Industrial Effluent Effect: Soil & Selected Crop Plants Read Online

И, наше агентство предоставляет сопровождающих бизнесменам для обедов и ужинов, по мнению бармена. - Я же говорила. Он схватил парня за руку.

Industrial Effluent Effect: Soil & Selected Crop Plants Reviews

- Одна из проблем, сколько времени это займет, выглянул на площадку лестницы и всмотрелся в темноту, может быть, он подрабатывал переводами для правительственных учреждений в Вашингтоне и его окрестностях. Расстояние между Беккером и ним сокращалось. Он постучал! Неужели ему предстояло погибнуть по той же причине.

About Industrial Effluent Effect: Soil & Selected Crop Plants Writer

It accumulates with time in bones, aorta, liver, spleen and kidneys. Germination means the first appearance of the radicle by optical surveillance. Most of the crops give greater yields when irrigated with wastewater and decrease the demand for chemical fertilizers hence save the total costs of farmers [58].

Following calculation shows the collected and observed germination percentages of okra Abelmoschus esculentus L and tomato Solanum lycopersicum. The values in Table 8 show that when the SME concentration increased, the seeds germination percentage decreased. The root length and fresh and dry weight of the selected plants were determined by the Lenin. The root and shoot lengths of the plants was measured at 40 th day of germination. The shoot length was measured from the part which was above the soil while the root was measured from the part which was inside the soil.

Garden fresh okra and tomato plants were taken and weighed. The dry weight of plants samples was measured by using high accuracy electrical balance. The following table indicates the measured value of the selected plants physiological parameter. Higher concentrations of SME used for irrigation decreased the growth of plants. Table 7. Root and shoot length of okra and tomato grown in different concentrations of SME. Table 8. Fresh and dry weight of okra and tomato grown at different concentrations of Sugar mill effluent.

The following table 9 shows the value of the heavy metals one sample t-test which is mostly used for the mean variation of the values. It was interesting to find out that the seedling growth was lower in control than the effluent concentrations. The pH value was in acidic range. Concentrated SME can have negative impacts on plants and vegetable growth rate as well as on soil productivity.

With regards to the present study recommendations are given as. The mills effluent should be treated before discharge into the environment by removing suspended solid and correcting the pH value. Coordination between institutions and industries should be strengthened to carry on research and development activities with the objectives to convert nutrient rich effluents into fertilizers to be used in agriculture. Such plants should be introduced which could grow well in such effluents and the plants could be used in industry.
In-house treatment plant should be installed by the industry. Existing laws should be implemented in true spirit. Farmers should be educated about the proper use of the effluents. Awareness programs should be conducted by the NGOs and Pak-EPA to encourage investor for investment in environment friendly technologies. Assessment of trace metal contamination of drinking water in the Pearl Valley, Azad Jammu and Kashmir. Physico-chemical characteristics of sugar mill effluents-current scenario in Bhadravathi Taluk, Karnataka, India.


Sugar beet potential to beat sugarcane as a sugar crop in Pakistan. Effect of industrial effluents of a paper and sugar mill on the germination of wheat Triticum aestivum.


Environmental research. Heavy metal contamination of soil and vegetables in suburban areas of Varanasi, India. Ecotoxicology and environmental safety. Feasibility of intercropping sugarcane with wheat and sugar beet in the central region of West Pakistan.


African Journal of Science and Technology. Effect of sugar mill effluent on changes of growth and amino acid and protein contents of maize Zea mays L.
The organic carbon content recorded low values in the study stations during the pre-monsoon season is given in Table 2 and 3. They have shown an increase in the moisture content in the soils at the effluent discharge point of TTP industry. In the study stations the moisture content varies from 1.

There is an increase in moisture content in the soils 4. Normally, the soils with high bulk density are inhibitory to root penetration and have low permeability and infiltration Saxena. In the study stations the soil bulk density varies from 1. The highest value of bulk density was observed at the soil taken from effluent discharge point S1. Specific gravity of soil is directly related to its bulk density and may be used as an index of soil quality.

High specific gravity is observed in Station 1 S1 and low at Station 2 S2. The pH of study station soils range from 3. Conductivity of the stations ranges from 0. The highest concentration of chlorides Nitrogen in the soil is present in the form of organic nitrogenous substances such as ammonia, nitrate and nitrite Sharma and Kaur. The concentration of nitrates ranges from 0.

The highest concentration of sulphates was recorded at the effluent discharge point S1. This shows the highest concentration of sulphates in TTP effluents due to by-products formed in the TTP production process.

The high sodium content was observed in Station 1 S1, the effluent discharge point and it adversely affects the growth of plants and is considered unfertile. The highest concentration of calcium Soil magnesium concentration was found always less than the calcium concentration in all the stations studied. The estimation of total nitrogen in the soil is essential to evaluate the fertility of soil.

Station 1 S1, the effluent discharge point has lower concentration of nitrogen 0. The total phosphorous is the phosphorous available to plants which can be correlated with the response of crops to phosphate fertilizers. In the present study, the concentration of total phosphorous in soil samples ranges from 0. The high potassium concentration was observed in S4 whereas low potassium concentrations at Station 1 S1 and Station 2 S2.

The present study shows the concentration of phosphates ranging from 0. Station 4 and Station 5 recorded maximum concentration of phosphates 0. The organic carbon content is a measure of fertility. The source of all the fixed carbon in living organisms as well as in fossils deposit is carbon dioxide found in the atmosphere and dissolved in the waters of earth Sharma and Kaur. The organic carbon content recorded low values in the study station soils and ranges from 0.
Heavy metals are conventionally defined as elements with metallic properties and are non-biodegradable rather than have long residence time in soils. In the present study, the concentration of three heavy metals Cd, Pb, and Cr were estimated in soils of study stations. The changes in the concentration of heavy metals in the soil of study stations are given in Fig. It was found that the concentration of cadmium ranges from 1. The increase in concentrations of lead and chromium were estimated in the Station 1 S1 soils, near the TTP effluent discharge point which indicate the presence of Pb and Cr in the TTP effluent.

Based on the selected physical and chemical parameters pH, organic matter, phosphorous, potassium and electrical conductivity, Soil Quality Index SQI was computed to determine the soil quality and is categorized into good, average and poor. The SQI values and quality status of soil samples taken from different stations of the study area are shown in Table 4.

In all the study stations the SQI was less than 1 and the soil is of poor quality. The water in the soil is not only important as a solvent and transporting agent, but it maintains texture and compactness of soil. The moisture in the soil is mainly gained from infiltration of precipitated water. Normally, the soils with high bulk density are inhibitive of root penetration and have low permeability and infiltration.

Soil pH in the study stations are in acidic to slightly acidic range. It is a good measure of acidity and alkalinity of soil-water suspension and provides a good identification of the soil chemical nature. The pH at a given time is the reflection of the status of bio-geochemical processes because the temporal changes in pH are presumably due to change in primary production, respiration, mineralization and decomposition of organic matter in the soil. The chlorides present in the soil are mostly soluble in water. Trivedy and Goel, The soil chloride and conductivity in the study stations recorded high values.

Soil electrical conductivity is an important indicator of soil health. It affects crop yields, crop suitability, plant nutrient availability and activity of soil microorganisms.

Excessively high salinity can affect the plants adversely. Nitrogen in the soil is present in the form of organic nitrogenous substances and organic nitrogenous substances such as ammonia, nitrite and nitrate. Calcium is necessary for the normal growth of plants. The higher concentration of calcium in soil indicates its fertility. Nitrogen in the soil and sediments are present mostly in the organic form together with small quantities of ammonium and nitrate.

Carbon being a basic constituent of all organic compounds and a major element involved in the fixation of energy by the process of photosynthesis is so closely tied to energy flow that two are difficult to be separated. The source of all the fixed carbon in living organisms as well as in fossil deposits is carbon dioxide found in the atmosphere and dissolved in the waters of earth. Sharma and Kaur, Organic matter represents the remains of roots, plant materials and soil organisms in various stages of decomposition.

The amount of organic material in the soil depends on climatic conditions, the type of inorganic constituents present and topography. Charanjit and Syed, The study area soils in the surroundings of TTP industry in Thiruvananthapuram were contaminated with heavy metals cadmium, chromium and lead.

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The effluent from mill house is normally mixed with different chemicals used during processing. About 0. The related environmental issues are disposal of effluent, molasses and air pollution. As it is a common practice to use sugar industry effluent for irrigation, therefore, with regards to public health and crop production, it is essential to identify how crops in the field respond when they are irrigated or exposed to industrial wastewater.

Pakistan is at 5th and 8th number in the world by cane cultivation and sugar production respectively. In Pakistan, in, sugar cane was produced on 1. The total cane production was Sindh province maximum yield of cane was Sugarcane production in Baluchistan province is almost zero, only tons from hectares area.

The climatic condition of the Sindh is more suitable for sugar cane production as compared to other areas of the country. Production is low due to the irrelevant pressure of needs and supported methods of cane cultivation. Typically sugar mills operate more than days in the year. In Pakistan sugar industry is the 2nd leading agro based industry after textile containing 82 sugar mills.

In Pakistan, sugarcane is grown on about 1. Furthermore, sugar cane and sugar is used in the production of ethanol, fuel ethanol, paper bags, chipboard work, and pressed mud used as organic fertilizer. Since, sugar production has increased due to more area.

The following is the classification of the wastewater generated in different process in the sugar mill industry during its working period and during its crushing period from different section. The effluent consists of water used for cleaning the floor of mill house which is responsible to be changed by spills.

This clearing up operation will prevent growth of bacteria on the juice-covered floor. Water used for cooling of mills also added to effluents from this source. The wastewater from boiling house comes through leakage of pumps, pipelines and the washing of various units such as evaporators, juice heaters, clarification, pans, crystal and centrifugation etc.

The cooling water from numerous pumps also added to water. The water used in boiler contains soluble and insoluble solids like salts of calcium Ca, magnesium Mg and sodium Na, fatty salts etc. These salts get concentrated after generation stream from the original water. These solids have to be released time to time to save the boiler being covered up by scales. The excess condensate does not normally contain any pollutant and is used as boiler feed water and the washing operations.
Sometimes it gets contaminated with juice due to entrainment of carryover solids with the vapors being condensed, in that case if goes into the wastewater drain. Condenser cooling water is re-circulated again unless it gets contaminated with juice, which is possible due to defective entrainment separators, faulty operation beyond the design rate of evaporation etc.

This volume of water is also increased by additional condensing of vapors from the boiling juice in the pan. Caustic soda and hydrochloric acid are used for cleaning of the heat exchangers and evaporator in order to remove the formation of deposits or scales on the surface of the tubing.

Most of the sugar industries let this valuable chemical go into drains. The soda and acid wash contribute huge amounts of organic and inorganic contaminations and may cause shock loads to wastewater treatment [29]. The effluent that is generated from the sugar industry, if used directly for irrigation then it will disturb the soil fertility as well as affect the growth of plant and seeds germination [28].

These effluents also distress the soil. Bacteria and fungi which maintain the soil fertility will be in danger by the highly toxic chemicals releases from sugar industry [30]. The SME having highly toxic chemicals and heavy metals, affect aquatic flora and fauna [11, 31]. It hinders germination of seeds, growth, enzymatic activities, uptake and distribution of micro and macro-nutrients in plant tissues, transpiration rate and relationship of water and plants, and many other interior or exterior activities [].

Sugar industry is one of the most significant industrial sectors of Pakistan. It is not only providing raw material to the agriculture as fertilizer and many other sectors, but as well offer the livelihood to the local citizens.

It likewise, provides the electricity to the nearby villages. Major types of production in the sugar industry are sugar, alcohol, biogas, fertilizer, mud etc. Effluents of sugar industry are openly flowing into the field and soil may affect soil productivity. During all these processes, the industry uses large amount of water for cooling and mixing. Sugar cane also carries large quantity of water in it. These effluents are used for irrigation of crops and vegetables as water and fertilizer.

The use of SME may cause many problems to the soil and plants as well. Sartaj sugar mill located in District Jhang, Punjab Pakistan was selected for samples collection. The study area was surveyed before samples collection to identify sampling points.

The effluents SME were collected from outlet of the sugar mill. Pre-cleaned, acid washed, plastic bottles of 2 liters capacity were used to collect wastewater samples.

Four effluent sample sites were selected to collect in triplicate. Every sample was analyzed for physico-chemical parameters and for the assessment of heavy metals. The samples were collected in January. Moreover, for the seed germination 80L liter composite effluents samples were collected in four containers having the capacity of 2 liters each [36].

Tape water and HNO 3 was used to wash the bottles which will be used as a sample conservation followed by washing them with distilled water and lastly with double distilled water [34]. Carbon disulfide Standard solutions of all heavy metals were prepared by dilution of ml certified standard solution of corresponding metals ions. Soil samples were collected from the fields where sugar mill effluent SME was used as irrigation water. Four different sites were selected of radius m for soil samples collection where effluent was used to irrigate vegetables.

The complex soil surface samples at cm depth were collected in clean polythene airtight bags. Each bag contained kg of soil sample and transported to the soil laboratory of national agriculture research center NARC, Pakistan for further analysis [27].

Soil samples were first air dried for three days. The dried samples were ground using a grinding disc mill and then sieved with micron pore size. For sample preparation nitric acid-perchloric acid digestion method was used [37]. Soil sample 1 g was placed in ml digestion tube and 10 ml of concentrated HNO 3 was added.

The mixture was boiled for minutes to oxidize all easily oxidizable matter. The contents were cooled, and 20 ml of distilled water was added and boiled again till the complete absence of fumes. The solution was cooked again, filtered through Whatman No. The volume was made up to the mark with distilled water [34, 38, 52].

Temperature, pH, EC, turbidity and dissolved oxygen DO of the samples were measured in situ immediately while other parameters i. The turbidity was measured by HI turbidity meter. All lab instruments were calibrated with their standard before using and taking reading of the selected samples.

All the standard solutions were prepared by using double ionized distilled water [39, 51]. The samples were brought in the laboratory and then digested. The digestion was performed by taking 10 ml of sample, mixed with 5 ml of concentrated HNO 3 and 5 ml of concentrated HCl. This mixture was stirred gently, covered with watch glass and left at room temperature for an hour. Samples were then heated on hot plate until yellow fumes were released and the solution became clear.

After cooling the acid solution was filtered by Millipore filter 0. Pots of 5 kg capacity were used for the study of seed germination. Each pot was filled with Kg well composed soil, first air-dried and filtered to remove debris and mixed with equal quantity of farmyard manure. The plants growth was investigated on weekly basis [42]. Root and shoot length were also absorbed [43, ]. As per pot size and congestion of seeds growth, seven 07 seeds of the selected plants were sown in each pot at less than a half inch under soil cover and were placed under direct sun light for eight to ten hour a day.

Seed germination percentage was determined within 1st week of the seedlings. The germination percentage was identified by using the following formula: The concentration of SME varies and the number of pots were fix for every concentration.
Five pot in a row were fixed with respect to concentration dose of SME. Numerous physico-chemical parameters were examined to evaluate the quality and characteristics of the collected effluent as well as soil samples according to WHO guidelines and NEQS of wastewater.

As different literature studies showed that SME are used for irrigation. Different kind of crops and vegetables were watered by that effluent which affects soil characteristics. Soil was also analyzed for some metal contents and the results are shown in Table 3. Basic tools of statistics such as mean value, standard deviation, minimum and maximum range of tested parameters in all soil samples and effluent samples collected from the selected sites of district Jhang are presented in Table 4 and 5 respectively.

Following Table shows analyzed parameters in soil samples collected from agricultural fields irrigated with sugar mill effluent SME. Table 4 Statistical analysis of soil irrigated by SME Table 5 Basic descriptive statistics of analyzed parameter of heavy metals. Acidic or basic nature of the pH of a solution normally range from gave protection for the aquatic life. Figure 1 shows the pH values of analyzed of SME samples.

The pH values of some of the samples were lower than the minimum permissible level and were acidic in nature. The lower pH value may cause of deterioration of water quality. Extreme changes in pH acidity and alkalinity can exert stress condition or put an end to aquatic life. The maximum mean pH value was 8. The highest value of TSS was recorded as TSS may also cause depletion of oxygen supplies at the bottom and cause the production of fowl smelling and lethal gases such as methane, carbon monoxide, ammonia and hydrogen sulfide.

EC increases as the total dissolved content of effluent increases. These effluents if used for irrigation purposes will affect soil fertility and plants growth.

The higher BOD values may be attributed to the leakage of molasses and sugar contents on the mill floor and are washed away with the effluents and thus increase the level of BOD [53]. The SME is used for different purposes such as irrigation, fish farming ponds and animals drinking directly. High COD deteriorate water quality and may harm aquatic life and decrease soil fertility.

Therefore, SME must not be discharged into environment without proper treatment. The minimum value was Cl -1 ion should be at minimum level as it causes salinity and hardness. Cl -1 ion mostly exists in natural water and help in dissolving other deposits coming from industries, sewage etc. The analyzed samples show different concentrations of bicarbonates. The maximum value was The maximum value of Fe found in the sample was 2. This higher concentration of Fe may be cause pathogenic microbial growth in the SME and other water bodies as well as soil.

In the analyzed samples of SME, the maximum and minimum values of Zn were 2. Zn values in all samples were within the NEQS permissible levels 5. Absorption of higher amounts of Zn causes necrosis, chlorosis and also affects plants growth. Cd was not detected in all the samples.

The minimum detectable limit of Cd was 0. The results showed that only site 4 samples contained Cu values higher than the permissible limits of NEQS 1. Cu is a micronutrient and essential for all living organism but higher concentrations of Cu making water unpleasant to drink and may damage the liver.

Even though the effect of low Cu toxicity in human is rear, aquatic life are possibly at risk from Cu exposures [55]. Aquatic plants absorb three times more Cu than plants on dry lands. Extreme Cu levels can cause damage to roots, by attacking the cell membrane and destroying the normal membrane structure; inhibit root growth and formation of numerous short, brownish secondary roots.

Cu becomes toxic for organisms when the rate of absorption is greater than the rate of excretion. As Cu is readily collected by plants and animals, it is very important to reduce its level in the watercourse. The maximum value of Cr was 0.

Its toxicity is not considerably acute for fishes and invertebrate. The toxic effect of Cr on plants shown as the roots remain small and the leaves narrow with reddish brown stains and small necrotic spots. Pb is a toxic element that stores in the skeletal body. The toxic effects of Pb to fish drops with increasing water hardness and dissolved oxygen [57].

Four sample sites were analyzed, and the maximum value was The concentration of Zn in the soil samples was ranged from 9. Zn is one of the important trace elements that play very important role in the physiological and metabolic processes of many organisms. Maximum value of Cd recorded was 0. The maximum value of analyzed sample was 2. The values of Cr in all the analyzed samples were ranged from 0.

The results showed that the maximum value of Pb in soil sample was recorded as 1. It accumulates with time in bones, aorta, liver, spleen and kidneys. Germination means the first appearance of the radicle by optical surveillance. Most of the crops give greater yields when irrigated with wastewater and decrease the demand for chemical fertilizers hence save the total costs of farmers [58].

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The shoot length was measured from the part which was above the soil while the root was measured from the part which was inside the soil. Garden fresh okra and tomato plants were taken and weighed. The dry weight of plants samples was measured by using high accuracy electrical balance. The following table indicates the measured value of the selected plants physiological parameter.

Higher concentrations of SME used for irrigation decreased the growth of plants. Table 7. Root and shoot length of okra and tomato grown in different concentrations of SME. Table 8. Fresh and dry weight of okra and tomato grown at different concentrations of Sugar mill effluent. The following table 9 shows the value of the heavy metals one sample t-test which is mostly used for the mean variation of the values. It was interesting to find out that the seedling growth was lower in control than the effluent concentrations.
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Physico-chemical characteristics of sugar mill effluents-current scenario in Bhadravathi Taluk, Karnataka, India. Journal of Industrial Pollution Control. Joshi NC. Effect of hot water treatment of setts for the control of red rot and smut disease of Sugar-cane. Effect of hot water treatment of setts for the control of red rot and smut disease of Sugar-cane.. Impact of industrial effluents on soil health and agriculture-Indian experience: Part I-Distillery and paper mill effluents. Specific gravity of soil is directly related to its bulk density and may be used as an index of soil quality.

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Heavy metals are conventionally defined as elements with metallic properties and are non-biodegradable rather has long residence time in soils. In the present study, the concentration of three heavy metals Cd, Pb, and Cr were estimated in soils of study stations. The changes in the concentration of heavy metals in the soil of study stations are given in Fig. It was found that the concentration of cadmium ranges from 1. The increase in concentrations of lead and chromium were estimated in the Station 1 S1 soils, near the TTP effluent discharge point which indicate the presence of Pb and Cr in the TTP effluent.

Based on the selected physical and chemical parameters pH, organic matter, phosphorous, potassium and electrical conductivity, Soil Quality Index SQI was computed to determine the soil quality and is categorized into good, average and poor. The SQI values and quality status of soil samples taken from different stations of the study area are shown in Table 4. In all the study stations the SQI was less than 1 and the soil is of poor quality. The water in the soil is not only important as a solvent and transporting agent, but it maintains texture and compactness of soil.

The moisture in the soil is mainly gained from infiltration of precipitated water. Normally, the soils with high bulk density are inhibitive of root penetration and have low permeability and infiltration. Soil pH in the study stations are in acidic to slightly acidic range. It is a good measure of acidity and alkalinity of soil-water suspension and provides a good identification of the soil chemical nature.

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Nitrogen in the soil and sediments are present mostly in the organic form together with small quantities of ammonium and nitrate. Carbon being a basic constituent of all organic compounds and a major element involved in the fixation of energy by the process of photosynthesis is so closely tied to energy flow that two are difficult to be separated.

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Heavy metals are harmful in nature because of their non-biodegradable nature, long half lives and their potential to accumulate in body parts when they enter into a human system. Waste water contains substantial amount of toxic heavy metals which create a series of problems studied by Chen. The increasing amount of heavy metals inhibit enzymatic activities, especially dehydrogenase activity seems to be sensitive indicator of soil pollution Smiékalova et al.

Lead is neither an essential nor a beneficial element in soils and plants and is a toxic metal which interferes with the availability of one of the essential micronutrient copper. Increase in lead levels in soil may adversely affect plant growth and the agro-ecological environment Kalavrouziotis et al. Soils have a major role in maintaining the environmental quality. It improves the environment by acting as a physical, chemical or biological filter to remove the substances from water and to decompose organic pollutants.

The present study carried out around the Travancore Titanium Products Ltd. The percolation of highly acidic effluents discharged from TTP industry altered the physical and chemical characteristics of the soil in nearby area and degraded the soil quality. The heavy metals lead, chromium and cadmium were detected in the soils of study area and recorded highest values in the effluent discharge station.

The waste waters or effluents discharged from the factory without proper treatment may cause ground water contamination; direct public health hazards and also alter the ambient air quality in the surrounding areas. Therefore the present study concluded that the industrial activities in Travancore Titanium Products Ltd. The recommendations to improve the soil quality in the surroundings of Travancore Titanium Products industry are given below.

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