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To Investigate The Effects Of A Covid -19 Lockdown On Soil Quality Measure In Bhilwara's Industrial Region (Rajasthan)

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Abstract:
This research aimed to determine the soil Physico-chemical parameters following the comparative study before and after lockdown and the impact of industrial pollution on soil quality in the RIICO industrial area of Bhilwara Rajasthan. During the winter of 2019-20, soil samples were taken from two different industries and tested to determine the physical and chemical properties of the soil. In each area, five separate sites were chosen to gather soil samples from ten distinct places. pH, electric conductance, bicarbonates, Ca, Mg, Na, K ions, micronutrients including Fe, Cu, Mn, Zn, total organic carbon, and organic matter were measured in soil samples. According to the results of soil tests, the pH of the soil is neutral to slightly alkaline. Cation and anion concentrations, organic carbon, and organic matter all showed substantial variations compared to permitted levels in contaminated soil samples. The study found that prolonged wastewater application appears to degrade soil quality in the area.

Keywords: Micronutrient Organic matter, Industrial soil, Physico-chemical parameters

Introduction:

The soil is the most critical factor in determining the vegetation of a specific location. Industrial effluents are still being discharged into the aquatic system regularly. Water that has been contaminated by industrial wastewater is used for irrigation. As a result of these activities, the soil quality is deteriorating. Textile industries have long played an essential role in Bhilwara's industrial sector. There are a lot of dyeing and processing machines here, and they use a lot of chemicals. The effluent is high in dyestuffs, surfactants, and other additives, all of which are organic molecules with a complicated structure. Textile dyeing businesses have a high potential for polluting water bodies and the ecosystem as a whole. [1]
Textile industry waste pollutes soil, surface, and groundwater and negatively impacts agricultural goods, animals, and people's health. The degradation of soil quality affects the quality of groundwater and the production of crops and other plants in and near contaminated areas. The toxicity that effluents put into the soil can last for years, with long-term consequences. Physico-chemical parameters of textile-industry contaminated soil, with results compared to ISOSS, allowed limits. [2]

Study area:

The study area was chosen from the textile industries in the RIICO industrial areas of Hamirgarh and Bhilwara Mandal. On National Highway 79, the desired region is 15 kilometers north and 20 kilometers east. During the dyeing process, a lot of water is used. This untreated or partially treated effluent is released into drains that connect the industry to the leading drainage network or open land nearby. Because the wastewater is used for crop production, it has an impact on the surrounding agricultural area. [3]
For the research of soil quality characteristics, soil samples were collected during the summer season in May 2021 from the area surrounding the selected two industries in this location.
The following Textile Industrial areas are selected for our study:

I: Site Two: 74º37'20.00" E 25º20'54.74" N
I: Site Three: 74º35'52.96" E 25º19'6.1" N

Figure 1.1 Study Area

Material and Methods

Soil samples were taken from adjoining agricultural land where untreated industrial effluent was being used for irrigation. From 0-9-15cm depth, three replicates of each sample were taken from 10 distinct places. Each replicate's composite samples were made, air-dried, softly crushed, and sieved at 2mm. For further investigation, sieved soil samples (2 mm) were stored in plastic bags. The physicochemical properties of the collected effluent samples have been determined. The soil samples were taken in May of this year. On the field, temperature and pH were measured. pH, electrical conductivity (EC), water holding capacity (WHC), percent organic carbon (OC), and organic matter (OM), as well as accessible phosphate (P) and potassium (K), sodium (Na), bicarbonates (HCO3), calcium (Ca), and magnesium (Mg), were all determined in the soil samples. pH, electrical conductivity (EC), and cation and anion concentrations were measured in effluent samples. [4].

A digital conductivity meter was used to detect 1:10 soil water suspension, and organic carbon was quantified using the "Walkley and Black's titration method." Available The stannous chloride colorimetric galvanometer method was used to assess phosphorus in the soil. Soil testing laboratories used gravimetrically or calorimetrically calibrated volumetric spectrographs to quantify potassium in soil K. The amount of sulfur in the soil was determined using a flame photometer. The Atomic Absorption Spectrophotometer (AAS) method determines micronutrients in soil, such as Fe, Cu, Mn, or Zn. Standard procedures were used to measure water-soluble salts. [5, 6]

Result and Discussion

Table no.1.1 shows the values of physicochemical parameters in soil samples and industrial soil samples in each case throughout the summer season. The Indian Society of Soil Science recommended all of the results compared to the acceptable standard (ISOSS). A site I, Site II are the different sites. Dyes, bleaching chemicals, acid, metals, micro, and macronutrients Cr, Cu, Fe, Pb, Zn, and Mn are all flown into the Bhilwara RICO Industrial area without any or partial treatment. This untreated water is utilized to irrigate surrounding farmland. In all four rounds, the temperature of the polluted soil sample was higher than that of the forest soil, which could be related to chemical reactions in the effluents in the soil. [7, 8]

Table 1.1: Analysis of physicochemical parameters of soil samples After & Before lockdown selected study areas.

Site	Site I				Site II				Permissible limit
Sample	Before lockdown		After lockdown		Before lockdown		After lockdown		_
Parameters	Industrial soil	Agriculture soil	Industrial soil	Agriculture soil	Industrial soil	Agriculture soil	Industrial soil	Agriculture soil	_
Colour	Dark-brown	Black	Dark-brown	Black	Radish	Brown	Radish	Brown	NA
Temperature (°C)	14.2	13.9	14.o	13.5	12.1	13.0	11.25	12.28	NA
Ph	7.9	7.4	7.5	7.1	9.9	9.1	8.1	7.8	7-8.5
EC (µs/ms)	0.32	0.55	0.28	0.48	11.8	11.6	7.3	5.8	0-1
Organic carbon (%)	0.28	0.31	0.20	0.26	0.42	0.15	0.35	0.12	0.5-0.75
S(mg/l)	24.01	15.46	30.59	17.17	19.02	10.01	26.30	12.11	10-20
K(mg/l)	512	448	350	200	610	592	268	210	142-337
P(mg/l)	20	12	16	8	42	30	18	24	23-56
Fe(mg/l)	7.78	2.64	3.22	1.04	8.88	3.01	1.3	1.0	4.5
Cu(mg/l)	1.13	0.9	1.01	0.4	1.78	1.4	1.28	1.0	0.20
Mn(mg/l)	22.8	19.72	15.08	16.66	26.92	8.75	20.88	6.55	2.0
Zn((mg/l)	3.2	3.01	2.8	2.5	2.58	1.87	1.88	1.66	0.6

pH: The pH of the soil is a measurement of its acidity or alkalinity. ISOSS has determined a standard acceptable limit of 7-8.5 for agriculture soil. Before lockdown, the pH is agricultural soil 7.4 to 9.1, and industrial soil range is 7.9 to 9.9, and after lockdown, it is agricultural soil 7.1 to 7.8, and industrial soil range is 7.5 to 8.1. its content has decreased during the lockdown period. Figure 1.1.1

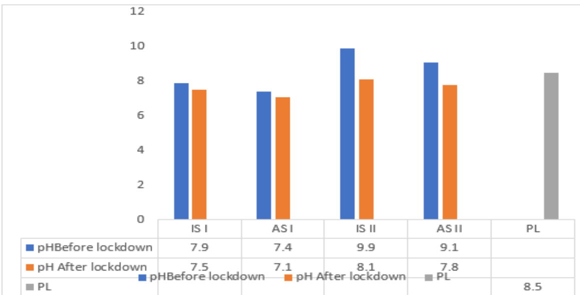

Figure 1.1.1 Variations in pH after & Before lockdown.

Electrical conductivity (EC): EC is highest in industrial and agricultural soil at site II before lockdown. In terms of soil type, Site I is medium. The range before lockdown is industrial soil 11.8 to 0.32 µs/ms, and the agricultural soil range is 11.6 to 0.55 after lockdown is 7.3 to 0.28 µs/ms. Its ISOSS-approved limit is 0-1 µs/ms. Figure 1.1.2

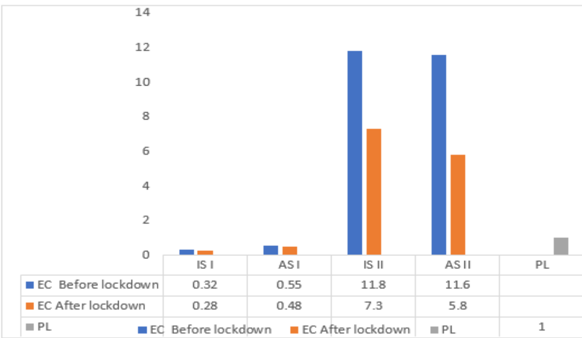

Figure 1.1.2 Variations in EC after & Before lockdown.

Organic Carbon (OC) %:

Organic carbon percentage in the soil before and after a lockdown range from 0.42 to 0.28 percent for industrial soil, 0.35 to 0.20 percent for industrial soil after lockdown, and 0.31 to 0.15 percent for agricultural soil before lockdown. Both sites have medium polluting after lockdown, with 0.26 to 0.12 percent. A range of 0.5 to 0.75 percent is allowed by the ISOSS. Figure 1.13

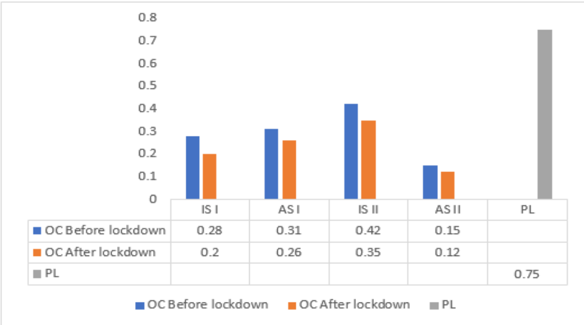

Figure 1.1.3 Variations in OC after & Before lockdown.

Sulfur (S): In industrial soil, sulfur concentrations vary from 30.59 to 24.01 mg/l before the lockdown range. The range after lockdown is 26.30 to 19.02 mg/l. Before the lockdown, the agricultural soil range was 17.17 to 15.46 mg/l. After lockdown, agricultural soil had a concentration of 12.11 to 10.01 mg/l. Site II is the most polluted, while site I am the minor pollutant. The ISOSS allows a concentration of 10 to 20 mg/l.Figure 1.1.4

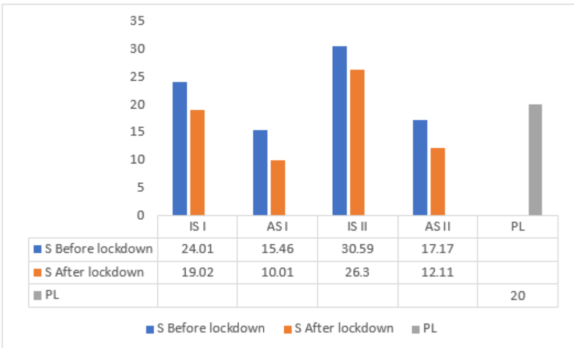

Figure 1.1.4 Variations in S after & Before lockdown.

Potassium (K): Before and after shutdown, potassium levels in the soil ranged from 610 to 512 mg/l in industrial soil. Industrial soil has a pH range of 350 to 268 mg/l after lockdown, while agricultural soil has a pH range of 592 to 448 mg/l before lockdown. After lockup, the content of agricultural soil is 210 to 200 mg/l. Site II is the most polluted, whereas site I am the least contaminated. The ISOSS allows a range of 142 to 337 mg/l. Figure 1.1.5

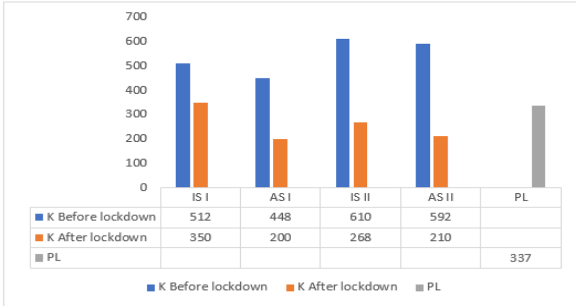

Figure 1.1.5 Variations in K after & Before lockdown.

Phosphorus (P):

The number of phosphorus ions present determines the quality of the soil. Following the lockdown, before and after. Before the shutdown, the industrial soil range is 42 to 20 mg/l. After the lockout, industrial soil rage is 18 to 16 mg/l. And agricultural soil ranges from 30 to 12 mg/l before lockdown to 24 to 8 mg/l after lockdown. Both sites are of medium difficulty. Its allowed maximum, according to the ISOSS, is 23-56 mg/l. Figure 1.1.6

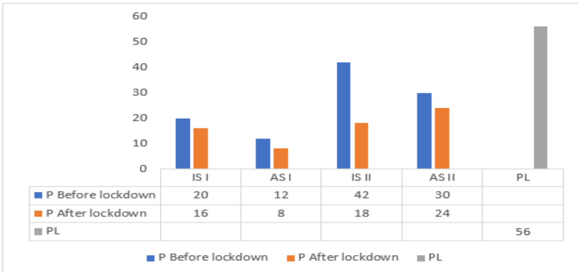

Figure 1.1.6 Variations in P after & Before lockdown.

Iron (Fe): Before and after the shutdown, the iron concentration in the soil was measured. Before the shutdown, the industrial soil range was 8.88 to 7.78 mg/l. After the lockdown, the concentration drops to 3.22 to 1.3 mg/l. Before the shutdown, the agricultural soil range was 3.01 to 2.64 mg/l. The content of agricultural soil following lockdown is 1.04 to 1.0 mg/l. Before lockdown, both locations were significant polluters. The ISOSS allows a maximum concentration of 4.5 mg/l. Figure 1.1.7

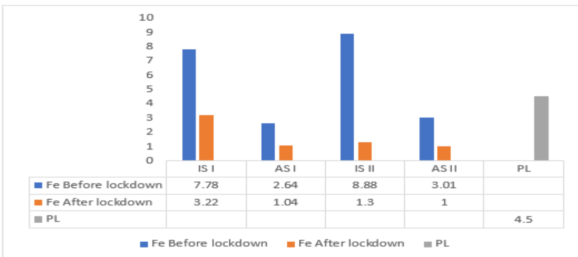

Figure 1.1.7 Variations in Fe after & Before lockdown.

Copper (Cu): The copper concentration in soil quality was measured before and after the shutdown. Before the shutdown, the industrial soil range was 1.78 to 1.13 mg/l. In industrial soil, the level is 1.28 to 1.01 mg/l after lockdown, whereas in agricultural soil, the amount is 1.4 to 0.9 mg/l after lockdown. Following the lockdown range, the range in agricultural soil is 1.0 to 0.4 mg/l. Before and after lockdown, both sites are highly polluted. The ISOSS acceptable limit for this substance is 0.20 mg/l. Figure 1.1.8

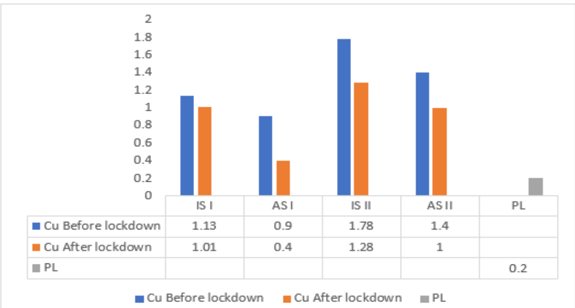

Figure 1.1.8 Variations in Cu after & Before lockdown.

Manganese (Mn): Before and after lockdown soil quality, manganese ion concentrations were measured. Before the shutdown, the industrial soil range was 26.92 to 22.8 mg/l. After lockup, industrial soil had a range of 20.88 to 15.08 mg/l. Before the shutdown, the agricultural soil range was 19.72 to 8.75 mg/l. Following a lockdown, the content in agricultural soil is 16.66 to 6.55 mg/l. In this area, both sites are significant polluters. The ISOSS allows a maximum concentration of 2.0 mg/l. Figure 1.1.9

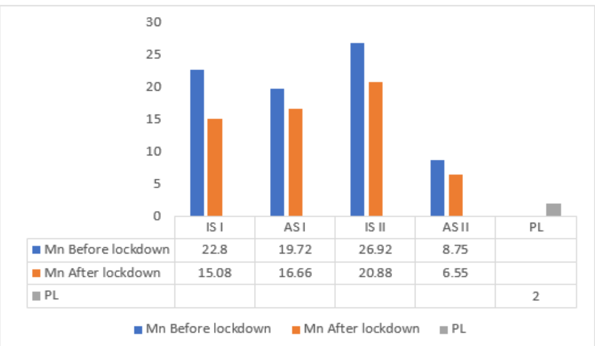

Figure 1.1.9 Variations in Mn after & Before lockdown.

Zinc (Zn): Concentration of zinc Before and after a soil quality lockdown. Before the shutdown, the industrial soil range was 3.2 to 2.58 mg/l. After lockup, industrial soil has a range of 2.8 to 1.88 mg/l. The content for agricultural soil is 3.01 to 1.87 mg/l. After lockdown, the range of agricultural soil is 1.66 to 2.5 mg/l. In this region, all locations have high levels of pollution. The ISOSS acceptable limit for this substance is 0.6 mg/l. Figure 1.1.10

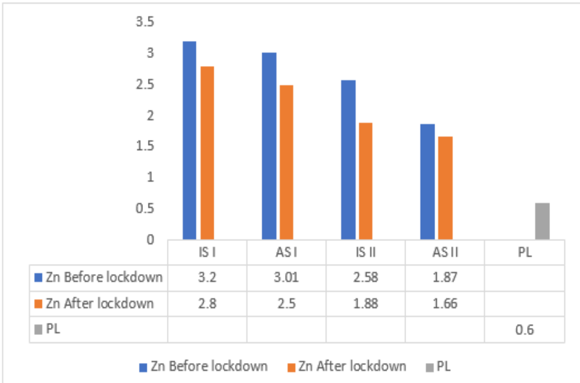

Figure 1.1.10 Variations in Zn after & Before lockdown.

Conclusion:

According to the data, there has been a significant decrease in the levels of all parameters in the city of Bhilwara (2021) following the implementation of strict lockdown due to COVID 19, compared to the previous level of 2019 to 2020 analyzed of Hamirgarh and Mandal Rico industries area Bhilwara water resources in summer seasons. Therefore, it is recommended that soil of good quality and maintenance of all parameters in the permissible limit is essential. Since the first COVID 19 case was confirmed in India, numerous companies have instituted a work from home drill using critical resources to understand whether remote working conditions are feasible. We have observed that soil quality also has limitations in this area and that others carried out by other sectors like agriculture and drinking purpose are suitable. Continuous monitoring of their quality parameters and their use as a supplement to industrial soil and agricultural soil will reduce the soil crisis of the city of Bhilwara.

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