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Characterization and clarification research on the soil fertility status of Sakaldiha Block in Chandauli District of Uttar Pradesh's highway region.

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Abstract

The recently finished study is titled "Characterization and Comparative Study on Soil Fertility Status of Sakaldiha Block in Chandauli District of Uttar Pradesh." The investigation was finished in 2019. Winter. In the Sakaldiha block, soil samples were taken at three separate locations (0–15 cm). According to the established methods, the collected soil samples were processed and evaluated in the lab for various Physicochemical characteristics and readily available nutrients.to compare nutrient status differences in the Highway soil region and to investigate the relationship between pertinent soil characteristics and pertinent nutrients (NH-2). The soil in the Sakaldiha block of the Chandauli district has soluble salt levels that are safe and have no impact on crop germination. In terms of response, the soil is classified as neutral to slightly acidic. The soils in the study area have a limited variety of organic carbon. The soils in the study area have low to medium levels of phosphorus. Potassium was found to be in the intermediate to high range, while nitrogen ranged from low to high.The soils of the Sakaldiha block had sufficient levels of calcium and magnesium. All the soils under study had suitable Fe levels, although Mn, Cu, and Zn amounts varied from insufficient to sufficient. With the exception of Zn and Cu, areas close to highway regions exhibited slightly higher B.D., P.D. macro- and micronutrient values.

Keywords: Soil properties, Soil Fertility, Nutrient status, Calcium, Magnesium, Highway region.

1. Introduction

Soil is an essential part of an ecosystem that depends on several systems to support life and on socioeconomic growth. Today's soils have less capacity for production, and the amount that can be generated is limited by a number of intrinsic traits and agro-ecological conditions. Soil, which is vital for life to exist on this planet, is one of the most significant natural resources. Understanding the soil system is therefore the key to effective land use and environmental harmony.Physical, chemical, and biological degradation mechanisms are all involved in the degradation of soil quality for fertility, according to [1]. In developing nations like India, where the land-person ratio is quickly declining, the only way to meet the demand for agricultural production is to enhance agricultural productivity with little to no negative effects on the environment and sustainability. Sustainable farming depends on the characterization of soils for the assessment of the fertility state for a specific location or region. The key elements in soil that control fertility and agricultural productivity are nitrogen, phosphorus, potassium, sulphur, calcium, and magnesium. Due to inconsistent and insufficient fertiliser application combined with the poor reaction efficiency of other inputs, chemical fertiliser nutrients under intensive agriculture have seen a considerable reduction in reaction efficiency in recent years. It is common for nutritional availability to vary; some nutrients may not be present in sufficient quantities, while others might. Physical claims that chemical and biological processes cause soil quality to deteriorate in terms of productivity or fertility. Without using macronutrient fertilisers to address current imbalances, we are unable to boost agricultural productivity.[2].

Uttar Pradesh is the fourth-largest state in the nation by physical area, accounting for 10.41% of the nation's total area and having a 3, 42, 239 square km land area. It is situated in the southeast of the nation (provisional data from the 2012 Census) [3]. The predicted agricultural output for the nation is heavily reliant on the monsoon's prompt arrival. According to the current monsoon season rainfall pattern, the State received 1000 mm from the northeast monsoon and 650 mm from the southwest monsoon, compared to the 741 mm normal rainfall.The lack of precipitation has resulted in a shortage of groundwater. Plants are suffering as a result of the increasing wind speed and warmth. The ability to store water is insufficient in heavy soils. In general, the availability of organic carbon and the condition of the soil's nitrogen are minimal to moderate. In soil, there is a lot of potassium. This region's some parts also displayed deficiencies in microelements, particularly zinc. The current study's findings were helpful in identifying the micronutrient components that were deficient and, as a result, how efficiently fertilisers might be employed in the presence of those nutrients. District Chandauli was constructed from Varanasi in 1997. This process results in a gradual increase in the urbanisation trend over time. Since the urban sprawl of the primary city (Chandauli) and regional service centre (Block headquarters) has been affecting the land use and cropping pattern, the study is necessary to measure these changes. The project's objectives are to determine the factors that have contributed to changes in the land use and cropping patterns in the study area and to examine how these patterns have changed in the Chandauli district.[4].

Research area

District Chandauli is located in eastern Uttar Pradesh and is a part of the middle Ganga plain. It has a total area of 2441 square kilometres. It is situated between longitudes 83.00 and 83.24 east and latitudes 24.42 and 25.35 north. The Sonbhadra district in the south, Bihar state in the northeast and southeast, the Ganga River in the north-west and north, and Mirzapur district in the west serve as the political and natural boundaries of the research region. This region has a humid subtropical monsoon climate with a hard summer and a mild winter, according to Koppen's classification of climates. The majority of the yearly precipitation occurs between June and September, with the remaining amount coming from western disturbances during the winter [5]. The district is distinct.

It is widely acknowledged that using a car for transportation has harmful impacts on the environment and people's health [7]. Polycyclic aromatic hydrocarbons (PAH), heavy metals (HM), total petroleum hydrocarbons (TPH), and de-icing salts (DS) are the main contributors to the vast variety of contaminants produced by motor vehicles. The biological effects of PAH are known to be genotoxic, carcinogenic, and teratogenic [8–9]. PAH tend to assemble in the environment as a result of their low solubility, high hydrophobicity, and photochemical stabilityThe main source of PAH in relation to traffic is the incomplete combustion of fossil fuels. The abrasion of brake linings, asphalt roads, and rubber tyres all contribute to additional emissions [10]. In addition to cancer, HM's harmful impacts on human health include the capacity to worsen blood, neurological, and pulmonary conditions [11–12]. They are primarily released into the environment as a result of fuel combustion that contains Pb, tyre dust, asphalt pavement abrasion, radiator and brake corrosion, and vehicle body corrosion [13]. Due to their low oxidative leachability [14] and lack of microbial or chemical decomposition [15], HM exhibit great persistence in the environment.

Materials and Methods

Location

The town of Sakaldiha is located in the Chandauli district of the Indian state of Uttar Pradesh's Sakaldiha tehsil. The distance from Chandauli to the Pt. Deen Dayal Upadhyay station is 19.8 kilometres. The Chandauli district can be found between the latitudes of 24°56′ and 25°35′ in the north and the latitudes of 81°14′ and 84°24′ in the east. It is located about 30 kilometres east-southeast of Varanasi. On the state map of Uttar Pradesh, the location of the research area is indicated.

ANALYSIS OF SOIL SAMPLE

The lithosphere, the earth's outer layer of rock, and the atmosphere are separated by the soil. It also functions as the interface between the lithosphere and water bodies (hydrosphere), making it a component of the biosphere. The topmost weathered layer of the earth's crust, known as the soil, contains a variety of living things as well as the byproducts of their ageing and decomposition. The area of the earth's crust where plants are attached is another way to define it. The six main components of soil—inorganic matter, organic matter, soil organisms, soil moisture, soil solution, and soil air—make up this complicated system. Approximately, the soil is composed of 50–60% mineral materials, 25–35% water, 15–25% air, and a little amount of organic matter.

Sewage also contributes to significant soil contamination. Several diseases are caused in human beings due to pathogenic organisms prevalent in the soil. In order to determine the soil's quality, it is necessary that we investigate its physico-chemical characteristics. To determine its various properties, including pH, Electrical Conductivity, Phosphorus, Potassium, Sulfur, Carbon, and Boron, twenty representative samples were taken from various areas of the Kadi taluka [7]. The soil's physicochemical properties were studied, including its mechanical properties, pH, electrical conductivity, organic carbon content, availability of nutrients (N, P, K, S, Ca, Mg, Fe, Cu, Zn, and Mn), as well as its demand for lime.

Soil pH and Electrical conductivity

The soil's acidity or alkalinity is expressed by the soil's pH or soil reaction. The pH of the soil is a key factor since it impacts capacity. The pH range, which an acidic soil cannot exceed, was just 8.5 between the readings. Alkaline 6.5, Neutral 6.5-7.8 Alkali > 8.5 = 7.5–8.5. The electrical conductivity (EC) of aqueous soil is used to calculate the total amount of soluble salts in the soil. Extracts. Normal soil EC is 0.8 dsm-1, which is essential for crops that are sensitive to salt but not necessary for crops that can tolerate salt. The EC value is (0.4 -1.8 dsm-1), and the range is (1.6 -2.5 dsm-1, Injurious to most crops > 2.5 dsm-1.

Bulk density and Particle density

The tidy, dry pycnometer was taken and weighed on an electric balance. The soil was poured into the pycnometer to the top with a spatula. The weight of the pycnometer in the ground was then determined. After that, the soil was removed from the pycnometer. The identical pycnometer was placed in a burette and filled with water. Water was then drip-fed into the pycnometer from the burette until it was completely submerged. The burette reading will reveal the pycnometer's true volume. In order to weigh it, the pycnometer was taken off. Dry and spotless, it was. After being weighed, the pycnometer was filled with water. 10 g of oven-dried soil, 10 cc of water, and a beaker should be used. The air should be driven out of the mixture using heat. This soil is transported to the pycnometer using flushing water. The bottle's interior side of the neck was rinsed of the soil that was stuck to it using a pipette. I inserted the stopper, scrubbed the pycnometer's surface, allowed it to air dry, and then weighed it.

Water holding capacity of soil

The piper method was used to gauge the soil's water-holding capacity (1996). The inside base of the box was covered with filter paper that had the same diameter as the keen box, and the box was then weighed. Earth was put to the container over the filter paper. Twenty taps on the box filled the soil. After filling with earth, the upper surface was practically made horizontal with the use of a knife. The soil-filled box was then placed in a water-filled Petridis for an hour, after which the wet box was let to dry in an oven. The weight of the dried box was then determined. Finally, a filter paper the same size as the soil-filled box was also immersed in water for an hour.

Organic carbon

The amount of unreacted dichromate with ferrous ammonium sulphate was measured using chromic acid wet digestion to estimate the amount of organic carbon in the soil.

Available Macronutrients

Excess alkaline kmno4 and a distillation device were utilised to remediate 5g of soil using the alkaline kmno4 procedure. In the presence of NaOH, nascent oxygen created by kmno4 oxidised the organic matter (amino acids) in the soil, releasing NH3. The excess NH3 was then titrated with standard alkali after being distilled and absorbed in a known volume of standard acid (H2SO4) (NaOH). A 0.5M nahco3 solution was used to extract the soil's available phosphorus (pH 8.5(1954) was measured by combining the Kurtz method (0.03 NH4F+ 0.025 HCL (pH 3.5)-prepared by mixing 1.11 g of NH4F with 2.1 ml of concentrated HCL in 1 gallon) and the Watanabe ascorbic acid method. The potassium from the soil was extracted using a flame photometer to determine the amount of K in the extract after it was shaken with neutral normal ammonium acetate for five minutes at a constant temperature (250C) [8].

Available Sulphur

Soil was eliminated using a 0.15 percent calcium chloride solution. The amount of soluble sulphate in an extract sample was measured using barium chloride while gum acacia solution was also present. The barium sulphate-induced turbidity was identified at a wavelength of 420 nm.

Available calcium and magnesium

The calcium and magnesium were extracted from the soil by shaking a neutral, aqueous ammonium acetate solution for a brief length of time. The calcium and magnesium extract was then filtered. To determine whether the extract's colour changed from wine red to blue in the presence of ammonium chloride, ammonium hydroxide buffer solution, and Eri chrome black T indicator, a sample of the extract (typically 5 ml) was titrated against a standard EDTA solution.

Available micronutrients

The micronutrients Zn, Cu, Fe, and Mn were extracted using 0.005M diethylene triamine Penta acetic acid (DTPA), 0.01M calcium chloride dehydrate, and 0.1M Tri ethanol amine buffered at pH 7.3. A 20 ml DTPA solution was added to a 100 ml conical flask that held 20 g of soil. For two hours, it was shook horizontally. It was filtered using Whatman No. 42 filter paper, and the concentrations were measured using an atomic absorption spectrophotometer.

Methodology for Soil nutrients status evaluation

According to the nutrient index value calculated from the soil test summaries, which provided their percent distribution into low, medium, and high categories, the soils of the individual blocks were classified as a whole into the three fertility classes. The nutritious index is calculated using the following formula: Nutrient index= [% in high category *3+ percent in medium category *2+ percent in low category *1] / 100 (1965; Mohr et al.).

In this percent assessment, a nutritional index of less than 1.5 denotes a poor category, and one between 1.5 and 2.5 denotes a medium fertility class. For a given nutrient, a value of 2.5 and higher (up to 3.00) indicates a high fertility class.

Statistical Analysis

The data from each observation were statistically analysed. Every soil parameter's range, mean, standard deviation, and coefficient of variation were calculated along with correlations between other numbers.

Result and Discussion

Physicochemical properties of soil.

Table 4.1 contains data on pH, EC, B.D., P.D., W.H.C., and organic carbon. The data reveals that these soils had a pH range of 6.1 to 7.9, with an average of 6.6. The soils in the village of Dhaus Khas had the lowest pH (6.1), while the soils with the highest S.D. values (0.541614 and 7.72 percent) had the highest pH (7.52). (7.9).

A moderately acidic pH was present in 13% of the communities (out of 60), while a reactive neutral pH was present in 87%. The soils were transitioning from a mildly acidic state to a neutral state. In the lower Shivaliks in the Solan region of the North West Himalayas, a similar outcome was seen. The Sakaldiha and Niyamtabad blocks had an average electrical conductivity of (0.8 -2.0) dsm-1. The lowest and highest ECs, respectively, were recorded in the villages of Alampur (EC = 0.8) and Akabalpur (EC = 2.0), both of which had S.D. values of 0.317438 and C.V. values of 20.21896 percent. Salt is not detrimental to seed germination because the vast majority of soil tests are within a permissible level. Of the 60 communities, 13% were marginally acidic, whereas 87% were reactively neutral. The soils were moving toward neutrality after being moderately acidic. Similar findings were observed in the lower Shivaliks in the Solan region of the North West Himalaya. The Sakaldiha and Niyamtabad blocks' electrical conductivity had a range of 0.8 to 2.0 dsm-1, with an average value of 1.03 dsm-1. Akabalpur village had the highest EC (2.0), whilst Alampur village had the lowest EC, both with S.D. values of 0.317438 and C.V. values of 20.21896 percent (0.8). Because the vast majority of soil tests fall within an acceptable range, salt does not inhibit seed germination. The sample from Rahmatnagar had the lowest water retention capacity (23%) whereas the sample from Reusa had the highest (43 percent).

The percentage of organic carbon data ranged from 0.2 to 1.2, with a mean value of 0.558. The S.D. value of organic carbon was 0.182 and the C.V. value of organic carbon was 32.597 percent, respectively, with the soils of Awati village having the highest value (1.00) and Bahadurpur village having the lowest value (0.20).

Status of available N, P, K of Sakaldiha block in soil.

The status of N, P, and K have been shown in and its subparts. With a mean of 155.12 kg ha-1, the available N concentration in these soils ranged from 150.52 to 188.16 kg ha-1. The lowest nitrogen content (150.52 kg ha-1) was found in the soils of the villages of Alampur, whereas the highest nitrogen content (188.16 kg ha-1) and maximum S.D. and C.V. values were found in the soils of Basani.

In the Sakaldiha block, out of 60 soil samples collected from 60 settlements, 25% were found to have low quality, while 58% were determined to have medium quality. The use of nitrogen fertiliser, green manures, or bio fertiliser may have contributed to the majority of soil samples falling into the medium group. The availability of nitrogen is significantly impacted by the climate.

The available phosphorus content in these soils ranged from 4.61 to 22.5 kg ha-1, with a mean value of 14.19 kg ha-1. Phosphorus concentrations ranged from 4.6 kg ha-1 in the village of Dhoos Khus to 22.5 kg ha-1 in Adampur, with a S.D. value of 3.41 and a C.V. value of 24.03 percent.

Out of the 60 soil samples that were collected, 11.6 percent were found to have low phosphorus contents, and 88.4 percent were found to have medium phosphorus contents. These findings are consistent with information that has been made public regarding soils in the Baloda block of the Janjgir district and a few soils in Rajasthan [9].

The potassium concentration in these soils ranged from 258.5 to 348.75 kg ha-1, with an average value of 308.65 kg ha-1 K. The soils in Patina exhibited the lowest K values (226.5 kg ha-1), whilst the greatest K values (348.75 kg ha-1) were found in Avahi village, with S.D. values of 26.35 and 8.53 percent.

Out of 60 soil samples, none had potassium levels that were low, 81.7 percent were medium, and 18.3 percent had levels that were high. The higher value for K may be due to the soils' elite potassium-rich minerals or to severe weathering that liberated K for the soils' mineral exchange site.

Status of Available secondary macronutrient viz. S, Ca, Mg in soil of Sakaldiha block.

The availability of S exchangeable Ca2+, Mg2+, and soils in block of Chandauli district is detailed in Table 1.3 and its subparts. The available sulphur contents in the soils of the Sakaldiha block ranged from 3.6 to 19.18 kg ha-1, with an average value of 10.91 kg ha-1. The sulphur content of the soils in Adampur was the lowest (3.16 kg ha-1), while that of the soils in Katsila village was the greatest (19.18), with a S.D. value of 4.87 and a C.V. value of 44.61 percent. In the soils of Sakaldiha Block, 40% of the soil samples were found to have low levels of sulphur, while 60% were found to have medium levels.These soils contain a moderate amount of sulphur, which may be due to the application of complicated fertilisers high in sulphur. According to the data, the exchangeable Ca2+ content in these soils ranged from 3.2 to 8 Cmol (P+) kg-1, with an average of 6.38 Cmol (P+) kg-1. The range of exchangeable Ca2+ in the soils of Braga village was the smallest (3.2 Cmol (P+) kg ha-1), whereas the range in the soils of Ajagra village was the highest (8 Cmol (P+) kg ha-1), with S.D. values of 1.81 and 33.94 percent. It was found that all soil samples contained an adequate amount of easily accessible calciumIt can be as a result of utilising calcium-rich fertiliser or adding lime to the soil in the research area. The exchangeable Mg2+ concentration in the soils of the Sakaldiha block ranged from 0.75 to 4.2 Cmol (P+) kg-1, with a mean value of 2.74 Cmol (P+) kg-1. Braga village had the largest quantity of exchangeable Mg2+ (4.2 Cmol (P+) kg-1) with a S.D. value of 0.93 and a C.V. value of 33.94 percent, while Faguia village had the lowest amount (0.75 Cmol (P+) kg-1). It has been determined that all of the soil samples collected from the sixty settlements contain an adequate amount of magnesium.

Status of micronutrients viz. Fe, Zn, Mn and Cu in Soil of Sakaldiha block.

With the use of high fertiliser and high yielding crop varieties under intensive cropping systems, micronutrient deficiencies in soils are becoming more common at a faster rate. This trend has also been accelerated by the use of these practises. Monitoring soils for Fe, Zn, Mn, and Cu has therefore become essential.

According to the information in table 1.4 and its subparts, the available Fe content of these soils ranged from (55.87-149.6 mg kg-1), with an average value of 31.47 mg kg-1. Similar results were found in 2012 [9]. The hamlet Jagdishpur had the greatest value (149.6 mg kg-1), with a S.D. value of 43.08 and a C.V. value of 136.89 percent, while the village Amara had the lowest value (55.87 mg kg-1). Out of 60 soil samples, 80% were deemed to be adequate, whereas 20% contained too much iron. The Sakaldiha block has a lot of iron in its soil because of its topography. Because iron-bearing minerals in most soils release the iron that crops require, most soils do not lack iron. Fe's accessibility

The Available Mn concentration of these soils ranged from 42.46 to 88.02 mg kg-1, with a mean value of 63.77 mg kg-1. The results are consistent with manganese-bearing minerals existing as a potential explanation for the greater Mn content in the soil of the Sakaldiha block. The lowest Mn value was found in Amawal village (42.46 mg kg-1), while the highest content value was found in Lauda village (88.02 mg kg-1), with a S.D. of 13.42 mg kg-1 and a C.V. of 21.05 percent. Out of 60 soil samples, it was determined that 23.33 percent were insufficient, 28.34 percent had high manganese concentrations, and 48.33 percent were adequate for their range [10].

The accessible Cu values of the Sakaldiha block soil ranged from 0.24 to 11.94 mg kg-1, with an average value of 5.25 mg kg-1. According to the results, the hamlet of Balipur had the highest concentration of copper (11.94 mg kg-1) and the lowest (0.24 mg kg-1) with a S.D. value of 2.21 and a C.V. value of 42.15 percent. Out of the total soil samples collected from 60 villages, 15% were declared sufficient, 81.67% were found to have high copper levels, and 3.33 percent had low copper levels [9].

The results showed that the accessible Zn concentration in the soils of Saakaldiha ranged from 0.338 to 7.546 mg kg-1, with a mean value of 2.16 mg kg-1. reported outcomes that were comparable. The Zn deficit diminished and pH rose as organic matter grew. Similar findings were made by Takkar et al. (1977) and Jatav and Mishra (1977). (2012). The Zn concentration ranged from 0.338 mg kg-1 in Bansipur to 7.456 mg kg-1 in Jalsapur village, with a S.D. value of 1.59 and a C.V. value of 73.58 percent. 60 soil samples were tested, and it was found that 58.33 percent of the samples lacked sufficient Zn, 33.33 percent of the samples had sufficient Zn, and 8.34 percent of the samples had excessive Zn contents [9].

Nutrient Index of Soils of Sakaldiha block.

The available macronutrients (N, P, and K), secondary nutrients (S, Ca, and Mg), and micronutrient cations (Fe, Zn, Cu, and Cu) in the Sakaldiha block of the Chandauli district are listed in Table 1.5 below.

The soil in the Sakaldiha block had "Low" for S and "Medium" for N, P, and K on the "nutrient value index." Nitrogen, phosphorus, potassium, and sulphur each have values of 1.98, 1.78, 2.18, and 1.20 on the nutrient index, whereas the values for fertility status are 1.5 for low, 1.5 to 2.5 for medium, and >2.5 for high. Each of the following nutrients had a nutritional index value of 1.0, 6.16, 1.81, 0.92, and 2.75: calcium, magnesium, iron, manganese, and copper. The nutritional index for zinc has risen to the "High" range. Zn has been assigned a nutritional index score of 2.75.

On the analysis various parameters of Highway Area following difference were seen.

The pH value of industrial area land is approximately 7.28. The greater pH of the soil may be caused by the use of fertiliser and continuous cropping, whereas the lower pH may be caused by Hihway raw materials. The median EC values in the highway area are 1.7, respectively. There is no observable difference The measured amount of soil from the highway area was 1.24 Mg m-3. The particle density varies between 2.23Mg m-3, 2.32Mg m-3, and 2.29Mg m-3, with the WHC showing findings of 31.63 percent, 32.10 percent, and 33.75 percent. It is essentially equivalent. Highway area for OC has a documented value of 0.42. OC in the Highway area because of agricultural cultivation. In 308.25, 302.06, and 320.66 kg ha-1, respectively, S, Ca, and Mg exhibit change as a result of farming and the highway. All sample locations were noted at 4.76.5.91, 13.42, 6.51, 6.59, 2.49, and 3.48 Cmol (P)+ kg-1, respectively. S, Ca, and Mg levels are elevated as a result of highway trash deposition. Fe, Mn, Zn, and Cu contents in industrial land were found to be 76.76, 64.16, 2.51, and 6.16 in 89.61, 66.14, 1.74, and 7.76 respectively. Nearly all metrics are high in industrial locations because of the contaminants from highways that have accumulated on the soil.

Table 1.1: Physical properties and characteristics of soil of Sakaldiha Block

Soil characteristics	Range	Mean	S.D	C.V. (%)
PH (1:2.5, soil water)	6.1 – 7.9	7.00	0.5416	7.726488
E.C. (ds m^{-1})	0.8 – 2.0	1.57	0.3174	20.21896
B.D (Mg m^{-3})	1.12- 1.42	1.4	0.0236	4.067498
P.D (Mg m^{-3})	2.00 – 2.89	2.23	0.1290	116.0092
W.H.C (%)	23 – 43	32.49	3.9984	12.30478
O.C. (%)	0.2 – 1.02	0.558	0.182000893	32.59728

Table 1.2: Status of available primary macronutrients in soil of Skaldiha block.

Soil characteristics	Range	Mean	S.D.	C.V.
Available N (kg ha^{-1})	150.528 - 188.16	155.1213	15.70	10.12
Available P (kg ha^{-1})	4.6 - 22.5	14.19	3.41	24.03
Available K (kg ha^{-1})	258.5 - 348.75	308.65	26.35	8.539

Table 1.3: Status of available secondary macronutrient viz. S, Ca, Mg in soils of Sakaldiha block

Soil Characteristics	Range	Mean	S. D	C.V
Available S (kg ha^{-1})	3.6 - 19.18	10.91	4.87	44.61
Available Ca(Cmol(P^+)kg^{-1})	3.2 – 8.0	6.38	1.81	28.37
Available Mg (Cmol (P^+)kg^{-1})	0.75 - 4.25	2.74	0.932757	33.94

Table 1.4: Status of available micronutrient viz. Fe, Zn, Mn, Cu in soils of Sakaldiha

Soil Characteristics	Range	Mean	S.D.	C.V.
Available Fe (mg kg^{-1})	55.87 - 149.6	31.47	43.08	136.89
Available Mn (mg kg^{-1})	42.46 - 88.02	63.77	13.42	21.05
Available Cu (mg kg^{-1})	0.24 - 11.94	5.25	2.215	42.15
Available Zn (mg kg^{-1})	0.338 - 7.546	2.16	1.59	73.58

Table 1.5: Nutrient Index value of recorded nutrients showing soil fertility analysis present in Sakaldiha block of Chandauli district.

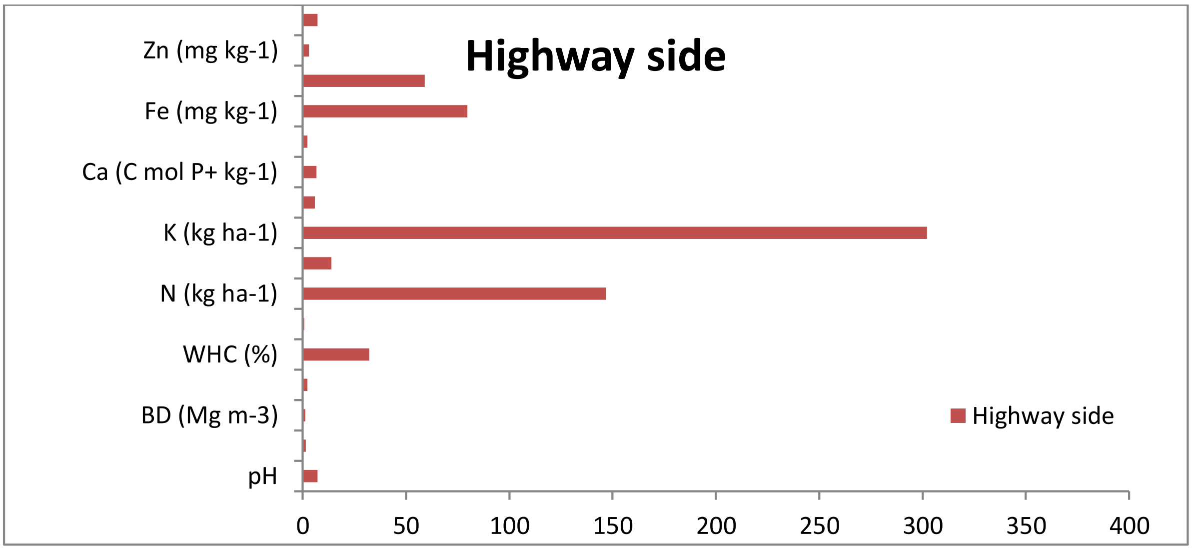
S.No.	Available Nutrient	NIV	Category
1	Nitrogen	1.89	Medium
2	Phosphorus	1.78	Medium
3	Potassium	2.18	Medium

4	Sulphur	1.20	Low
5	Calcium	1.0	Low
6	Magnesium	1.0	Low
7	Iron	6.16	Medium
8	Manganese	1.81	Low
9	Copper	0.92	High
10	Zinc	2.75	High

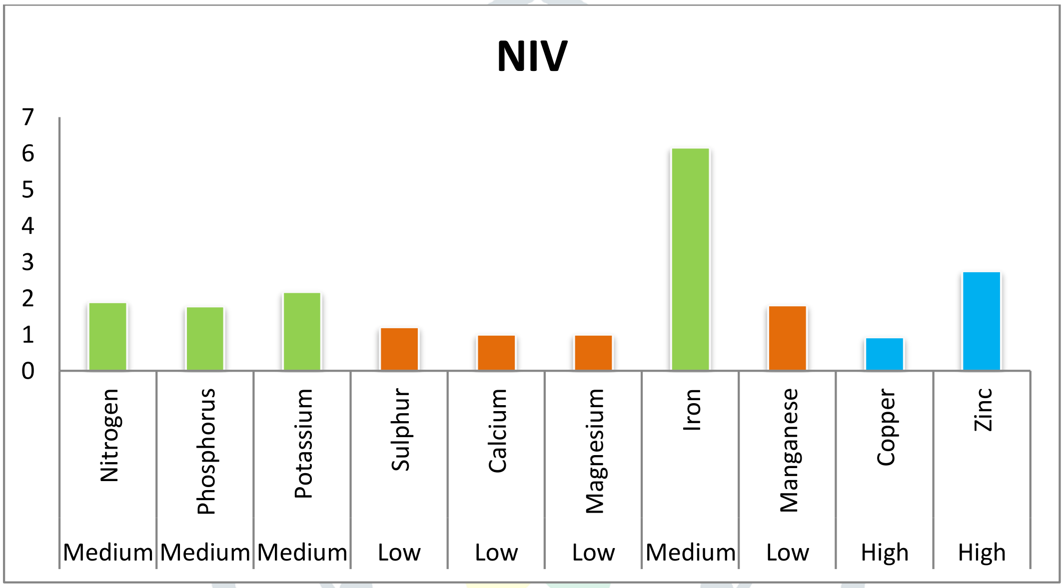
Table 1.6: Comparison between soils of highway area of Sakaldiha block in Chandauli district.

Sr. No	Parameter	Highway side
1	pH	7.28
2	EC (dsm^{-1})	1.60
3	BD (Mg m^{-3})	1.30
4	PD (Mg m^{-3})	2.32
5	WHC (%)	32.1
6	OC (%)	0.61
7	N (kg ha^{-1})	146.76
8	P (kg ha^{-1})	13.79
9	K (kg ha^{-1})	302.06
10	S (kg ha^{-1})	5.91
11	Ca (C mol P^{+} kg^{-1})	6.59
12	Mg (C mol P^{+} kg^{-1})	2.24
13	Fe (mg kg^{-1})	79.67
14	Mn (mg kg^{-1})	59.03
15	Zn (mg kg^{-1})	3.07
16	Cu (mg kg^{-1})	7.169

Graph 1.1: Nutrients present in soils of Highway area of Sakaldiha block in Chandauli district.



Graph 1.2 Nutrient Index value of Sakaldiha block of Chandauli district.



Conclusion: The soluble salt level of the soil in the Sakaldiha block of the Chandauli district is within a safe limit and has no effect on crop germination. The soil is categorised as neutral to slightly acidic in reaction. The research area's soil has an average level of organic carbon. The soil in the research area has a low to medium phosphorus level. Nitrogen ranged from low to high, whereas potassium was revealed to be in the middle to high range. The amount of calcium and magnesium in the Sakaldiha block's soil was adequate. Fe levels were adequate throughout the soil in the study region, although Mn, Cu, and Zn contents ranged from insufficient to sufficient. In regions near industries, the B.D., P.D., macronutrient, and micronutrient values are somewhat higher. According to our research, residents of highway-side soil and farmers whose livelihoods are entirely dependent on agriculture can ensure that their seeds will germinate and proceed with cropping in order to avoid disease and field destruction. The important macronutrients and micronutrients contained in the soils of highway side soil were analysed in our research to improve the human food supply and to show the

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Disclosure of conflict of interest

There is no conflict of interest in this work, according to the authors.

Statement of informed consent

All individuals taking part in the study gave their informed consent.

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