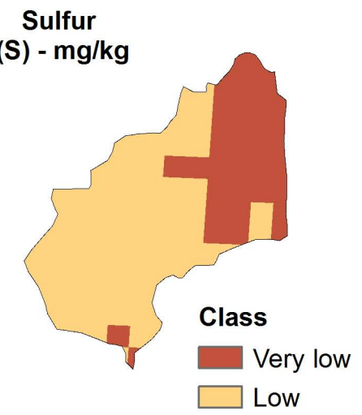


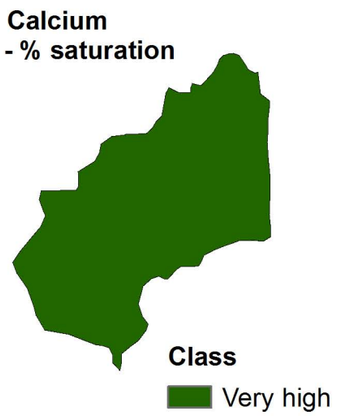


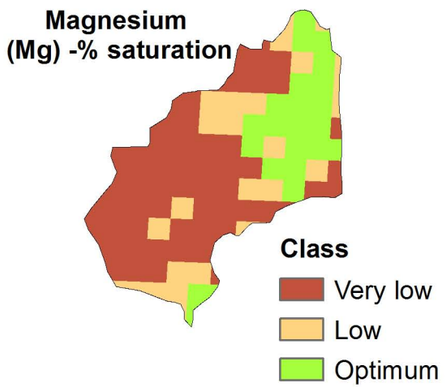


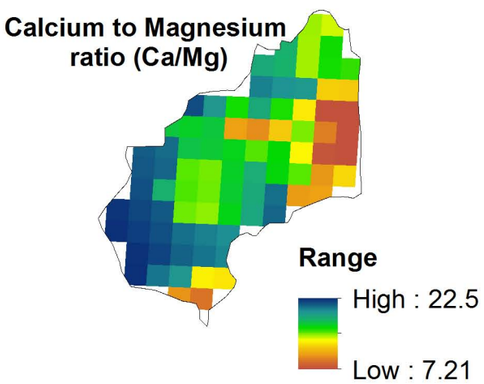


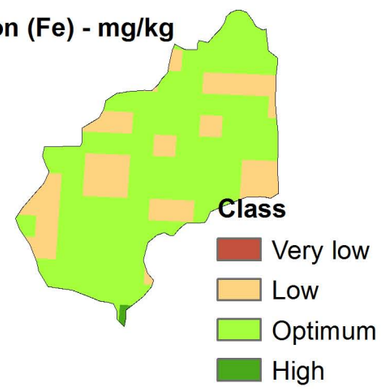


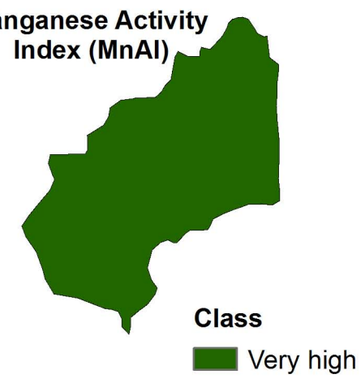


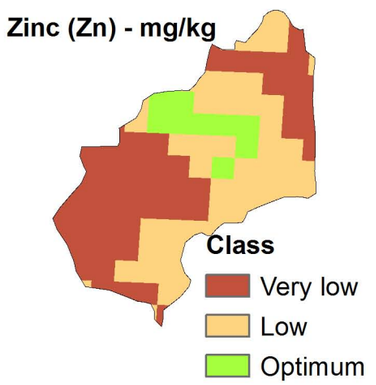


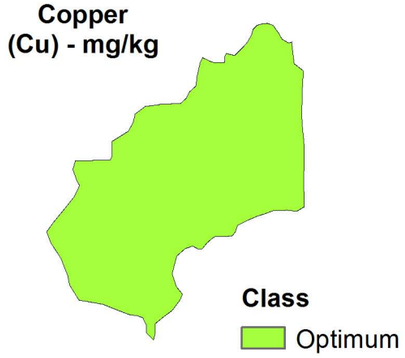


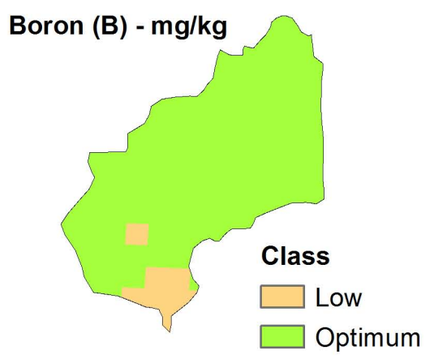




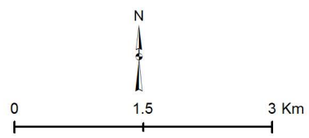




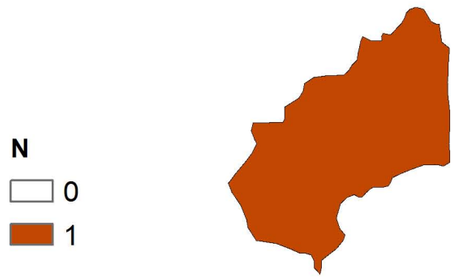


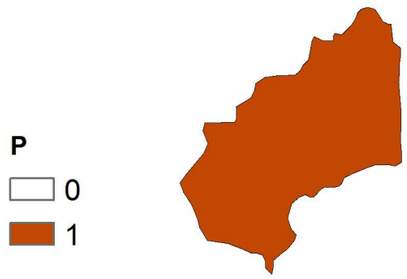


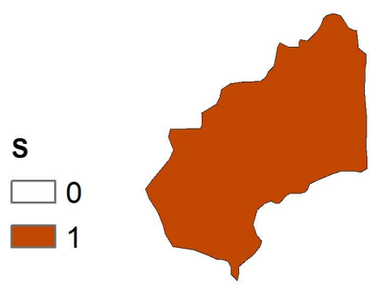
Total nitrogen, available phosphorus, exchangeable potassium, available sulfur, and extractable iron, zinc and boron were found to be deficient in the woreda.

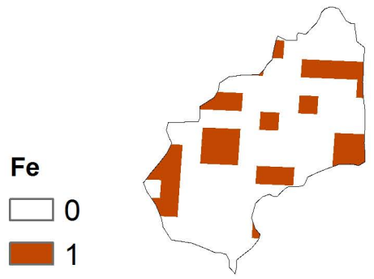


Quiha Woreda Fertilizer Recommendation

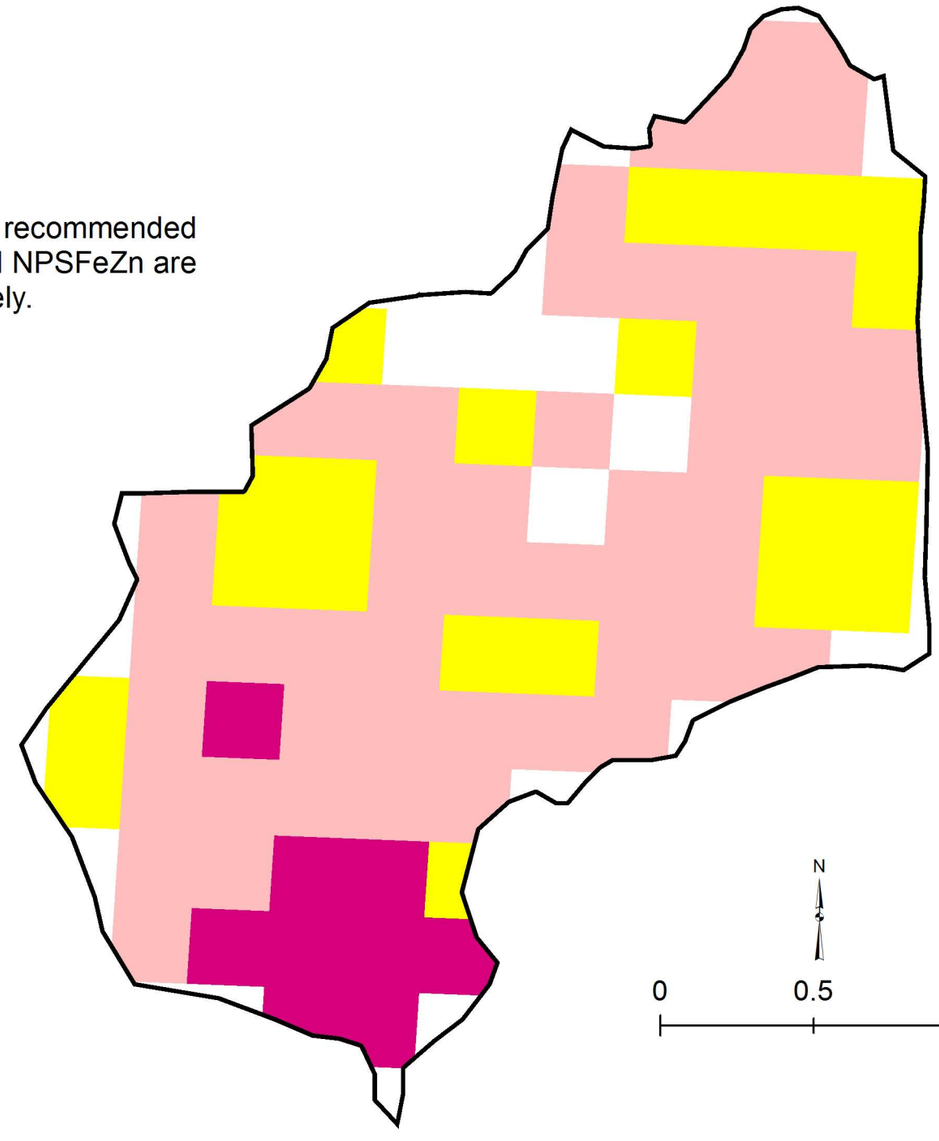


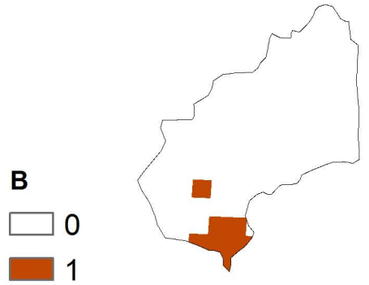






Three types of blended fertilizers are recommended for this woreda, of which, NPSZn and NPSFeZn are the most dominant blends, respectively.





Appendices

Appendix1. Critical levels used for classifying soil fertility parameters analysis results

Soil parameter	Status	Critical level adopted by EthioSIS	Soil parameter	Status	Critical level adopted by EthioSIS	Soil parameter	Status	Critical level adopted by EthioSIS
Soil pH (water)	Strongly acidic Moderately acidic Neutral Moderately alkaline Strongly alkaline	< 5.5 5.6 – 6.5 6.6 – 7.3 7.3 – 8.4 > 8.5	Exchangeable sodium percentage (ESP)	Very low Low Optimum High Very high	< 0.5 0.5 – 1.0 1.0 – 3.5 3.5 – 5 > 5	Copper (mg/kg)	Very low Low Optimum High Very high	< 0.5 0.5 – 0.9 1 – 20 20 – 30 > 30
Phosphorus (mg/kg)	Very low Low Optimum High Very high	0 – 15 15 – 30 30 – 80 80 - 150 > 150	Sulfur (mg/kg)	Very low Low Optimum High Very high	< 10 10 – 20 20 – 80 80 – 100 > 100	Boron (mg/kg)	Very low Low Optimum High Very high	< 0.5 0.5 – 0.8 0.8 – 2.0 2.0 – 4.0 > 4.0
Potassium (mg/kg)	Very low Low Optimum High Very high	< 90 90 – 190 190 – 600 600 – 900 > 900	Zinc (mg/kg)	Very low Low Optimum High Very high	< 1 1 - 1.5 1.5 – 10 10 – 20 > 20	Total nitrogen (%)	Very low Low Optimum High Very high	< 0.1 0.1 – 0.5 0.15 – 0.3 0.3 – 0.5 > 0.5
Calcium saturation Percentage	Very low Low Optimum High Very high	< 30 30 – 50 50 – 70 70 – 80 > 80	Iron (mg/kg)	Very low Low Optimum High Very high	< 60 60 – 80 80 – 300 300 – 400 > 400	Organic matter (%)	Very low Low Optimum High Very high	< 0.2 2.0 – 3.0 3.0 – 7.0 7.0 – 8.0 > 8.0
Magnesium saturation percentage	Very low Low Optimum High Very high	< 8 8 – 10 10 – 18 18 – 25 > 25	Manganese Activity Index (MnAI)	Low	< 25	EC ($mScm^{-1}$)	Salt free Very slightly saline Slightly saline Moderately saline Strongly saline	< 2 2 – 4 4 – 8 8 – 16 > 16

Sources: EthioSIS team analysis, 2014.

Appendix 2. List of covariates* and their definitions

No	Covariate name	Descriptions	No	Covariate name	Descriptions
1	BLUE	Blue Reflectance (Band 3) data set at 250m resolution for the continent of Africa, including long-term and monthly averages for the period between Jan 2000 and June 2012 (MOD13Q1)	13	MAT	Mean Annual Temperature (annual temperature)
2	BSAn	Black Sky albedo near infra-red	14	MIR	Mid-infrared (MIR) Reflectance (Band 7) data set at 250m resolution for the continent of Africa, including long-term and monthly averages for the period between Jan 2000 and June 2012 (MOD13Q1)
3	BSAs	Black Sky albedo shortwave	15	NDVI	Normalized Difference Vegetation Index, calculated from NIR and Red of spectral regions
4	BSAv	Black Sky albedo visible	16	NIR	Mid-infrared (NIR) Reflectance (Band 2 & 3) data set at 250m resolution for the continent of Africa, including long-term and monthly averages for the period between Jan 2000 and June 2012
5	CTI	Compound Topographic Index	17	NPP	Net Primary Productivity derived from satellite imageries
6	DEM /ELEV	Elevation is derived from Digital Terrain Model (DTM) of Shuttle Radar Topographic Mission (SRTM) of NASA at 90-m resolution	18	RED	Red band of spectral region
7	EVI	Enhanced Vegetation Index (EVI) data set at 250m resolution for the continent of Africa, including long-term and monthly averages for the period between Jan 2000 and June 2012	19	RELIEF	Calculated from elevation difference at a pixel level.
8	fPAR	fraction of Photosynthetically Active radiation	20	SLOPE	Derived from Shuttle Radar Topographic Mission (SRTM) of NASA at 90-m resolution
9	LAI	Leaf Area Index (LAI) data set at 1km resolution for the continent of Africa, including Long-term Average, Variance, and Standard Deviation for the period between Feb 2000 and June 2012 (MOD15A2)	21	WSAn	White Sky albedo near infra-red
10	LSTd	Land Surface Temperature (LST) Day data set at 1km resolution for the continent of Africa, including Long-term and Monthly Averages and Variance for the period between July 2002 and June 2012 (MYD11A2)	22	WSAs	White Sky albedo shortwave
11	LSTn	Land Surface Temperature (LST) Night data set at 1km resolution for the continent of Africa, including Long-term and Monthly Averages and Variance for the period between July 2002 and June 2012 (MYD11A2)	23	WSAv	White Sky albedo visible
12	MAP	mean Annual Precipitation (annual rainfall)			

Sources: Africagrid.net; NASA, NMA of Ethiopia

* They are categorized into four main types: Climatic factors; Reflectance; Topographic and Vegetation indices.

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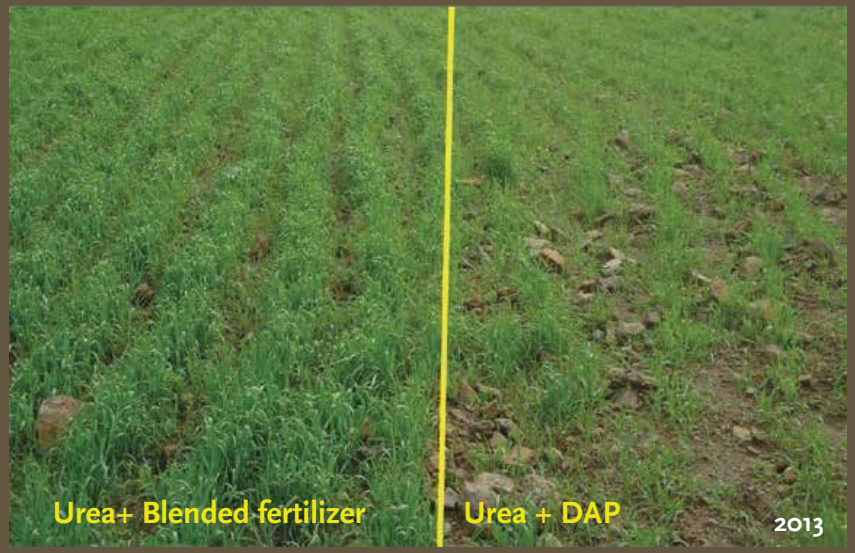
Ethiopia

One of the five Fertilizer Blending Plants at Tulu Bolo (owned by Becho Weliso Farmer's Cooperative Union)



Wheat planted with blended fertilizer in Enderta Woreda, Tigray

Tef planted with blended fertilizer in Enderta Woreda, Tigray

With balanced fertilization, maize could bear four productive cobs at Dabo Hana, Oromia