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Characterization And Evaluation Of Micronutrients And Macronutrients In Soil Of Durg Dist. Chhattisgarh, India

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Abstract: -

Soil pH, electrical conductivity (EC), natural carbon (OC), accessible nitrogen (N), phosphorus (P), potassium (K), and micronutrients (Fe, Mn, Cu, and Zn) all play a role in a physicochemical investigation. Five representative samples' alkalinity content, pH, electrical conductivity, organic carbon, sodium, and potassium were investigated. At depths ranging from 0 to 20 cm, five soil samples were collected and analyzed for neutral to slightly alkaline soils. The value of the soil ranged from 6.75 to 7.68, with conductivity ranging from 0.201 to 0.288 dSm1, natural carbon ranging from 0.57 to 1.70 percent, the range of iron (Fe) ranging from 8.062 to 16.700 percent, and potassium ranging from 28.49 to 75.87 percent. Among the enhancements, available Nitrogen was seen as 150.52 to 250.88 kg/ha, Phosphorous was going from 11.64 to 22.84 kg/ha. With this information, the farmers will be able to figure out how much fertilizer to put in the soil to produce.

KEYWORDS: - Quality of Soil, EC, PH, OC, Rasmada

Introduction

The most fundamental step in any soil analysis is probably soil testing. It is a one-of-a-kind normal body that was created by pedogenic processes during the enduring of rocks [1]. It is the typical vehicle for the growth of land plants, which is why it has such traditional significance. Soil is the unconsolidated material of the outer layer of the planet in which land plants can grow. If there is enough water and temperature, at least the base nutrients can be found there, and poisonous substances have a low fixation. According to Joffe (1949), [2] it is made of minerals and natural components, and it has distinct physical, synthetic, and organic properties that vary in depth. Over the outer layer of earth gives a sensible medium to lay out improvement. Soil generally contains half pore space (air and water) and half solid stage. Natural components and 45 percent mineral matter make up the majority of the soil stage.

One of the correspondences is in charge of managing the soil in Rasmada Village. Five areas of Rasmada Village received soil tests. Soil quality features like pH, Electrical Conductivity (EC), Complete Natural Carbon, Accessible Nitrogen (N), Accessible Phosphorus (P2O5), and Potassium (K2O) are all examples. not entirely established by conventional methods.

Soil assessment can additionally foster yield proficiency and breaking point wastage of these enhancements thus restricting impact a biological provoking inclination through ideal creation. Misses the mark on, assistant and micronutrients have been seen in serious created districts. Several states, including Andhra Pradesh, Gujarat, Haryana, Karnataka, and Uttar Pradesh, have made significant progress in their soil testing programs in a variety of ways. These developments include the establishment of soil testing offices, the campaign-style promotion of the program, the development of maps of soil fruitfulness, and the use of data innovation to inform ranchers about the state of soil supplementation and the best proposal. The purpose of this succinct edition is to compile the current state-by-state status of soil testing facilities and to summarize the main concerns with soil testing programs.

A second sample of soil was taken for testing in the industrial areas of Rasmada. The physicochemical properties, such as the percentage of moistness, express gravity, pH, and Mg2+, Na+, K+, and Cl-, HCO3-, PO43-, and NO3- in the soil, were particularly taken into consideration. The concentration of P, K, organic and inorganic materials, water, and other elements have an impact on the soil's fertility. Nitrogen, a component of chlorophyll, plant protein, and nucleic destructive, is necessary for plant growth. Phosphorous is an ordinary limiting enhancement that is at this point present in plant nucleic destructive, which stores energy. It supports energy move. Potassium is found in its mineral plan and effect spreads out all division, carb improvement, advancement of Sugar, different compound development and security from unequivocal plant sickness, more than 60 proteins are known to require potassium for beginning. The amount of nutrients already present in the soil determines how many more must be added for crops to grow. Today, fertilizer application is based on STR (Soil Test Recommendation), in which major nutrients (P, K) are measured using standard techniques prior to sowing. In terms of the supplements it contains, their qualities demonstrate whether the soil is of high, medium, or poor quality. It is now recommended to add this amount to the soil [5,6]. The amount of nutrients required for the subsequent crop is used to calculate the contents of these nutrients. One of the correspondences watches out for the idea of the dirt in Rasmada. In Rasmada towns, soil samples were taken from five distinct regions. The pH, conductivity, and total organic carbon of the soil are just a few of the variables taken into account in the physicochemical investigation. Standard methods were used to calculate the quantities of nitrogen (N), phosphorus (P2O5), and potassium (K2O) that were readily available. According to the findings, the richness record for Rasmada soil is consistent with the soil's readily available phosphorus.

The translation of the potential climate impact of delicate supplements like phosphorus is not the goal of this framework. The sole reason for this understanding framework is to decide if the ongoing soil is appropriate for crop creation in agriculture or agronomy. Even though the availability of nutrients may have a significant impact on the likelihood of negative effects on the environment, this is only one aspect of the larger picture. Slant, ground cover, the joining of supplement sources, the timing of use, and other factors all affect the expected development of supplements off-site as well as their actual capacity for adverse climate impacts on surface and ground water [8, 9]. In cold environments, root development must occur quickly and early. Some harvests may benefit from a small amount of starter compost to energize this, regardless of whether the soil level is considered ideal or excessive.

Experimental Materials and Methods

In 2023 and 2024, five distinct locations in Rasmada town and the opposite side of the town—covering the north, south, east, and west—were selected for the quality test outline of the soil. A delegate soil test, the consequences of which address the dirt of four to five particular towns. Specialist soil tests were gathered in polythene sacks as per the quadric procedure. In accordance with guidelines for various soil parameters, these samples were examined in the laboratory. Reagents of the AR grade and twice refined water were used to complete the soil examination. The results were compared to standard values to determine whether the nutrients required for STR were low, medium, or high.

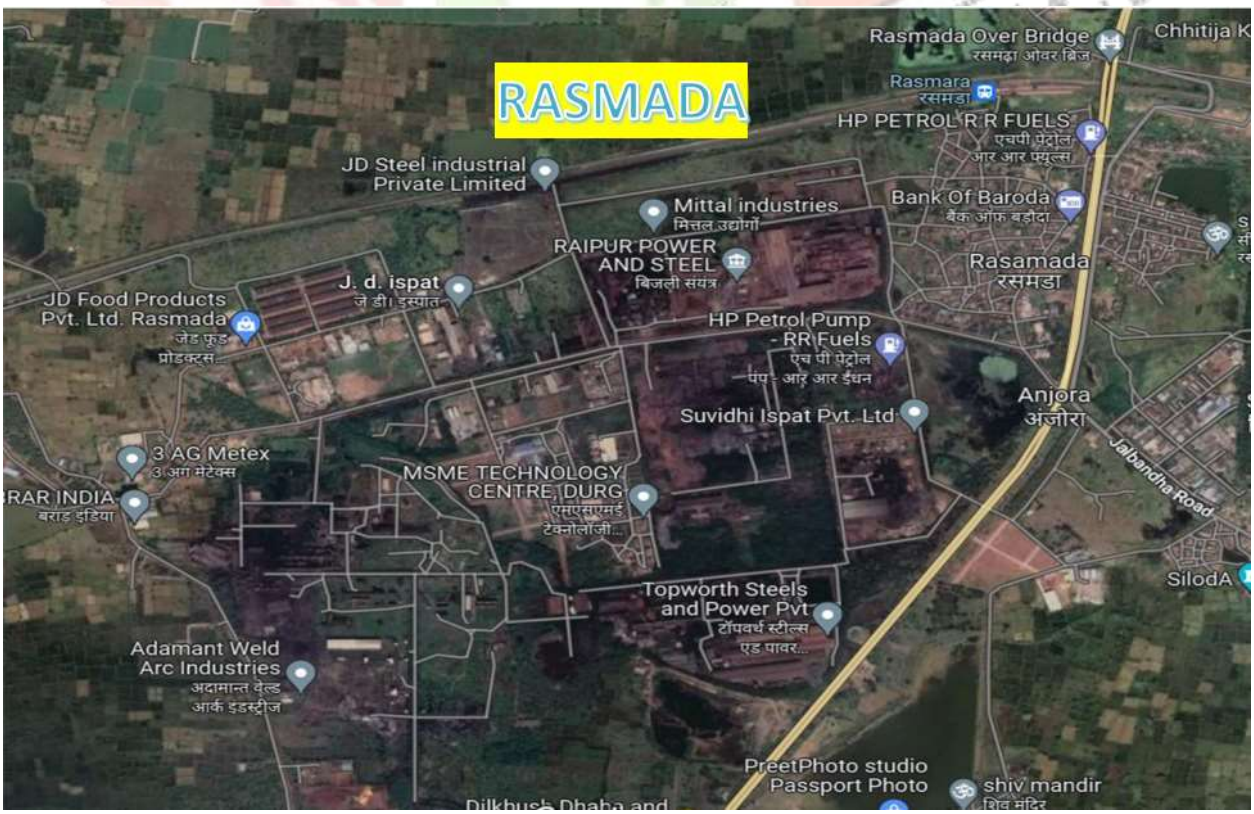


Table 1.1

Grade	pH		Pb	Cd	Cr	As	Hg
1	Not limited	≤	25.47	0.1323	75.00	9.10	0.1012
2	Not limited	≤	35	0.3	85	13	0.20
	<6.5	≤	50	0.3	120	25	0.25
3	6.5–7.5	≤	50	0.3	120	20	0.3
	>7.5	≤	50	0.4	120	20	0.35
	<6.5	≤	250	0.3	150	40	0.3
4	6.5–7.5	≤	300	0.3	200	30	0.5
	>7.5	≤	350	0.6	250	25	1.0
	<6.5	>	250	0.3	150	40	0.3
5	6.5–7.5	>	300	0.3	200	30	0.5
	>7.5	>	350	0.6	250	25	1.0

Element	Land use					
	Agricultural		Residential		Industrial	
	SQG[a, b]	SQGEH[c]	SQG[a, b]	SQGEH[c]	SQG[a, b]	SQGEH[c]
As	20	12	30	12	50	12
Ba	750	750	500	500	2,000	2,000
Co	40	–	50	–	300	–
Cu	150	63	100	63	500	91
Cr	750	64	250	64	800	87
Ni	150	50	100	50	500	50
Pb	375	70	500	140	1,000	600
Sb	20	–	20	–	40	–
U	–	23	–	33	–	300
Ta	1	1	–	1	–	1
Zn	600	200	500	200	1,500	360

SQG=Soil Quality Guidelines; SQGEH=Soil Quality Guidelines for Environmental Health

[a] Argentinean legislation (Law 24051)

[b] CCME (Canadian Council of Ministers of the Environment) (1991)

[c] CCME (2007)

Table 1.2

S. No.	Name Of Area	EC (ms/m)	pH	OC (in %)	P (kg/ha)	K (kg/ha)	N (kg/ha)	Fe (PPM)
1	2	3	4	5	6	7	8	9
1	North Area SS1	0.273	7.68	0.57	17.02	30.34	213.24	8.062
2	West (Field) SS2	0.288	7.58	1.05	17.02	28.49	250.88	16.420
3	West (Outside of Field) SS3	0.209	7.56	0.89	11.64	75.87	188.16	16.700
4	South SS4	0.201	6.75	0.89	17.02	29.86	150.52	12.420
5	East SS5	0.232	6.83	1.70	12.54	38.84	213.24	16.670
6	Center SS6	0.221	7.59	0.57	22.84	34.02	112.89	8.926

PHYSICO-CHEMICAL ANALYSIS

In the collected examples [15,16], significant soil quality boundaries like pH, Electrical Conductivity (EC), and Natural Carbon (OC) were examined. Natural matter is oxidized by chromatic corrosive (Potassium dichromate + H2 SO4). Indian laboratories frequently employ this approach. typical K and P investigation A PH meter (Medel No.) was used to measure the PH. 361), a conductivity meter (Model No.) was used to measure EC. 304), OC was measured with a Colorimeter marked with the model number. 112), a Fire Photometer (Model No.) was utilized to measure potassium. 130), a model number Spectrophotometer was used for phosphorus estimations. 166). Soil testing is carried out by the Soil Testing Lab Ruhabandha in Bhilai, Chhattisgarh.

Conclusion and Discussion

Clean polythene sacks were utilized to ship the dirt examples from Rasmada Town's 5 Modern Region to the exploration office. It is the passable norm as shown by Soil Testing Lab Ruhabandha. In the event that the stone substance is huge, record as percent of the model (w/w) as to go it through 0.2 to 0.5 mm sifters treatment of the model for examination. In order to conceal the soil tests, air dry them, lightly crush the soil blocks, and then sift the entire batch through a 2mm tempered steel sifter.

Assurance OF SOIL

pH: - pH was antacid qualities goes from 6.75 to 7.68. **North Area** had the highest pH value, 7.68 (Table 1.0). The limit of soil pH is acidic below 6.5, alkaline between 7.8 and 8.5, and alkali above 8.5.

EC: - Estimates of total soluble are made using aqueous soil extracts' electrical conductivity (EC). For salt-sensitive crops, the standard value of EC in the soil is typically less than 0.8 dsm-1, while for salt-open crops, it is typically between 1.6 and 2.5 dsm-1. Harming to most collects > 2.5 dsm-1. Table 1.0 shows the EC upsides of 0.201 to 0.288.

OC: - Since natural matter is oxidized with chromic corrosive, soil natural carbon is much of the time utilized as a record of nitrogen accessibility utilizing the colorimeter technique (Datta et al., 1962). OC in Rasmada 0.57 to 1.70 (Table 1.0). Low (0.50), medium (0.5–0.75), and high (>0.75) are the typical values for OC.

Phosphorus: - In the range of medium to high, phosphorus was found (Table 1.0). Orthophosphate, an inorganic type of phosphorus, is an essential part of sea-going environments. Phosphorus, the primary micronutrient, is utilized by plant species as H2PO4 and HPO42.

Potassium: - The typical soil K_2O value is between 140 and 280 kg K_2O ha-1 for low, medium, and high levels. According to Table 1.0, potassium levels ranged from low to medium to high. K however present in modest quantity in soil test, assumes a crucial part in the digestion of new water and viewed as a significant micronutrient. The K is somewhat plentiful in the world's outside layer, its majority isn't open to plant.

Conclusion

This can be done based on the study's recommendation of a rich fertilizer for open EC, pH, OC, N, P, and K-deficient soil. to anticipate the logical response to supplements that are applied. to determine the kind and severity of soil-related issues like saltiness, alkalinity, corrosiveness, and others. additionally, to suggest reasonable measures for healing and improvement. to determine whether orchards and crops can thrive there. to decide the propriety of the water framework. to concentrate on the soil's beginning.

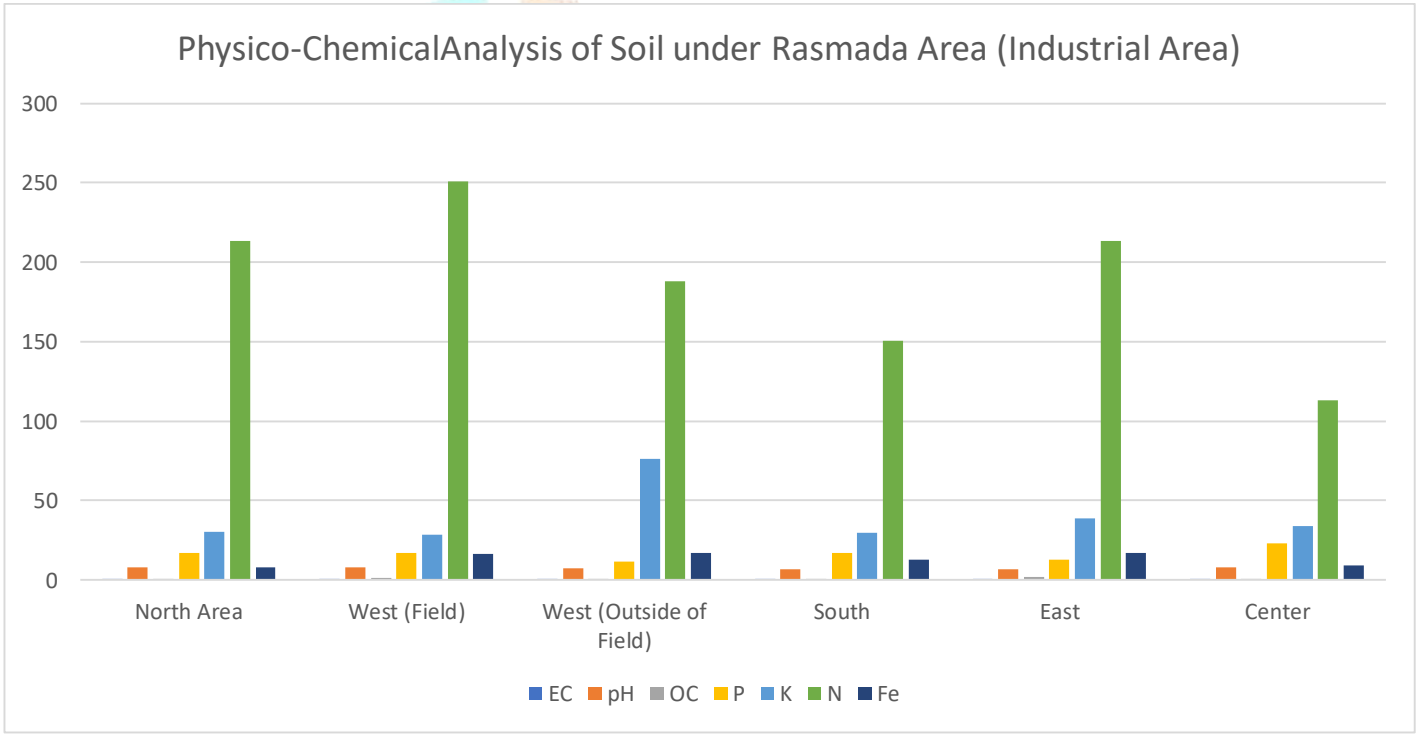
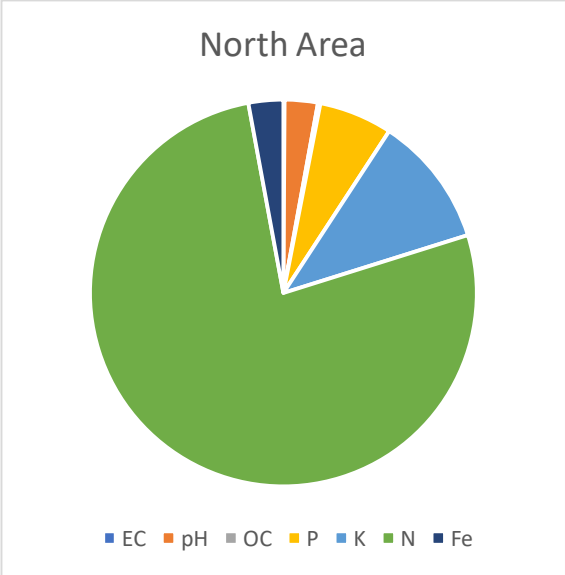
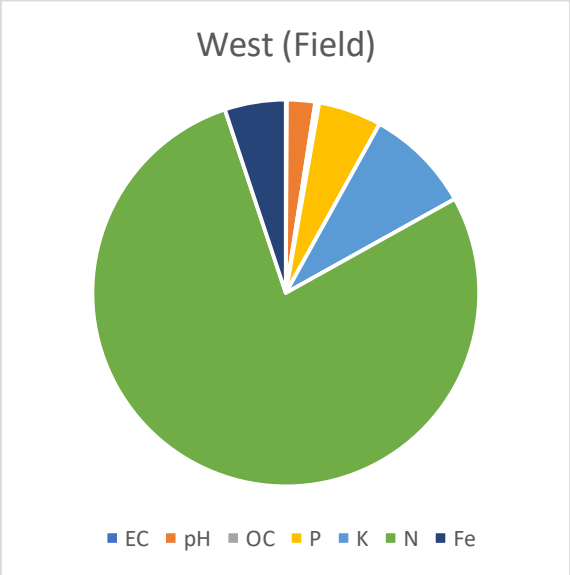
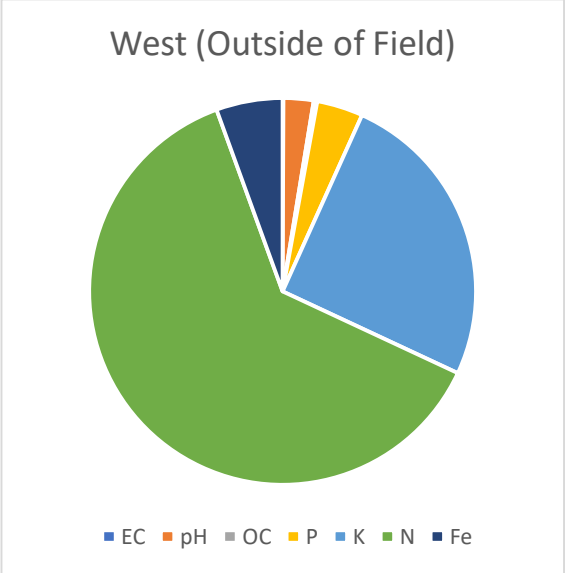
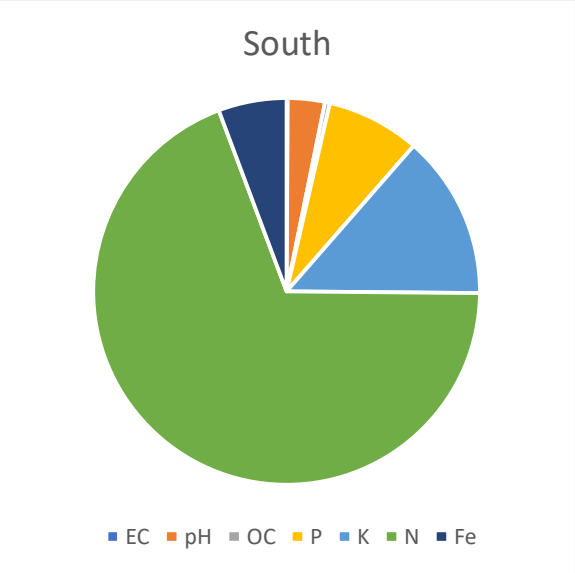


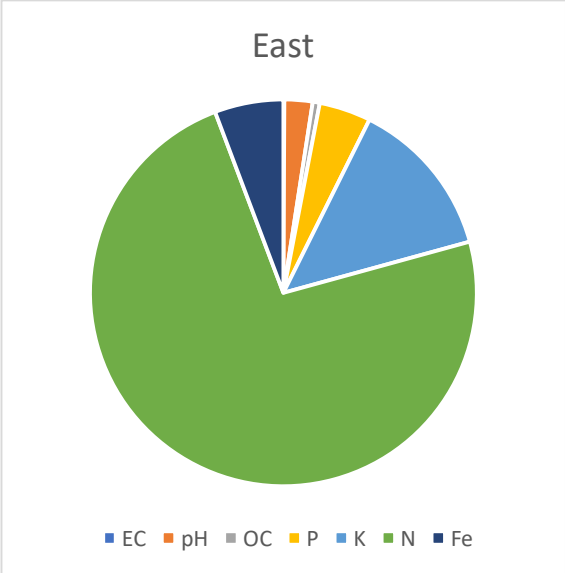
Table 1.0

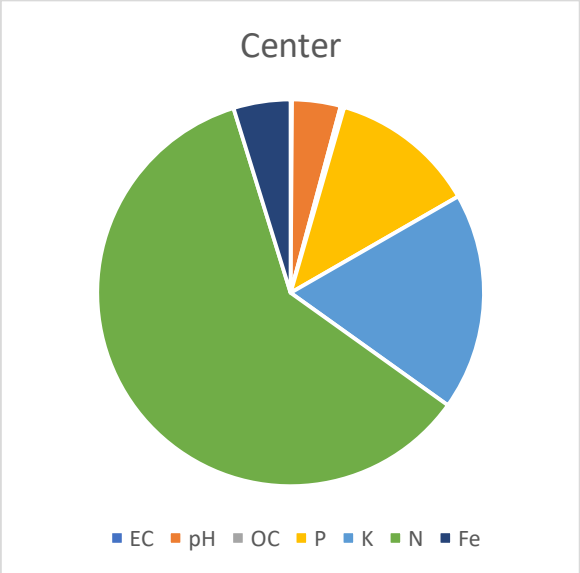

North Area
EC pH OC P K N Fe


West (Field)
EC pH OC P K N Fe


West (Outside of Field)
EC pH OC P K N Fe


South
EC pH OC P K N Fe


East
EC pH OC P K N Fe


Center
EC pH OC P K N Fe

Reference: -

[1] P.K. Gupta, Methods in Environmental analysis, 2nd Edition Agrobios, Kota, India 101, (2000). |

[2] H. Kaur, Environmental Chemistry 2nd Edition, Pragati Prakashan 416, (2002). |

[3] Mayur Shah, Pratek Shilpkar, Ajay Shah, Amit Isadara and Anilsinh Vaghela, J Dev.Adv, Res.2(1), 50-53, (2011). |

[4] R. Rawds, Earth is first Organics, Chemical Engineering News, Compendium on Soil health Report American Chemical Society, 20-22, (1997). |

[5] R.W. Miller and R.L. Donahue, Soils in our Environment 7th edition Prentice Hall Ine, New Jersey-07362, 67-68., (1995). |

[6] B. S. Patel and H.R. Dabhi, Asia Journal of chemistry, 12(2), 1155-1158, (2009). |

[7] Dilip.H. Patel and Milan M.L., Archives of Applied Science Research 5(4): 24-29, (2013). |

[8] J. L. Lemunyon and R.G. Gilber, Journal of Production Agriculture, 6:483-486, (1993). |

[10] D. Beegle, Interpretation of Soil Testing Result, IN Recommended Soil Testing Procedures for the Northeastern United State. University of Delaware Ag. Experiment Station Bulletin no.493, second edition UK, pages 84-91 |

[11] D. J. Eckert, Soil test translations: In soil testing, basic cation saturation ratios and sufficiency levels are collected, correlated, calibrated, and interpreted. J.R. Earthy colored manager, SSSA Exceptional Distribution No.21. American Soil Science Society ,53-64. (1987). |

[12] G. Stefanic, Organic definition evaluating technique and horticultural translation of soil ripeness, Romanian Agrarian Exploration 2, 107-116, (1994). |

[13] B. R. Hoskins's Soil testing handbook for professionals in nutrient and residuals management, agriculture, and horticulture. The third ed. Previously "Soil Testing Handbook for proficient Agriculturalists", Phosphate prerequisites. Maine Soil Testing Administration/Logical Lab Maine Ranger service and Horticultural Analysis Station College of Maine 34-35, (1997). |

[14] Soil Chemical Analysis, M. L. Jakson, Prentice-Hall of India Pvt. Ltd., New Delhi. ,123-126, (1967). |

[15] S.R. Olsen, C.V. Cole, F.S. Watanbe, L.A. Dean. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. USDA Circular No. 939. (1954). |

[16] S. R. Olsen and L E Sommers, Phosphorus- IN Methods of Soil Analysis, Agronomy no.9, part 2, second edition. American Society of Agronomy.,416-422, (1982). |

[17] www.ifc.org | | Meena H.B, Sharma R.P.& Rawat U.S., (2006),” STATUS OF MACRO- AND MICRONUTRIENTS IN SOME SOILS OF TONK DISTRICT OF RAJASTHAN”, Journal of the Indian Society of Soil Science, Vol. 54, No. 4, pp 508-512 2. M. N. Survase, A. V. Pore, C. T. Pawar, (2011),”

A STUDY OF FERTILITY STATUS OF SOIL AND NUTRIENTS RECOMMENDATIONS IN PANCHGANGA BASIN (MAHARASHTRA): A MICRO LEVEL ANALYSIS,” INDIAN STREAMS RESEARCH JOURNAL” vol - i, issue-v. 3. Marimuthu Krishnaveni (July 2015) Research J. Pharm, and Tech. 8(7):

NUTRIENT ANALYSIS OF SOIL COLLECTED FROM PANUCHAKULI VILLAGE, KANYAKUMARI DISTRICT, KANYAKUMARI 4. G. Usha Kiranmai and P.S. Raja Sekhar, (2016),”

ESTIMATION OF SOIL ORGANIC CARBON PERCENTAGE OF MANGROVES/WETLANDS OF VISAKHAPATNAM COAST, BAY OF BENGAL”. “JOURNAL OF GLOBAL BIOSCIENCES” ISSN 2320-1355 volume 5, number 1, 2016 5. Jadhav Laxmi, Prof. Pai Vidya,

IMPLEMENTATION & TESTING OF SOIL ANALYSIS IN CULTIVATION LAND USING IOT, "International Research Journal of Engineering and Technology" (IRJET) e-ISSN: 6. Das Shaon Kumar. Avasthi R.K. K. Sharma K. SinghM. Sharma P |

(June-2019) SOIL FERTILITY ASSESSMENT IN DIFFERENT VILLAGES OF EAST SIKKIM DISTRICT, "INDIAN JOURNAL OF HILL FARMING" June 2017, Volume 30, Issue 1, Page 14-16.2395-0056 TRJET Volume: 06 Issue: 06 | June-2019, p-ISSN: 2395-0072. 7. Bunemann Else K, Giiulia Bongiorna et al, (2018) Soil Quality "BIOCHEMISTRY", Volume, Pages 105-125 8. Kandoliya RU, BB Kunjadia BB,"

EFFECT SOIL AND FOLIAR APPLICATION OF ZINC ANDIRON ON MICRONUTRIENTS UPTAKE BY WHEAT IN CALCAREOUS SOIL OF SAURASHTRA REGION."

EUROPEAN JOURNAL OF BIOTECHNOLOGY AND BIOSCIENCE" Volume 6; Issue 4; July 2018; Page No. 65-69 ISSN: 2321-9122 Impact Factor: RJIF 5.44 9. Makkar Arushi, Sibbal Chatli Anshu, Sharma Akshita, Kaur Parneet. Navdeep Kaur Navdeep. Goswami Ekta-(2018)

"ANALYSIS OF SOIL SAMPLES FROM VARIOUS AREAS OF PUNJAB, "INTERNATIONAL JOURNAL OF RESEARCH IN ENGINEERING, SCIENCE AND MANAGEMENT" Volume-1, Issue-11, 10. Reddy Ragunathan, Shankarappa R.L. T.H. Shankar Reddy T.H. Shankar Kolle, Satish M.V,

"COMMUNICATIONS IN SOIL SCIENCE AND PLANT ANALYSIS" REVIEW OF TRENDS IN SOIL FERTILITY RESEARCH USING SCOPUS DATABASE, volume 50,2019- issue 8,16 11. Palani Kalpana, Selva Preetha Paneerselvam, Sathya Velusamy and Ramasubramaniyan Ramanathan, (2019) "

ASSESSMENT OF SOIL FERTILITY STATUS FOR SUSTAINABLE AGRICULTURAL PRODUCTION IN CHITHAMUR BLOCK, KANCHIPURAM DISTRICT, TAMIL NADU, INDIA, INDIAN JOURNAL OF PURE & APPLIED BIOSCIENCES," Ind. J. Pure App. Biosci. (2019) 7(6), 340-350) DOI: 12. Mr. H. James, Deva Koresh, (2021),

ANALYSIS OF SOIL NUTRIENTS BASED ON POTENTIAL PRODUCTIVITY TESTS WITH BALANCED MINERALS "ENVIRONMENTAL SCIENCE, JOURNAL OF ELECTRONIC IMAGING, 22 march volume 3,23-35 13. Dr. (Mrs.) Nivedita A. Lall, (2011),

UTILIZATION OF AGRICULTURAL LAND AND CROP STRUCTURE IN RAJNANDGAON DISTRICT (CHHATTISGARH "RESEARCH JOURNAL OF HUMANITIES AND SOCIAL SCIENCES, Volume- 2, Issue – 3 14. Rao P Smriti, ThomasTarence, Singh Zineeka, Rachana, (2016),

ASSESSMENT OF MACRONUTRIENTS IN SOILS OF BASTAR PLATEAU REGION, CHHATTISGARH, INDIA" INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND DEVELOPMENT", Volume 3, Issue 7, Pages 34-38 15. Tigga Sunny Abhishek, Tarence Thomas, David, Arun A., SWAROOP NARENDRA AND RAO P. SMRITI, (2017)

ASSESSMENT AND CHARACTERIZATION OF SOIL IN SARGUJA DISTRICT, CHHATTISGARH, INDIA INT.J.CURR.MICROBIOL.APP.SCI 6(7): 223-229 16. Esahak David Tirkey1, Tarence Thomas, (2017),

ASSESSMENT OF SOIL SAMPLE BY ANALYZING CHEMICAL PROPERTIES OF SOIL IN KORBA DISTRICT OF CHHATTISGARH, INDIA "RESEARCH JOURNAL OF CHEMICAL AND ENVIRONMENTAL SCIENCES, RES J. CHEM. ENVIRON." Sci. Vol 5

[18]: 76-81, Online ISSN 2321-1040 17. Patel Himanshu, Patel Rajkamal, Paikara Madan Prasad Brajendra, MishraV.N.(2018)," ASSESSMENT OF SOIL FERTILITY IN BARAMKELA BLOCK UNDER RAIGARH DISTRICT OF CHHATISGARH, INDIA, Special issue-7 18. Bano Sarvaree, (2018)," SOIL ANALYSIS OF CHHATTISGARH Volume 3; Issue 6; Page No. 292-295 19. Singh Chandrabhooshan, Bajpai RK, Tiwari Alok, CHANDRA MITHILESH AND KRISHNA BAL (2018),

EVALUATIONS OF SOIL FERTILITY STATUS OF AVAILABLE MAJOR NUTRIENTS (N, P & K) AND MICRO NUTRIENTS (FE, MN, CU & ZN) IN VERTISOL OF BALODABAZAR BLOCK IN BALODABAZAR DISTRICT OF CHHATTISGARH, "CHANDRA MITHILESH AND KRISHNA BAL JOURNAL OF PHARMACOGNOSY AND PHYTOCHEMISTRY"; SP2: 10-12 20. Singh Ranjana, Upadhyay Dr. Manish, (2018),

ANALYTICAL STUDY OF SOIL QUALITY OF NCPH COLLIERY OF KORIYA DISTRICT,

"INTERNATIONAL JOURNAL OF APPLIED CHEMISTRY (SSRG – IJAC)" – Volume 5 Issue Page 7, ISSN: 2393 – 9133. 21. Pande Bhawana, (2018),

PHYSICO CHEMICAL STUDY OF SOIL NEAR BHILAI STEEL PLANT EFFLUENT CHANNEL, "NISREEN HUSSAINB AND DEEPAK KUMAR SRIVASTAVC, INDIAN" J.Sci.Res. 09 (1): 89-91, 22. Rao P. Smriti, Thomas Tarence, Chattree Amit, Dawson Joy and Swaroop Narendra, (2019)," SPATIAL

ANALYSIS OF SOIL CHEMICAL PROPERTIES OF BASTAR DISTRICT, CHHATTISGARH, INDIA

"INTERNATIONAL JOURNAL OF CURRENT MICROBIOLOGY AND APPLIED SCIENCES" ISSN: 2319-7706 Volume 8 23. Chandravanshi Kavita, Swaroop Narendra, and Thomas Tarence, (2020),

ASSESSMENT AND CHARACTERIZATION OF MACRONUTRIENT IN SOIL OF KABEERDHAM DISTRICT, CHHATTISGARH, INDIA,"

INTERNATIONAL JOURNAL OF CURRENT MICROBIOLOGY AND APPLIED SCIENCES, ISSN: 2319-7706 Volume 9 Number 8 24. Dr. Nair Sumita (2020),

ASSESSMENT OF POLLUTION AND ENRICHMENT OF SOIL IN AND AROUND INDUSTRIAL AREA OF RAIPUR CITY, C.G., INDIA, "POLLUTION RESEARCH" 39 November supplementary issue):34-39 25. Motghare Ritesh, Meher Sunil Kumar, Motghare Himachal, Banwasi Rakesh and Sahu K. K., (2020)

EVALUATION OF SOIL FERTILITY STATUS AND ITS VARIATION IN ARANG BLOCK OF RAIPUR DISTRICT IN CHHATTISGARH INT.J.CURR.MICROBIOL.APP.SCI Special Issue-10: 461-469 26. Tigga Vibha, Xalxo Anjna, Bachkaiya Vinay, Chouksey Rajesh and Nayak Vinod, (2022),

EVALUATION OF SOIL NUTRIENT STATUS OF AN INCEPTISOL OF SURGUJA DISTRICT, CHHATTISGARH "THE PHARMA INNOVATION JOURNAL"; SP-11(9): 813-816