



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 7, July 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

A Study on Effect of Industrial Effluents on Agricultural Land around Perundurai SIPCOT Zone

Mr. S Raajamurugan, Ms. S Vanisha

Assistant Professor, Gnanamani College of Technology, Pachal, Namakkal, Tamil Nadu, India

PG Student, Gnanamani College of Technology, Pachal, Namakkal, Tamil Nadu, India

ABSTRACT: Perundurai is known for Asia's second biggest SIPCOT with 101 industries. A study was conducted in Perundurai SIPCOT around villages to dissect the impacts of industrial effluents on agricultural land. Inappropriate treatment and removal of industrial wastewater straightforwardly or in a roundabout way influences Farming, Domesticated animals, Groundwater and Human wellbeing. Conducting survey from farmers about their problems during farming, before and after Industrialization was identified. In this review, the 30 cultivating individuals from the accompanying villages Sengulam, Varapalayam, Moonampalli, Koundampalayam, and Nalivalasu were identified and studied for this review. Five Water and Soil tests were gathered from five villages and three to four replicate was done for each example. Analysis of the impact of industrial effluent on irrigation water containing high total dissolved solids, Sodium Adsorption ratio, pH, Electrical Conductivity and the soil irrigated with this water, showing the low NPK status and high alkaline nature of soil. The current study is to analyse the various adverse effects on the soil characteristics irrigated with water which affected by industrial discharge.

KEYWORDS: SIPCOT, Industrial Effluent, Agriculture, Irrigation, Soil nutrient

I. INTRODUCTION

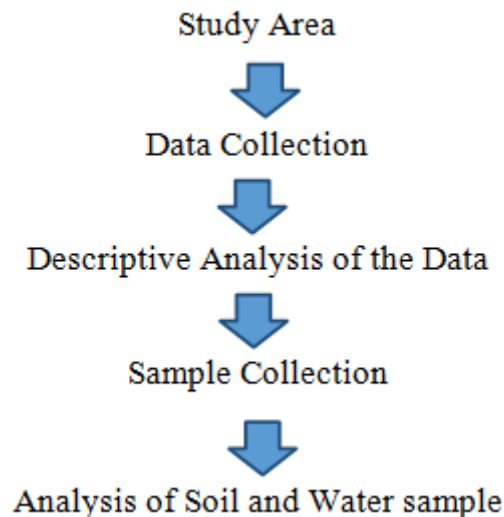
Perundurai is a Unique Grade Town Panchayat in the Indian territory of Tamil Nadu. Industrialization is the time of social and efficient change that changes a human gathering to a modern culture. Contamination in soil and water is completely connected with human exercises, for example, industry, consuming of petroleum derivatives, mining and metallurgical cycles and their garbage removal. An industry which involves the huge measure of water in their cycles incorporates substance produces, steel plants, metal processors and so forth. Effluents from any sort of businesses make a serious contamination to water bodies and soil bodies. The contamination of soil is often a direct or indirect consequence of industrial activities. With the consistently expanding request of water system water supply utilizing trench, the horticultural land gets sullied through the low quality of water system which is contaminated by modern effluents. Since, the utilization of impacted water system might present a few metal particles, which might collect in the plants and soil, unfavorably impacted supplement content of soil which is unacceptable for crop creation. Soils contaminated with toxic metals from point sources are potential exposure routes for surrounding population. The weighty metals gather in the plant material filled in these dirt, which will eventually go to human body through order of things straightforwardly or by implication causing various physic mental issues. The target of the current review is to study the different unfavorable impacts on the soil characteristics irrigated with water which affected by industrial discharge.

II. PURPOSE OF STUDY

The main motivation of this study is to find the physio-chemical characteristics of irrigation water and Agricultural soil around the villages of Perundurai SIPCOT. As industries expand and production increases, they frequently produce different pollutants like Soil, water, air, and Light that can hurt the climate, environments, and human wellbeing. In Industrial cycle, water utilized in many stages and it release as wastewater. Without legitimate treatment these wastewater releases into water bodies or coming to groundwater straightforwardly or by implication might taint the water climate. Involving these contaminated water for irrigation lead to debase of soil supplements, influence soil pH, Electrical conductivity, natural carbon, stored weighty metal substance in horticulture soil and water. By considering,

this study expects to analysis the production difference before and after industrialization, and also analysis the characteristics of irrigation water and agricultural soil around villages.

III. RESEARCH METHODOLOGY



IV. STUDY AREA

The Review region was chosen around the Perundurai SIPCOT zone arranged at Tamilnadu (India). The accompanying villages were chosen based on agriculture Sengulam, Varapalayam, Moonampalli, Koundampalayam and Nallivalasu. For the most part the water hotspot for irrigation system was exclusively from wells and bore wells. There is no river or waterways passing around the encompassing villages yet the review show the yield of farming harvest diminished after the industrialization. By keeping this view it was thought that this activity of the industry may indirectly cause the adverse effect not only over environment but also over the farmers.

Data Collection

Data collection is the process of gathering and measuring information on variables of problem, in an establishment systematic fashion that enables one to answer stated research question, test hypotheses and evaluate outcomes. The process is used to collect information and data for the purpose of study impact of industrial wastewater on agricultural land. The sample size is an important feature of any empirical study in which the goal is to make inference about a population from a sample size if 30.

Questionnaire	
Size of the Farm (In Acres): :	0 <input type="checkbox"/> to 2 acre <input type="checkbox"/> 2 to 5 <input type="checkbox"/> <input type="checkbox"/> 5 to 8 acre <input type="checkbox"/> above 8 acre <input type="checkbox"/>
Types of Soil:	
Primary Source of Irrigation water:	
<input type="checkbox"/> Bore Well <input type="checkbox"/> Well <input type="checkbox"/> Canal	
Major crops cultivated on your Farm before the establishment of the SIPCOT Industry:	
How much yield did you obtained in tones per acre for the major crops grown on your farm before Industrialization?	
What are the crops cultivated on your farm after the establishment of the SIPCOT Industry?	
How much yield did you obtain in tones per acre for the crops grown your farm after Industrialization?	
Have you observed any yield differences in crops since the establishment of the SIPCOT Industry?	
Have you observed any cultivation difficulties in your field?	
What are the current concerns regarding the impact of industrial activities on your farming practices in the future?	

Table.1.A questionnaire for farmers about their farming

Personnel Details	
Name of the Farmer:	
Location of the Farm :	
Farmer Contact No:	
Aadhar No:	
Age of the Farmer:	<input type="checkbox"/> - 40 years <input type="checkbox"/> 40-5 <input type="checkbox"/> years <input type="checkbox"/> 50-60 ye <input type="checkbox"/> <input type="checkbox"/> above 60 <input type="checkbox"/>
Years of Farming Experience:	be <input type="checkbox"/> w 10 years <input type="checkbox"/> 10-2 <input type="checkbox"/> ears <input type="checkbox"/> 20-30 year <input type="checkbox"/> 30 <input type="checkbox"/> 0 years <input type="checkbox"/> 40-50 <input type="checkbox"/> ars <input type="checkbox"/>

Table.2. Personal Information of the farmers

V. DESCRIPTIVE ANALYSIS OF THE DATA

Age of the Farmers

From this review, it is obvious that around 23% of the ranchers are under the age gathering of over 60, 30 percent of the ranchers fall under the gathering of 50-60 years, 27 percent of the ranchers under the age gathering of 40-50, and 20 percent of the ranchers are younger than 30-40 years.

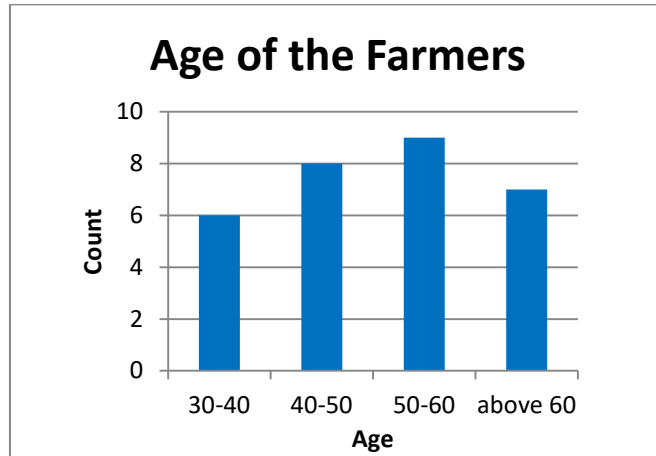


Figure.1. AGE OF THE FARMERS

Size of the Farm

From this review, it is obvious that, 5% of the ranchers have 0.5-2 sections of land, 40% of the ranchers have 2-5 sections of land, 40% of them have 5-8 sections of land and 1% of the ranchers have over 8 sections of land of the homestead.

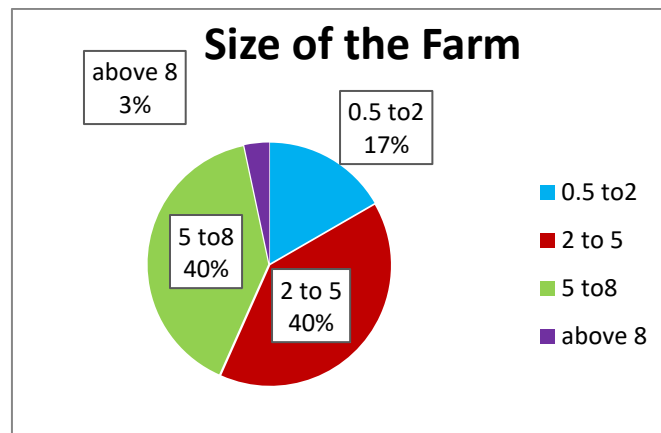


Figure.2. SIZE OF THE FARM

Years of Experience

From this review, it is clear that 13% of the ranchers have under 10 years experience, 20% of them have 10-20 years of involvement, 37% of the ranchers have 20-30 years of involvement, 23% of the ranchers have 30-40 years of involvement, and 7% of the ranchers have 40-50 years of involvement.



Figure.3. YEARS OF EXPERIENCE

Primary Sources of Irrigation

From this review, it is clear that 80% of the ranchers utilizing both bore well and well source of irrigation and 20% of the farmers only using well water as source of irrigation.

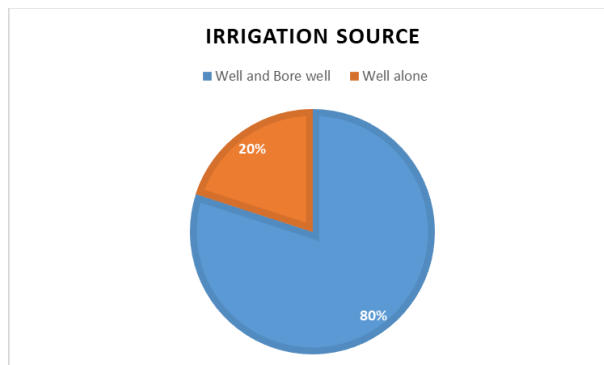


Figure.4. PRIMARY SOURCES OF IRRIGATION

Yield Comparison of Different Crops

From this study, it is evident that the yield and crop practices of some farmers are different. Due to yield decrease of the crops which needs proper irrigation water, some of the farmer alters their crops and some of them cultivate the minimum yield with same crops.

Table.3.Major Crops, Yield Before and After Industrialization

S. No	Land (Acres)	Crops		Yield(tones)	
		Before Industrialization	After Industrialization	Before Industrialization	After Industrialization
1.	51	Turmeric	Sorghum	1530	25
2.	40	Banana	Bajara	60,000(Tar)	10

3.	12	Groundnut	Groundnut	36	24
4.	5	Elephant yam	Elephant yam	105	75
5.	12	Tapioca	Napier Grass	16	7
6.	10	Coconut tree	Coconut tree	1.8 L Nuts	67,500 Nuts

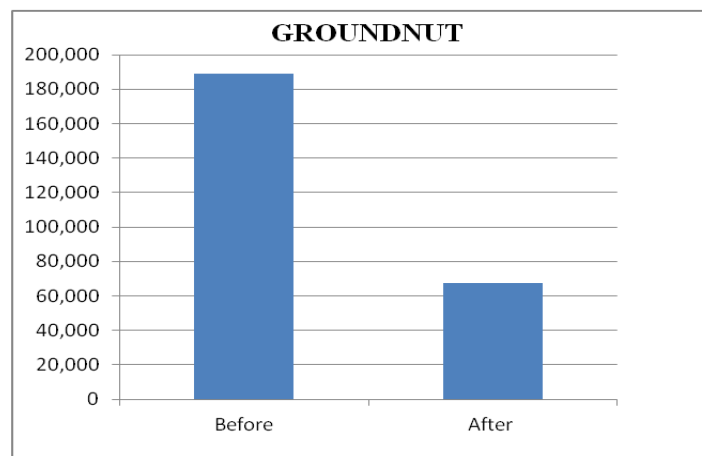


Figure.5. Groundnut yield difference before and after industrialization

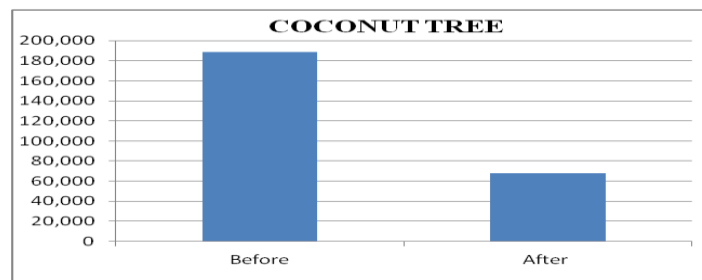


Figure.6. Coconut yield difference before and after industrialization

VISAMPLE COLLECTION

Samples collection from Irrigation water

Five water tests were gathered from five treatment and three to four replicate was done for each example. The water tests were gathered in polyethylene bottles from the irrigation source of the farmers. The following Sampling locations were selected Sengulam, Varapalayam, Moonampalli, Koundampalayam and Nallivalasu from each 1 km from industries. Introductory example were taken from 1 km distance, while second area was 2 km from industry. Then again third, fourth and fifth examples were gathered from around every 1 km distance from the industrial point. Gathered water tests were investigated for physio- chemical characteristic content.

Samples collection for Soil

Five soil tests were gathered from the inspecting areas and three to four replicate was completed for each example. The soil sample were gathered in polyethylene covers from ranchers field. Testing areas were chosen after every 1 km from

enterprises. Starting example were taken from 1 km distance, while second area was 2 km from industry. Then again third, fourth and fifth examples were gathered from roughly every 1 km distance from the industrial point. Gathered soil tests were investigated for physio- chemical characteristic content.

For the examining of soil, it was kept in a round about structure and isolated into four equivalent parts and division was gone on from two inverse direction until just half kg. Soil sample is left and stored in polythene bags for investigations.

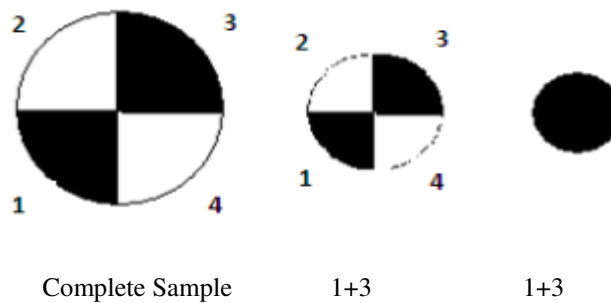


Figure.7 Soil Sampling Procedure

VII. ANALYSIS OF WATER AND SOIL PARAMETERS

Analysis of Irrigation Water Parameters

The pH, Electrical conductivity (EC), Total dissolved solids (TDS) of the examples was resolved utilizing the deluxe water and soil examination kit. Chlorides of the samples were determined by using argentometric method of precipitation. Bicarbonate of the samples were definite quantity of water against a standard acid using phenolphthalein & Methyl orange as indicators adding the slandered acid drop-wise, the pink colour disappears when all the carbonate in the sample water are converted to bicarbonates. Sulphate was determined by quantitative precipitation by barium chloride. Sodium adsorption ratio (SAR) finds the relative amount of sodium ions to the combined amount of calcium and magnesium ions.

Analysis of Soil Parameters

20g soil test was moved to a 100 ml of container and 40 ml refined water, blended completely with a glass pole for around 30 minutes and afterward further this dirt water suspension was utilized for various substance determinations. The pH of soil tests were assessed once more by grand water and soil examination pack in a similar suspension conductivity was likewise determined. The assurance of soil natural carbon depends on the Walkley-Dark chromic corrosive wet oxidation strategy. The fundamental wellspring of nitrogen in soil is natural materials. Kjeldahl method grants the accessible nitrogen to not entirely set in stone in the plant and in the soil. Leachate was saved to appraise soluble cations like sodium (Na⁺), potassium (K⁺), and calcium (Ca²⁺) and magnesium (Mg²⁺) particles. Accessible potassium was assessed by draining the dirt with ammonium acetic acid derivation and deciding the potassium utilizing fire photometer. Iron was resolved spectrophotometrically in the got soil. Concentrations of zinc, copper, iron, and magnesium (Zn, Cu, Fe, and) not entirely settled by consolidating a 10-gram scoop of air-dried of soil with 20 milliliters of DTPA (Diethylenetriamine-pentaacetic corrosive) separating arrangement, and shaking for two hours.

VIII. OBSERVATION AND RESULT

WATER SAMPLES

Physical parameters

The pH of these examples was gone from 7.35-7.96; it prompts saline- alkaline nature of the water. The acknowledged pH for irrigation water is somewhere in the range of 5.5 and 7.5, it shows somewhat high. Electrical conductivity of the water ranges between 2.87 to 7.01 dSm⁻¹. The conductivity values were high in the example of the second, fourth and fifth area. The Total dissolved solids are more than that of ordinary level, consequently all out vegetation is impacted. Farming and agriculture crop development is nearly nothing.

Chemical parameters

Bicarbonate content of the water system water range from 8.4 to 14.6meq/l. Standard bicarbonate content is not exactly that of 8.5 meq/l. It prompts decrease the supplement admission of yields. Chloride content of the irrigation water shifts between 17.1 to 52.6meq/l. Standard substance of the chloride is not exactly that of 10 meq/l. High chloride content makes extreme harms portions of the plant and harvest quality.

Calcium content of water tests ranges between 8.2-13.6meq/l, it demonstrates extremely low range of desired level of 40 meq/l and it prompts plant inadequacy. Magnesium content shifts between 4.4 to 21.6meq/l. Standard magnesium level reaches between 0 to 5 in any case it prompts soil degradation. Sodium content of the water tests ought to be higher than the ideal level. The ideal degree of sodium 5 to 10 assuming that the reach increments, it prompts calcium and potassium insufficiency in soil. Potassium content of the example water over the ideal degree of 0.06 meq/l. Sodium assimilation proportion (SAR) content differs from 2.79 to 7.73. Standard range of the sodium absorption ratio was under 3. Abundance SAR content makes water system water as inadmissible and makes serious harm the harvests. Significant salt substances present in the irrigation water are sodium chloride and calcium chloride. Due to industrial effluent and pollution on the environment around Perundurai SIPCOT industries affect the irrigation water sources.

Table.4. Physio-chemical analysis of irrigation water

Parameter	Location 1	Location 2	Location 3	Location 4	Location 5
pH	7.96	7.67	7.45	7.35	7.82
Conductivity (dSm-1)	2.87	7.01	2.50	3.02	3.94
Total Dissolved Solid(mg/l)	933	2278	813	982	1281
Bicarbonate(meq/l)	14.2	14.6	8.4	11.4	11.6
Chloride(meq/l)	18.9	52.6	12.7	17.1	21.9
Sulphate(meq/l)	0.42	0.41	0.21	0.40	0.41
Calcium(meq/l)	13.1	13.6	8.2	11.1	10.4
Magnesium(meq/l)	7.3	21.6	4.4	7.5	6
Sodium(meq/l)	15.2	32.5	9.75	8.5	17.75
Potassium(meq/l)	0.33	0.68	0.20	0.45	0.49
SAR	5.69	7.73	3.88	2.79	6.21
Major Salt content	Sodium chloride	Sodium chloride	Sodium chloride	Calcium chloride	Sodium chloride

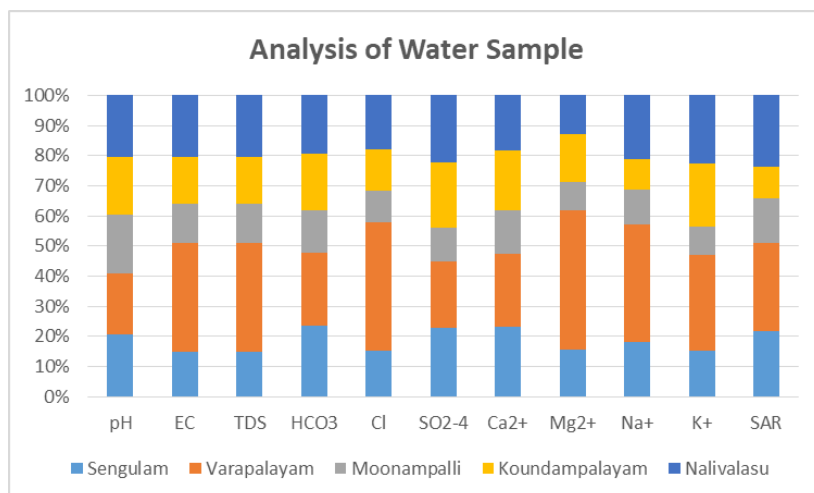


Figure.8. Analysis of Irrigation water sample

SOIL ENVIRONMENT

Soil pH

Soil pH is a proportion of the grouping of hydrogen particles in the soil. It is known to be related to the availability of macro and micronutrients for plants. Soil pH ranged from 7.74 - 8.42. The most elevated pH range was tracked down in first, second and fourth area.

Soil salinity

Soil saltiness alludes to how much disintegrated salts in the soil arrangement. Emanating or the joined impact of profluent and manures might raise solvent salt level to the degree that they block plant development. Be that as it may, the focus in the soil at which salt is unsafe shifts soil surface and plant species.

Soil conductivity

The conductivity of the soil sample was gone from 0.24 to 2.48 dSm-1. The reach was most elevated in the third area which almost 0.3 km from the release point.

Nutrient status

In the supplement status the organic carbon was viewed as in the range of 0.30 to 0.54 % and nitrogen values was viewed as in the range of 78 to 94 kg/ha. The phosphorus in the samples was found as P2O5 were range between 4 to 7.5 kg/ha and potassium was viewed as in the range of 117 to 356 kg/ha. Results are portrayed in table 5. From the outcomes obviously the soil class goes under the low quality of the soil.

Micronutrients

In the micronutrient status Iron was tracked down in the range of 5.81 to 6.28 ppm. Magnesium tracked down in the reaches between 1.91 to 1.97 ppm. Zinc was gone between 0.89 to 1.12 ppm. Copper ran between 0.52 to 1.12 ppm. Calcium Carbonate present in the scope of medium to high.

Table.5. Physio-chemical analysis Soil

Parameter	Location 1	Location2	Location3	Location 4	Location 5
pH	8.36	8.25	7.74	8.42	7.82
Conductivity (dSm-1)	0.53	1.04	2.48	0.24	0.35
Organic Carbon%	51	27	30	42	54
Nitrogen(kg/ha)	87	78	80	87	94
Potassium(kg/ha)	7.5	6	4	4.5	7.5
Phosphorous(kg/ha)	117	125	146	164	356
Micronutrients					
Iron(ppm)	5.81	6.11	5.94	6.16	6.28
Magnesium(ppm)	1.91	1.66	1.86	1.74	1.97
Zinc(ppm)	0.89	0.94	1.07	1.12	0.98
Copper(ppm)	0.67	0.52	1.12	0.79	0.54
Calcium Carbonate	More	More	Medium	More	Medium

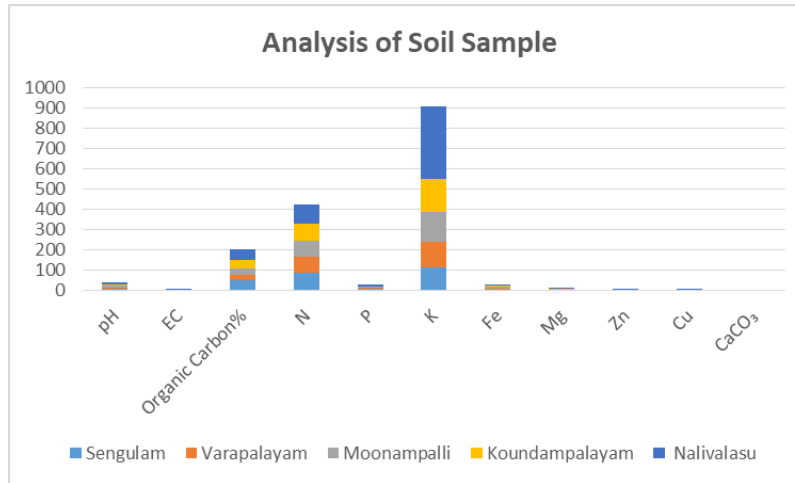


Figure.9. Analysis of Soil sample

IX. RESULT AND DISCUSSION

WATER

All the five locations the irrigation water analysis reflects the pH is 7.32-7.96 territory, shows saline alkaline status more hazardous present in the water. It's unsuitable for irrigation. Electrical conductivity likewise high ranges 2.50-7.01, practically the water polluted with additional risky salts. Total dissolved salts estimated and ranges from 813-2278. This likewise displays more undesirable salts disintegrated in the irrigation water and makes harms yields and soil organisms. Significant salt substance present in the testing region were sodium chloride and calcium chloride, the two salts influence the soil fertility and crop canopy.

All micro nutrients supplements accessibility is similarly extremely low (chloride, sulfate, calcium, magnesium and potassium) rates shows the micro nutrients supplements status in the irrigation water. Though hazardous minerals like bicarbonate and sodium accessibility as expanded in the irrigation water, influences the nature of water.

SOIL

The pH ranges from 7.4 to 8.42 obviously demonstrates the saltiness and alkalinity of the soil .It shows the soil is practically unacceptable for development. Electrical Conductivity likewise 0.24 to 2.48 affirms the salt substance accessible in the soil is more prompts poor cropping .The organic carbon status additionally shows the reaches between 0.27-0.54, brought about microorganism activities are exceptionally least and practically the soil is sterile.

Every one of the three significant supplements like N, P, and K were extremely low in the accessible status. The fertility status also depleted in the project area. The micro nutrients like iron, magnesium, zinc and copper which are very essential for crop growth were drastically reduced in the status, which inhabits the crop growth. Being a calcareous status of the soils in the project area, calcium carbonate availability is medium to more in the samples. This also affects the crop growth. which occupies the yield development.

X. CONCLUSION

Before the beginning of "SIPCOT" Perundurai, the farmlands were prospered with different food and business crops coconut trees, Palmyra trees and different products of the soil trees are more in number with fruiting. However, after the modern working, gradually the effluents let into rural grounds, the fields become sterile and ineffective. The trees bites the dust, aggregation of compound effluents ruin the air, water and soil at last are green matters. Industry and agriculture are two eyes of the economy. Yet, one development ruin the another area, Government found a way different ways to shorten their entrance of effluents in different logical ways. Absolute recovery of soil and water is absurd in light of the fact that numerous many years the contaminations are allowed into fields.

To recover the dirt and water in some degree is conceivable that to aggregate total amount of effluents. Use of gypsum (calcium sulfate) any place greater alkalinity is taken note. Utilization of more natural fertilizer like manure (5 MT/Section of land), FYM (5 MT/Section of land), bio fertilizer (1MT/Section of land), vermicompost (2MT/Section of land) and sugarcane molasses squander treated with microorganisms. Utilize just bio composts as opposed to going synthetic manures. Example, azospirillum, phosphobacteria, potash microbes, rhizobium, BGA, azolla and so forth. Dairy cattle benning and grassing of steers like goats, sheep and cows. The litters, composts and pees are have the ability to desaline and nutrifly the dirt in some degree. In wetland development utilization of more green leaf excrements like (neem, pungam, calotopis and so on) gives improved results. Various remedial measures discussed in the concerned chapters. By the approach to embracing incorporated techniques for controlling and overseeing contaminations just given great outcomes. Through this research there is a small eye opener attempt were made to help the poor farming community. Where our study and survey time we met the farmers with farm scientists, they gave generally excellent cures and ideas to the ranchers. I saw the grinning appearances of the farmers around then that is the progress of this review.

REFERENCES

- [1] S. Senthil Kumar and T. Meenambal(2007) -Study of Groundwater Quality near Sipcot Industrial Estate of Perundurai of Erode District, Tamilnadu, Nature Environment and Pollution Technology , Vol. 6 pp. 741-744.
- [2] DeeptiSahare (2014), Long term impact of industrial effluents on agricultural soil, Recent Research in Science and Technology 2014, 6(1): 253-257.
- [3] SanjoliMobal, PallaviKaushik and Pradeep Bhatnagar(2015), Physiochemical Comparison of Textile Effluent Impacted and UnimpactedAgricultural Soil of Jaipur City, INDIA ,International Journal of Recent Scientific Research Research, Vol. 6, Issue, 3, Pp.3090-3093.
- [4] LadwaniKiran D,Ladwani Krishna D ,ManikVivek S and RamtekeDilip S. (2012), Impact of Industrial Effluent Discharge on Physio-Chemical Characteristics of Agricultural Soil,International Research Journal of Environment Sciences,Vol. 1(3), 32-36.
- [5] M.O. Islam ,Md.H.R. Khan , A.K. Das , M.S. Akhtar2, Y. Oki and T. Adachi (2006), Impacts of industrial effluents on plant growth and soil properties,Soil & Environ. 25(2): 113-118, 2006.
- [6] Abu Rashed Md. Maukeeb , Md. Kamrul Hasan , MunmunSaha and Md. FuadMondal(2022), Effects of industrial effluents on growth and heavy metals accumulation in cabbage in Bangladesh ,Archives of Agriculture and Environmental Science 7(1): 42-50 (2022).
- [7] Nick HagertyAnshumanTiwari(2022), Industrial Water Pollution and Agricultural Production,December 24, 2022.
- [8] Sajid Ali, Tabassum Akhtar and Masood Alam(2015), The Effect of Industrial Effluents on Crop Plants: A Review, International Journal of Research in Engineering and Social Sciences, ISSN 2249-9482, Impact Factor: 5.343, Volume 5 Issue 6, June 2015.
- [9] I. Mohan dass andDr. B. Muniyandi[2013], Impact of Tirupur Garment Industrial Effluents Discharges on Agriculture at Noyyal River Basin,Shanlax International Journal of Economics, ISSN : 2319-961X.
- [10] Alagappan Sethuraman, Ekwil Imam, and Tesfamichael G. Yohannes (2012), Fluoride contamination in estuary water villages located around SIPCOT Industrial Zone, Cuddalore District, Tamil Nadu, India, J. Mater. Environ. Sci. 4 (4) (2013) 520-525, ISSN: 2028-2508.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details