Industrial wastewater treatment of fertilizer factory south region and reuse for tomato irrigation (Lycopersicon esculentum Mill.)

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Summary

The study was conducted to investigate the possibility of using the effluent originated from fertilizers factory/ south region, Basrah province for tomato irrigation. Effluent samples were collected from urea unite line, ammonia unite lion, and collection basin at nine periods during 3\9\2015 to 5\8\2016. Tap water was used as control water. Three types of filters were used to enhance the characteristics of water collected from the fertilizers factory which are Rice Husk Ash filter, sand filter and Rice Husk Ash + sand filter(75:25). chemical characteristics (EC, PH, Ca^{++}, Mg^{++}, Na^{+}, K^{+}, Cl^{-}, SO_4^{--}, total hardness, NO_3^{-}, NH_4^{+}, urea) were obtained before and after filtration then Removal efficiency (%) was calculated. Basin on above experiment, a pot culture experiment was conducted to study the effect of fertilizers industry effluents on chemical parameters of soil and its impact on growth parameters of the tomato plant. Each pot was prepared by filling loamy sand soil 10 kg collected from a farm nearby the factory. All the pots were fertilized by manure, phosphorus and potassium. Nitrogen fertilizer (urea) was applied an equivalent of 0, 50% and 100% of recommended level (300 kg N ha^{-1}). Tomato seedlings (hybride Newton F_1) were transplanted in the pots. The pots were irrigated with above fertilizer industry effluents or tap water after the seedlings standing in the pots. After 90 days, soil and plant samples were collected to measure EC, pH, NO_3^{-} in soil, NH_4^{+} in soil, plant height, shoot dry weight, N concentration,number of flowers $plant^{-1}$ and number of fruits $plant^{-1}$.

The results showed that there was a significant changes among sample periods in all water characteristics. The highest removal efficiency of urea, NH_4^{+}, NO_3^{-}, cations and anions were recorded by using Rice Husk Ash filter, while the lowest efficiency were recorded by using sand filter. Data also

showed that chemical parameters (EC, NH_4^+ and NO_3^-) of soil were differed by different filter used and follow the order: control (without filtration) > sand filter > Rice Husk Ash + sand filter > Rice Husk Ash filter. This result was reflected on plant growth parameters (plant high, shoot dry weight, N concentration ,number of flowers plant^{-1} and number of fruits plant^{-1}) and follow the order: Rice Husk Ash + sand filter > Rice Husk Ash filter > sand filter > control. However soil pH was not affected at different filters used. Increasing the level of nitrogen significantly increased EC, NH_4^+ and NO_3^- in soil and decreased soil PH resulted in increased plant parameters. Soil chemical parameters and plant growth parameters were differed by different source of fertilizers industry effluents and follow: ammonia line > urea line > collection basin > tap water. Data also revealed that tomato plant irrigated with water of ammonia line and filtered through Rice Husk Ash + sand filter showed best growth parameters as compared with other plants with higher shoot dry weight of 11.69 g plant^{-1}. The pot experiment suggested the possibility to using the water of ammonia line which filtered through Rice Husk Ash + sand filter with 50% of nitrogen recommended level to enhance tomato growth and it would save costs on fertilizer and reduction in pollution load of soil and water.