iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** I **Month of publication:** January 2019

DOI: http://doi.org/10.22214/ijraset.2019.1091

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue I, Jan 2019- Available at www.ijraset.com

Evaluation Study Observations Involving the Concentration of Pharma Industrial Effluent and its Potential Applications for Seed Germination Processes

D. Rama Rao[1], M. V. K. Mehar[2]
[1]*Department of Chemistry, P.R. Govt College (A), Kakinada,E.G.Dt.,AP State, India*
[2]*Department of Physics, GDC, Aalamuru, E.G. Dt., AP State, India*

Abstract: ***The present research study has been undertaken to physicochemical characterization and seed germination growth of some selected plants. The pharma industrial effluent contain some effected chemicals that can contaminate water and soil may affect the common crops by using this water for agriculture purposes. Experiment were conducted to analyze whether pharmacy industrial effluent used to irrigation crops is aloud or not. Germination seedling of Red Gram, Coriander and Brinjal plants were treated with different dilutions of effluent like (50 %, 25%, 15%, and 0%) and their effect was calculated on various parameters like %, germination, shoot length, From the results of experiment, The wastewater is also analyzed for the major water quality parameters, such as pH,EC, Chemical Oxygen Demand (COD) and Total Dissolved Solids (TDS), TSS,TOC, Chloride, and Plant growth studies. the results of present study revealed that direct effluent water is not secure for irrigation but in case of lack of water, Pharma industrial effluent could safely be used for agriculture purposes after proper dilution***
Keywords: Physicochemical, Contaminate, Germination, Microorganisms, Agriculture

I. INTRODUCTION

The pharmaceutical industry is extremely vital role to the economy of every country and drugs are so priceless that no nation can survive without them. Studies[1] have revealed presence of many active ingredients of drugs in surface- and groundwater at level of consequence to safety in the environment. Many reports have been published that proves the widespread occurrence of these pollutants in waste water, surface water and ground water[2]. Water consumption and wastewater discharge of pharmaceutical industries are quite large. The wastewater of pharmaceutical formulation as well as bulk drug industries contains many organic and inorganic matters. Effluents generated by industries are one of the most important sources of pollution. Contaminated air, soil and water by Effluents from the industries are associated with many disease[3] and this could be part of the reasons for the current shorter life expectancy [4]when compared to the developed nations. Proper treatment system in Pakistani industries is recommended to meet the international standards, but presently less than 10% of the waste water generated is treated and the rest of untreated water is discharged into the nearby water bodies. The use of industrial effluents for irrigation has emerged in the recent past as an important way of utilizing waste water, taking the advantage of the presence of considerable quantities of N, P, K[5]. But there can be both beneficial and damaging effects of waste water irrigation on crops including vegetables. Germination percentage: The formula given by Rehman *etal.*[6]was used to estimate germination percentage. Germination % = no. of seeds germinated/ total no. of seeds × 100 Root and shoot length: Length of root and shoot of seedlings.Extensive studies have been done to reflect the effect of industrial effluents on growth and yield parameters of agricultural crops and soil properties. Hence considering all the good and bad effects of industrial effluents on crop plants, the present study was conducted by using effluents obtained from pharmaceutical industry as a source of water to germinate seedlings of three vegetable crops

II. MATERIALS AND METHODS

Effluent samples were collected cleaned polythene bottle from the point of discharge at the pharmaceutical Industry. The water sample was filtered through what man paper and kept at 25°C.Certified seeds of three selected plants were purchased from the local market i.e. Coriander, Read Gram and Brinjal Plants. The parameters pH, Electrical conductivity,Potassium, Nitrogen, Phosphorous effluent composites with black soil in 1:1 are employed for the shoot level cultivation trials for studies on germination and seedling growth of four vegetable crops with black soil as control. Liquid effluent from Pharmaceutical industries is characterized and the data is presented in the given Tables.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue I, Jan 2019- Available at www.ijraset.com

Table 1:Physicochemical parameters of Pharma Industrial liquid Effluent

Sl No	Name of the Parameters	Parameter value mg/l
1	pH	7.41
2	Electrical Conductivity	23710
3	Total Dissolved Solids	15174
4	Total suspended Solids	643
5	DO	3.40
6	COD	1473
7	BOD	523
8	Oil &Grease	5.30
9	Total organic Solids	197
10	MPN Count	835/100 ml

Table 1.1**:** Seeds germination percentage of three plants grown in water and Pharmaceutical Industrial waste water Coriander plant Growth studies with water and Pharmaceutical industry waste water Different % Variations

No of days & Plants Growth	Plant growth with water	15%	25%	50%
5 Day	1.2 Cm	1.5 Cm	1.1 Cm	16 Cm
10 Day	7.6 Cm	6.7 Cm	5.9 Cm	7.2 Cm
15 Day	11.5 Cm	12.9 Cm	9.1 Cm	12.5 Cm
20 Day	13.4 Cm	16.7 Cm	14.1 Cm	1426 Cm

Table 1.2: Read Gram plant Growth studies with water and Pharmaceutical industry waste waterDifferent Variations

No of days & Plants Growth	Plant growth with water	15%	25%	50%
5 Day	1.2	1.1	15%	25%
10 Day	2.8	2.8	3.2	3.0
15 Day	11.5	9.1	12.9	12.5
20 Day	13.4	14.3	17.1	14.6

Table.1.3 Brinjal plant Growth studies with water and Pharmaceutical industry waste water

No of days & Plants Growth	Plant growth with water	15%	25%	50%
5 Day	0.4 Cm	0.7 Cm	0.3 Cm	0.5 Cm
10 Day	1.9	1.7	221	1.8
15 Day	3	3.2	3.7	3.5
20 Day	4.1	4.6	5.3	5

Fig. a- Coriander plant Growth studies

Fig b. Read Gram plant Growth studies

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Fig c. Brinjal plant Growth studies

The physical and chemical parameters for the effluents the effluent analysis were determined using standard methods (Ademoroti, 1996, Alloway**,** 1996). In situ analysis was carried out to determine pH determination is carried out by electrometric method, which is the most accurate and free of interference. while the samples for dissolved oxygen were fixed with 8 drops each of Manganese Sulphate ($MnSO_4$, $5H_2O$) and alkaline iodide before taken to the laboratory for analysis.

A. Sample Collection

Effluent sample was collected from the point of discharge at the pharmaceutical Industry for characterization of physicochemical, Biochemical and MPN count analysis. Collected effluent Sample stored in cleaned polythene bottles and refrigerated at 4**°**C before use.

B. Dissolved Oxygen (DO)

About 250 cm^3 of the water sample was placed in a bottle followed by the addition 2ml of manganese sulphate solution and 2cm^3 alkaline iodide solutions well below the surface of the liquid. The solution was thoroughly mixed for precipitate to settle. Concentrated H_2SO_4 acid (2cm^3) was added, allowing the acid to run down the neck of the bottle. The bottle was stoppered and mixed gently until dissolution was complete. 100ml was taken and titrated with standard sodium thiosulphate using starch indicator.

C. Chemical Oxygen Demand (COD)

The determination is achieved by using strong oxidizing agents (e.g. potassium dichromate) under acidic conditions. Oxygen is released some is used to oxidize an equivalent amount of the waste to carbon (IV) oxide and the unused is determined by titration with a reducing agent of known strength (ferrous ammonium sulphate) using ferroin indicator. The amount used for the oxidation of the waste is known by difference.

D. Biochemical Oxygen Demand (BOD)

The BOD test essentially consists of measurement of dissolved oxygen content of the sample before and after incubation at 20^0C for 5 days. The BOD equals the amount of oxygen consumed as a result of the oxidation of dissolved organic matter in the sample.

E. Total Suspended Solids (TSS)

Total suspended solids were determined by shaking and taking aliquot of the water sample and filtering through a pre-weighed membrane filter. After drying the filter at 105^{o}C to constant mass the weighing process was repeated. The difference in mass in relation to the quantity of water used is a measure of the TSS.

F. Total Dissolved Solids (TDS)

The TDS was determined using the portable HM DIGITAL EC/TDS/Temperature COM – 100 meter after standardizing the meter with 312 ppm, NaCl solution and the readings were taken directly from the meter.
Equations: TDS=Total soilds-Suspended Solids

III. RESULTS AND DISCUSSION

The results of present research study showed that direct pharmaceutical effluent directly is not suitable for irrigation purposes but after proper processing and dilution of effluent could use for safely in irrigation purpose.Table-1.1 is showing industrial effluent interaction with different dilutions with black soil and Coriander plant germination studies of compositely highest growth observed in 15% sample, Table 1.2 is presenting industrial effluent interface with different dilutions with black soil and Red Gram plant germination studies of compositely highest growth observed in 25% sample and Table 1.3 is indicating the industrial effluent influence with different dilutions with black soil and Brinjal plant germination studies of compositely highest growth observed in 25% sample.

IV. CONCLUSIONS

The research results of analysis carried out on effluents, from the pharmaceutical Industry. The analyzed parameters are pH 7.5 , EC 26760(µmohs)/cm,DO 3.2mg/l, Total organic solids 193mg/l, Total Suspended Solids 667mg/l, COD 1551 mg/l, BOD 584 mg/l, Total Dissolved Solid, 16780 mg/l,MPN count 764/100 ml, while Oil and Grease 4.50 mg/l. The physicochemical parameters of EC,TDS,COD,BOD,MPN count and TSS exceeded the permissible limit. It was concluded from the present study that the morphological characters like plant germination. The biochemical parameters like germination% and plant growth was not significantly affected at 15% in Coriander, 25% Red gram and 25% of Brinjal plants. So it was recommended that undiluted pharmaceutical effluents would be properly treated and diluted before being used for irrigation purpose

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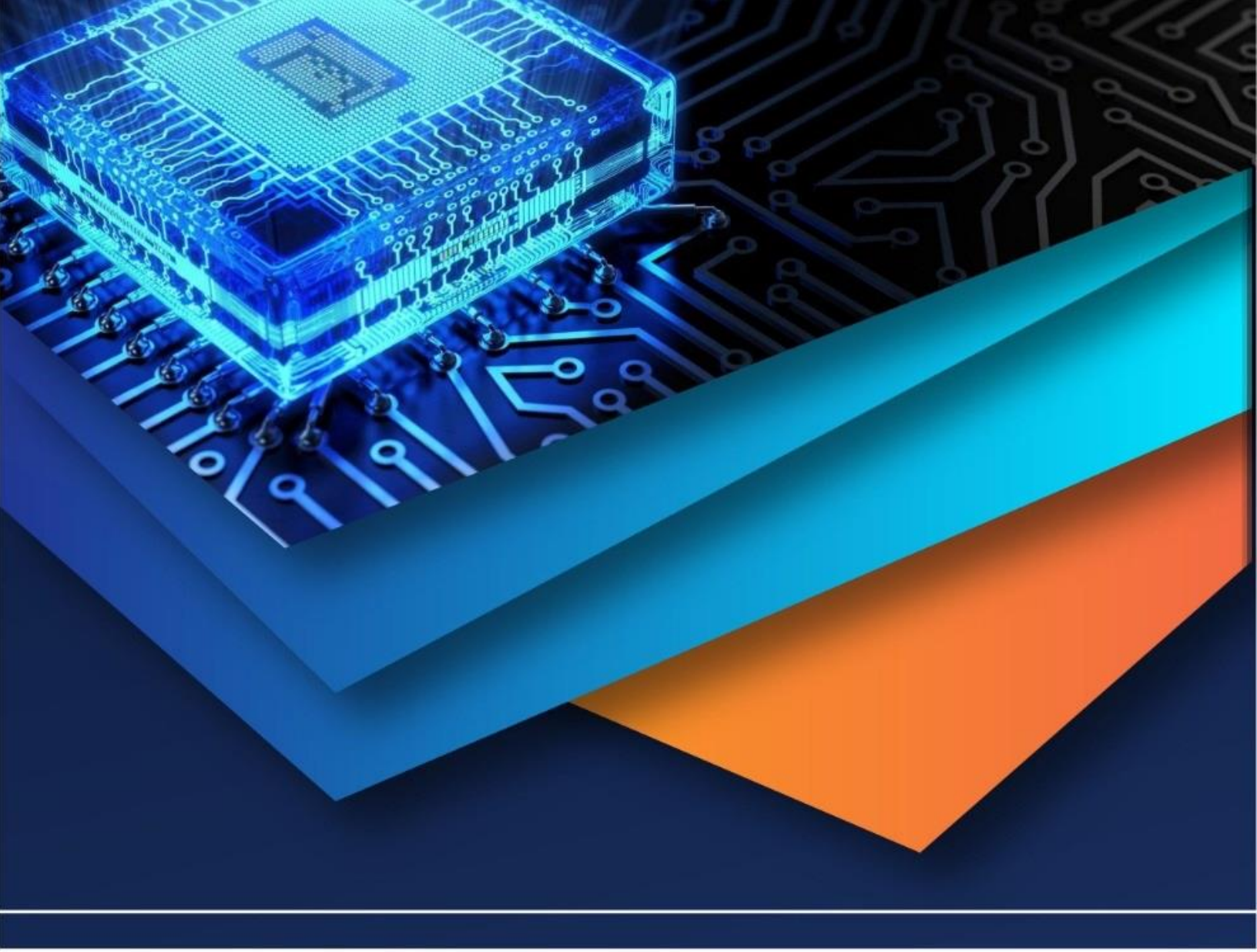

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