*Plant Archives* Volume 19 No. 2, 2019 pp. 4577-4580 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

# ISOLATION OF SOME BACTERIAL SPECIES FROM CONTAMINATED SOIL BY WASTEWATER

**Afrah Abdulla Jasim**

Department of biology, University of Samarra, Samarra, Iraq

## Abstract

Experiment cured out to ovulation effluent wastewater in bacterial committee in irrigated soil. Three sites selected as source of effluent (restaurant, dairy and car wash). Soil irrigated with raw wastewater and prepared by series of dilutions was made to get the final dilution factor to determine the number of CFU/ g . The results showed the number of bacterial colonies in irrigated soil using untreated effluent recorded significant increase in number of bacterial colonies. Maximum colonies count was recorded in irrigated soil with restaurant and dairy (8. 44, 8.4 and 8.2) and (9.5 ,9.3 and 9.2) raw wastewater respectively.

***Key words :*** Isolation, Wasterwater, Bacterial Species, Contaminated soil

## Introduction

Generally, wastewater is generated from domestic and industrial sources. The wastewater at existing facilities will be analysed to determine its characteristics and constituents as require, using analytical methods given in the American Public Health Association (APHA) publication, Standard Methods for the Examination of Water and Wastewater and as approved by the Environmental Protection Agency Paul (2010). Rani *et al.,* (2007) studied environmental side effects for textile mill's wastewater irrigation on soil microbes. The findings suggested that irrigation with textile wastewater not only alters the soil chemistry, but also effects on bacteria environment. The microbial population in soil contaminated with abattoir effluent was investigated using the spread plate method. The results revealed a high mean count of 3.70 $\times 10^6$ CFU/g and 1.40×104 CFU/g for bacteria and fungi respectively. Gallardo *et al.,* (2010) suggested that sludge from Kraft mill wastewater treatment may have potential as a beneficial soil amendment for improving biological properties of the soils. The sludge application at different rates increased the microbial activity and enzymatic activity of the sludge amended soils significantly. The maximum levels of activity were observed between 15 and 30 days after sludge application in the soil. Banupriya and Gowrie (2012) studied micro flora of the soil irrigated using dairy effluents.

## Material and Methods

### Soil Microbiology Analysis

The collected soil samples were from Samarra City. Soil samples were prepared by series of dilutions was made to get the final dilution according to (Balkwill and Ghiors, 1988).

### Preparation of Media Culture

Media culture to growth the fungi and bacteria were prepared and adopted the procedure of Obagwu and Korsten (2003). The experiment was performed under aseptic lamina conditions and replicated thrice. Soil solution 0.1 ml of (conc.$1 \times 10^6$ $ml^{-1}$) was added by pipette to the amended PDA and NA in petri dishes previously prepared. Inoculated plates were incubated at $27^0$C for 7 days for fungi and at $37^0$C for two days for bacteria. Colonies were counted using a plate counter. After counting the colonies, they were multiplied by the appropriate dilution factor to determine the number of CFU/ g in the original sample by the standard equation (1) below (Harley and Prescott, 2007).

$$(CFU)^0 = \frac{1}{\text{(Dilution factor used to make plate for colony count)}} \quad (1)$$

*X number of colonies*

Where:

CFU= Colony Form Unit

### Statistical Analysis

Statistical analysis was carried out by using statistical software SPSS version 19- 2012 (SPSS Inc., Chicago, USA). One way ANOVA was used to analyse the experimental results of dependent variables and obtain the effect of independent variables. Significant differences between mean values were determined using Duncan's Multiple Range test (DMRT) (P= 0.05) following ANOVA statistical analysis, which were performed using SPSS. All data presented were expressed as mean ± standard error.

## Result and discussion

A current study was undertaken to assess treated effluent irrigation on soil microbial in irrigated soil. The number of bacterial colonies in irrigated soil using untreated effluents presented in the Table 1. The results showed significant increase from untreated wastewater in number of bacterial colonies. Maximum colonies count was recorded in irrigated soil with untreated wastewater.

From Fig.1 advance treatment showed significant difference than, other treatments in site.1 which recorded lower number of bacterial colonies (CFU/g). The number

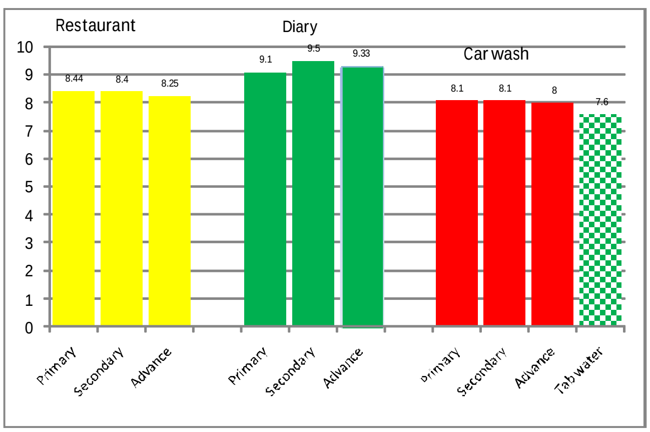


**Fig. 1:** Effect of irrigation untreated effluents on number of bacterial colonies (CFU/g) in irrigated soil.

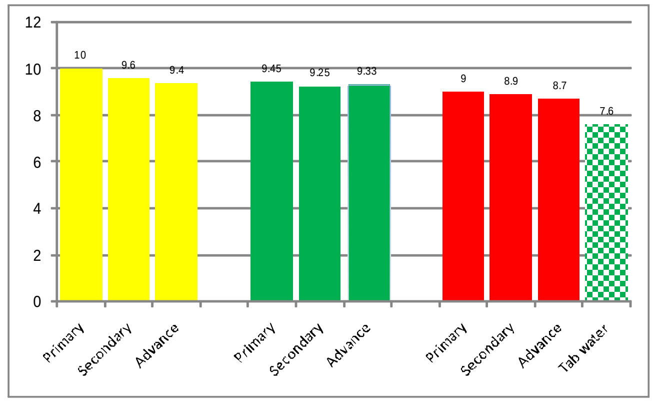


**Fig. 2:** Effect of irrigation untreated effluents on number of bacterial colonies (CFU/g) in irrigated soil in site.2.

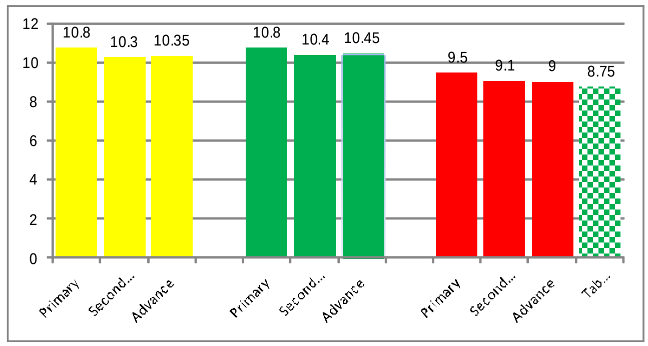


**Fig. 3:** Effect of irrigation untreated effluents on number of bacterial colonies (CFU/g) in irrigated soil in site.3

of bacterial in soil irrigated with effluent recorded (8. 44, 8.4 and 8.2) with restaurant, while diary and car wash reached (9.5, 9.3 and 9.2) and (8.1, 8.1 and 8) respectively.

Fig.1 Effect of irrigation untreated effluents on number of bacterial colonies (CFU/g) in irrigated soil.

In site. 2 the result recorded height number of bactria colony with primary treatment in restaurant effluent with values were ( 10, 9.6 and 9.4), followed by dairy effluent (9.45, 9.25 and 9.33). While less number of colony registered with effluent treated of car wash at all

**Table 1:** Effect of irrigation untreated effluents on bacterial colonies (CFU/g) in irrigated soil

| Treatments | Restaurant | | | Diary | | | Car wash | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Site.1 | | | | | |
| | Primary | Secondary | Advance | Primary | Secondary | Advance | Primary | Secondary | Advance |
| T1(TW) | 7. 6 | 7.6 | 7.6 | 7.6 | 7.6 | 7.6 | 7.6 | 7.6 | 7.6 |
| T2(WW) | 8. 4 | 8.4 | 8.2 | 9.5 | 9.3 | 9.2 | 8.1 | 8.1 | 8 |
| | | | | Site.2 | | | | | |
| T2(WW) | 10 | 9.6 | 9.4 | 9.45 | 9.25 | 9.33 | 9 | 8.9 | 8.7 |
| | | | | Site.3 | | | | | |
| T2(WW) | 10.80 | 10.3 | 10.35 | 10.80 | 10.4 | 10.45 | 9.5 | 9 | 8.75 |

*Alphabets different in the same column show significant difference using Duncan's Multiple Range test (P≤ 0.05) and average was calculated from three replicates treatments (9, 8.9 and 8.7).

Restaurant and dairy effluent recorded highest value [( 10.8, 10.3, 10.35) and ( 10.8, 10.4, 10.45)] of number of bactria compared with car wash ( 9.5, 9.1, 9) and tap water (8.75).

Generally the irrigated soil with treated effluents showed a lower number of colonies compared with the irrigated soil with raw wastewater. That could be as a result of decrease in additional input of nutrients and organic matter in the treated wastewater. Some studies have pointed out those changes in soil properties are the factors that influence on the structure of soil microbial in communities in agricultural systems due to the different requirements of the soil microbial for C, N and P (Gosling *et al.*, 2006; Toljander *et al.*, 2008). All this may lead to stability of soil characteristics, pH, mineralization of organic matter, and flow and transportation of liquids through the soil with reduced bacteria pathogens in the soil. Thus this may lead to change in population pattern where organisms in the wastewater and indigenous organisms to the soil are engaged in competition with other microbial (Ahmad *et al.*, 2005). This result confirm previous studies which states that secondary treated sewage effluent influenced soil microbial, and also that wastewater impacted on bacterial population sizes and soil microbial activities depending on the method and type of the treatment (Chipasa and Mêdrzycka (2006) and Micheal *et al.*, (2010).

Moreover, studies have shown that certain specialized' microorganisms, such as nitrifying bacteria (convert ammonium to nitrate) and nitrogen-fixing bacteria associated with many legumes, generally perform poorly when soil pH falls below 6 (Haby, 1993; Sylvia *et al.*, 1998).

From Table 1 the number of colonies differed with the types of effluent used in watering. Among the treated effluents of dairy recorded higher number of bacteria and fungi colonies compared with restaurant and car wash treated wastewater. This difference may be as result of the content of the nutrients in treated wastewater depending on the source of the effluent, which helped the growth of bacteria and fungi at different levels accordingly. Therefore addition of soluble organic materials in the dairy effluent (e.g. Lactose) would have stimulated the microbial growth and activity promoting microbial diversity and there by influencing its growth and also the effective growth of the plants (Banupriya and Gowrieb, 2012).

## Conclusions

This study indicates that, untreated effluents from human activities such as dairy, restaurant and car wash have high pollutants. Population of bacteria in soil irrigated was increased due to treated effluents compared with the tab water; the untreated effluents seem to have high effect on soil microbial.

## References

Ahmad, I., S. Hayat, A. Ahmad, A. Inam and Samiullah. (2005). Effect of heavy metal on survival of certain groups of indigenous soil microbial population. *J. Appl. Sci. Environ Mgt.*, **(9)**: 115-121.

Ali, M.F. and S.A. Shakrani (2011). Soil and soilless cultivation influence on nutrients and heavy metals availability in soil and plant uptake. *International Journal of Applied Science and Technology*, **1(5)**:54-160.

American Public Health Association (APHA) (2005). Standard methods for the examination of water and wastewater. 21st edition, Eaton, A.D., Clesceri, L.S., Rice, E.W., Greenberg, A.E., Franson, M.A.H. APHA, Washington.

Balkwill, D.L. and W.C. Ghiorse (1988). Characterization of subsurface bacteria associated with two shallow aquifers in Oklahoma. *Appl. Env. Micro*, **50**: 580-588.

Banupriya, G. and S. Gowrieb (2012). A study on microbial diversity of dairy effluent and its impact on growth of different plant species, *Int. J. Curr. Sci.*, **12**: 71-77. .

Chipasa, K. and K. Mêdrzycka (2006). Behavior of lipids in biological wastewater treatment processes. *J. Ind. Microbiol. Biotech*, **33**:635-45.

FAO, (2000). Simple soil, water and plant testing techniques for soil resource management. Rome, Italy.

Gallardo, F.C., G. Bravo1 and M.C. Briceno (2010). Effect of sludge from kraft mill wastewater on soil biological parameter, *R.C. Suelo Nutr.Veg*, 10(1): 48-61. Gosling , P., Hodge. A., Goodlass, G., Bending, G.D . (2006). Arbuncular mycorrhizal fungi and organic farming. *Agr Ecosyst Environ*, **113**:17-35.

Haby, V.A. (1993). *Soil pH and plant nutrient availability*, **33(2)**: 14 - 21.

Harley, J. and L. Prescott (2007). Laboratory Exercises in Microbiology, Fifth Edition.

Micheal, J., A. Travis, W. Noam, A. Eilon and G. Amit (2010). Greywater reuse for irrigation: Effect on soil properties. *Science of the Total Environment*, **408**: 2501-2508.

Bagwu, J. and L. Korsten (2003). Control of citrus green and blue molds with garlic extracts. *European Journal of Plant Pathology*, **109**: 221-225.

Rabah, A.B., S.B. Oyeleke, S.B. Manga, L.G. Hassan and U.J. Ijah (2010). Microbiological and physico-chemical assessment of soil contaminated with abattoir effluents in sokoto metropolis, Nigeria. *Science World Journal*, **5(3)**:1-3.

Rani, F., T. Faheem and H. Abdul (2007). Effect of irrigation wastewater on soil along with its micro and macro flora, *Pak. J. Bot.*, **39(1)**.

Rousk, J., D.L. Aldén., A. Bahr and E. Baath (2009). Examining the fungal and bacterial niche overlap using selective inhibitors in soil. *FEMS Microbiol Ecol*, **63**: 350-358.

Sylvia, D.M., J.J. Fuhrmann, P.G. Hartel and D.A. Zuberer (1998). Principles and Applications of Soil Microbiology. Upper Saddle River, NJ: Prentice Hall. 550p.

Toljander, J.F., J.C. Santos-González, A. Tehler and R.D. Finlay (2008). Community analysis of *arbuncular mycorrhizal* fungi and bacteria in the maize mycorrhizosphere in a long-term fertilization trial. *Microbiol Ecol.*, **65**: 323-338.