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Effect of water from different sources and associated soil on the germination, growth and yield of *Oryza sativa* (L.)

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ABSTRACT

The physical, chemical and biological factors of water and soil play an important role in the growth of plant. In the present investigation limnological parameters of tap water, pond water (Site I) and pond water (Site II) and the associated soil from the different selected sites were screened. The effect of the sampled water and soil was also investigated forits role on germination, growth and yield of paddy. The physicochemical parameters profile was found to be high in pond water of site II, compared with the other water samples. The associated soil samples of control water contained less potassium, iron and manganese content, while more of nitrogen, potassium and phosphorus was recorded in soil associated with site-II pond water. The heavy metal like copper and zinc content was also found to behigh in site-II pond water associated soil. Significant reduction in the germination percentage (P = 0.0213), (P = 0.0307) root length (P = 0.0001) shoot length and yield (P = 0.0001) of *Oryza sativa* seedlings was noticed when grown in pond water from site IIandits associated soil. The reason of which are discussed.

***Key words**: Physicochemicalparameters, water, soil,* Oryzasativa.

Introduction

Life on the earth is never possible without water. Water is one of the most essential constituents of the environments. Less than 1% water is present in ponds, lakes, rivers, dams, etc., which is used by Man for industrial, domestic and agricultural purposes. Ponds are useful in many ways and it is one of the methods of artificial infiltration of underground water. Water quality in an aquatic ecosystem is determined by many physical, chemical and biological factors (Sargaonkar and Deshpande, 2003). The term water quality was developed to give an indication of how suitable the water is for human consumption (Vaux, 2001) andis widely used in multiple scientific publications related to the necessities of sustainable management (Parparove *et al.*, 2006). Water plays a very important role in the growth of any plant. So if the quality of water used is such that it enhances the growth, gives good quality and quantity and healthy yield, then it can be a boon to the farmers. Water helps plants maintain their formation by transporting dissolved nutrients, aminoacids and sugars from the soil to areas where it is of high demand (Sanders, 2010).

The ponds, which were associated with day to day activities of the people of yester generations is under severe neglect now. Ponds play dual role of storing water on the surface and transmitting water to the subsurface, thus rejuvenating the surface and

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subsurface water environments in terms of quantity and quality (Chauhan and Thakor, 2012). Physico-chemical properties of water in any aquatic ecosystem are largely governed by the existing meteorological conditions and are essential for determining the structural and functional status of natural water (Parashar *et al*., 2006). Ponds are also nutrient traps as a high proportion of added nutrients which accumulate in the sediment, andis prevented from flowing into drainage waters (Julius *et al*., 2015).

Soil is a key part of the earth system as it control the hydrological, erosional, biological, and geochemical cycles. The soil system also offers goods, services, and resources to humankind (Berendse *et al*., 2015; Brevik *et al*., 2015). Contamination of soils by heavy metals such as Cd, Ni, Zn, Pb, and Cu, has increased dramatically during the last few decades (Chibuike and Obiora, 2014) due to mining, smelting, manufacturing, use of agricultural fertilizers and pesticides, municipal wastes, traffic emissions and industrial effluents (Morgan, 2013; Chibuike and Obiora, 2014).

A major crop in Asia is rice which consumes a lot of water during its life cycle. Rice is the second most substantial crop globally cultivated in an area of 161.1 million ha and production of about 751.9 million tonnes (OECD-FAO, 2018). India ranks next to china in rice occupying an area of 43.4 million ha with production of about 112.9 million tonnes in 2017 -18 (Anonymus, 2017). The use of waste water for irrigation purposes is becoming an important way to exploit its nutrients and removal of its pollution load by growing tolerant plant species. After proper dilution, waste water can be used as a potential source of water for seed germination and plant growth in agricultural practice (Dash, 2012). Chung *et al*., (2011), noted that the agricultural use of domestic waste water helps to preserve environmental quality, and concurrently furthers other national goals such as providing sustainable agriculture while preserving scarce water sources.

The dumping of waste water by municipalities is a major problem faced by them mostly in the case of large metropolitan areas, with limited space for land –based treatment and disposal. On the other hand effluent is also a resource that can be applied for productive uses since effluent contains nutrients that have the potential for use in agriculture. However, waste water can be considered as both a resource and a problem (Al - Dulaimi *et al*., 2012). In view of such perspectives, the present investigation was conducted to find the effect of different waters and the associated soils of that area on the germination, growth and yield of rice plant.

Materials and Methods

Collection and Analysis of Pond Water

Water from ponds located in different areas were of Methukummalpanchayat of Killiyour Talukin Kanniyakumari district of Tamil Nadu were collected. Samples were collected in clean plastic bottles and taken to the laboratory for physico-chemical analysis.Water quality parameters viz;physical parameters like pH, Alkalinity, Turbidity and chemical parameters like Phosphate, Nitrate, Chloride, Hardness, Fluoride levels, Iron, Calcium levels, etc were analysed using standard methods (APHA, 2012).

Collection and Analysis of Soil

Soil samplesfor analysis were collected from the banks of the water samples sources. Soil texture,pH, electrical conductivity, chemical parameters viz; soil Nitrogen, Phosphorus, Potassium,Iron, Manganese, Zinc, Copper, Calcium carbonate levels and were analysed using standard procedures.

Germination Study

Certified seeds of *Oryza sativa* were purchased from the Department of Agriculture, Pechiparai, Kanyakumari District. The seeds were surface sterilized using 0.1% mercuric chloride for 1 to 2 minutes followed by rinsing with distilled water. Fifty numbers of seeds were soaked in different water samples for about 24 hrs. Germination studies was carried out using petriplate method.Fifty numbers of the soaked seeds were placed in petridish lined with double layered filter paper or cotton. The petridishes were kept for 6 days at room temperature, 28±1ºC and kept moist with respective water samples. The germination rate of seeds were record and the germination percentage was calculated using the formula,

$$\text{Germination percentage} = \frac{\text{Number of germinated seeds}}{\text{Total number of seeds tested}} \times 100$$

Biometric observation

The germinated seeds were planted in pots filled with sampled soil from the selected areas. The control seeds were planted in the pots filled with potting mix composed of soil, sand and manure in the ratio of 2:1:1. The seeds were moistened regularly with the respective watersamples which were used to soak the seeds. Growth parameters such asshoot length, root length, number of lateral root and number of leaves, fresh and dry weight of plants were recorded. Yield parameter like number of grains and weight of grains were measured and recordedthe observation.

Data Analysis

The data recorded were analysed statistically through one way ANOVA.

Results

Physico-chemical Parameters of Water

Table 1 shows the results of physico chemical parameters analysed in thewater samples. From the data it could be noticed that the pH value of water samples wasranged from 5.70 to 6.72. An acidicpH value of 5.70 was noted inpond water of site II andmaximum of 6.72 pH value was observed in Tap water (control) (Table 1). Phosphate content varied from 0.1 to 1.20 mg/l. Minimum 0.1 mg/l was observed in Tap water and maximum 1.20 mg/l was noted in site-II pond water. The nitrate content ranged from 5 to 65.0 mg/l. Minimum nitrate content was observed in Tap water (5mg/l). Maximum of 65 mg/l was noted in pondwatersamples from site II (Table 1). The chloride content ranged from 88.65 to 383.7 mg/l. Minimum chloride content of 88.65 mg/l was recorded in Tap water (control), while the maximumchloride content 383.7 mg/l was observed in pond water samples from site II (Table 1). The hardness of water samplesranged from 50 to 500 mg/l. Minimum hardness 50 mg/l was noted in Tap water (control), while maximum hardness of 500 mg/l was observed in pond water samples of site II (Table 2). Minimum fluoride content i.e 0.0 mg/l was recorded in Tap water (control) and pond waterof site I. Maximum 1 mg/l was observed in pond water sample from site II. The alkalinity, iron, calcium content and turbidity levelswere minimum in Tap water (control) and maximum in thepond water samples of site II, while in the pond water samples of site I the levels of these parameters were moderate (Table 1).

Physico chemical parameters of soil samples

The physicochemical parameters of soil samples were presented in Table 2. From the Table, it could be noted that the texture of sample soilsvaried as sandy, clay and loamy soil (SCL). The electrical conductivity (EC) of soils ranged from 0.05 to 0.13 dsm. The maximum EC value, i.e. 0.13 dsm was observed in the soilassociated withpondof site II and minimum value, i.e. 0.05 dsm was noted in soil associated with tap water source (Table 2). The pH value varied from 5.4 to 6.8. Minimum pH of 5.4 was noted in soil associated with site Ipond, while maximum pH value, i.e. 6.8 was observed in soil associated with site II pond (Table 2). Macronutrientslikenitrogen content was ranged from 24 to 74 Kg/Ac. Minimum nitrogen content, i.e. 24Kg/Ac was recorded in the soil associated with tap water and maximum value, i.e. 74Kg/Ac was noted in the soil associated with site II pond (Table 2). The phosphorus content of soil samples varied from 9.2 to 21.7 Kg/Ac, with a value of 9.2 Kg/Ac observed in soil associated with tap water and maximum of 21.7Kg/Ac was noted in soil associated with site II pond water (Table 2). Minimum

Table 1. Physico chemical parameters of different water samples

No	Parameters	Water Samples		
		Tap Water (Control)	Site I pond water	Site II pond water
1	pH	6.72	6.48	5.70
2	Phosphate (mg/l)	0.1	0.7	1.20
3	Nitrate (mg/l)	5.0	20.0	65.0
4	Chloride (mg/l)	88.65	241.84	383.68
5	Hardness (mg/l)	50	100	500
6	Fluoride (mg/l)	0.0	0.0	1.0
7	Alkalinity (mg/l)	25	100	800
8	Iron (mg/l)	0.00	0.05	3.0
9	Calcium (mg/l)	10	20	87
10	**Turbidity (mg/l)**	**0 NTU**	**5 NTU**	**80 NTU**

potassium content of 33Kg/Ac was recorded in the soil associated with tap water. Maximum potassium value, i.e.165 Kg/Ac was recorded in the soil associated with site II pond (Table 2). Micronutrients like Fe content was minimum, i.e. 6.53NC in soil near tap water source pond and maximum value, i.e. 10.96 NC was observed in soil from site II. The minimum Mn content, i.e. 1.29 ppm was noted in soil associated with pond of site II (Table 2). Maximum Mn content 2.23ppm was observed in soil associated with site I pond. Minimum Zn concentration of 0.71 ppm was noted in soil near tap water source and maximum of 1.22 ppm was recorded in soil from site II(Table 2). Soil near Tap water source showed minimum Cu concentration 0.58 ppm while amaximum

Table 2. Physico chemical parameters of soil samples

	Soil I	Soil II	Soil III
Texture	SCL	SCL	SCL
Calcium Carbonate	No	No	No
EC (dsm-1)	0.05	0.07	0.13
pH	5.4	6.2	6.8
Macronutrients Kg/Ac			
O.C%	-	-	-
N	24	52	74
P	9.2	16.7	21.7
K	33	106	165
Micronutrients (ppm)			
Fe	6.53 NC	8.42 NC	10.96 NC
Mn	1.29	2.13	2.23
Zn	0.71	0.95	1.22
Cu	**0.58**	**0.67**	**1.45**

Soil I - Tap water associated soil
Soil II - Site-I pond water associated soil
Soil III - Site-II pond water associated soil

of 1.45ppm was noted in soil near site II (Table 2).

Seed Germination

The percentage of seed germination of *Oryza sativa* seeds in the selected soil samples and treated with different waters samples after six days of seed germination are shown in Fig.1. Maximum percentage of germination of 98% was observed in control seeds when exposed to tap water. The minimum of62% seed germination was observed in site II soil grown and site II pond water treated seeds. 86% of seed germination was observed in seeds grown in site I soil and treated with site Ipond water (Fig 1: Plate 1). It was also observed that there was a delay

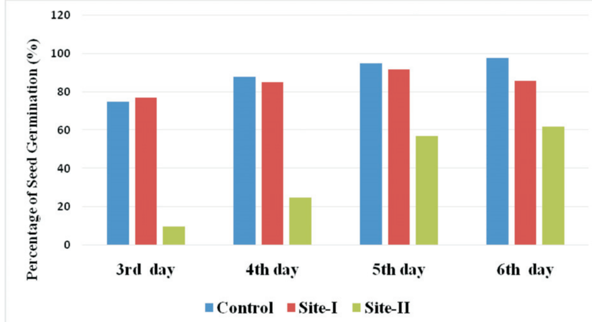

Fig. 1. Percentage of Germination of Experimental *Oryza sativa*

ingermination from seeds grown in soilfrom site II and when it is exposed to site II pond water.

Morphometric and Gravimetric Observation

Shoot Length

The changes in shoot length of *Oryza sativa* treated with different water samples are and grown in the corresponding soil is presented in Fig. 2. It was observed that the minimum of 25 cm shoot length was observed in 47th day seedlings which were treated withpond water from site II grown in soil from the area and maximum of 56.18 cm length was noted in seedlings treated with Tap water (control) and grown in soil taken from near that source . The site Ipond water treated seedlings grown in soil from that area had ashoot length of 54.02 cm (Fig. 2: Plate

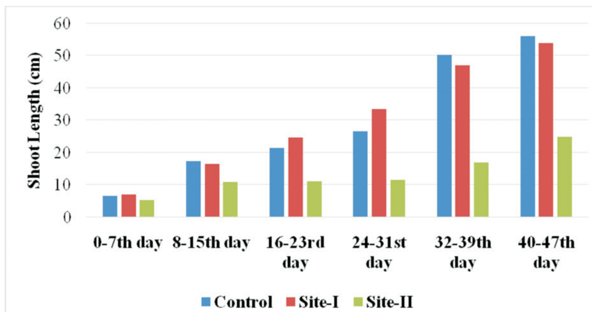

Fig. 2. Shoot Length variation of Experimental *Oryza sativa*

1). It was also observed that there was slow growth of seedlings when exposed soil and water rom Site II.

Root Length

The changes in root length of *Oryza sativa* treated with different water samples were presented in Figure 3. Minimum root length of 10.2 cm was recorded in the seedlings (47th day) treated with site II pond water which was grown in soil from the same area and maximum of 19.7 cm was recorded in the seedlings treated with tap water, which was grown in soil from near tap water source. The root length of

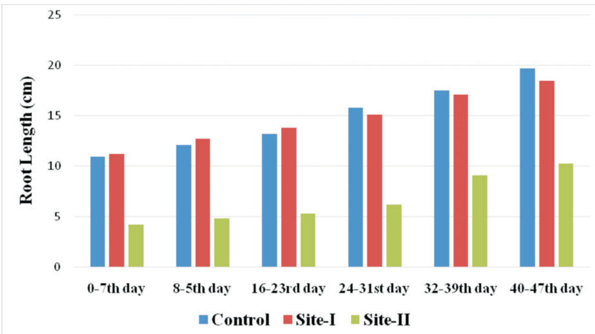

Fig. 3. Changes in Root Length of Experimental *Oryza sativa*

plant grown in soil from site I and treated with water from pond of the area was 18.5 cm (more or less equal to the tap water treated seedlings (Fig. 3: Plate 1).

Number of Lateral Roots

The number of lateral rootsformed in *Oryzasativa* treated with different water sampleswere presented in Fig. 4. Minimum of 12 number of lateral rootswere recorded in 47th day seedlings treated with site II pond water and grown in soil from that area. Maximum of 31.21 number of lateral rootswere observed in seedlings growing in soil collected from near tap water source and wastreated with tap water. The pond water treated from site I when given to seedlings, it produced more or less equal number of lateral roots compared with control, i.e. 30.05

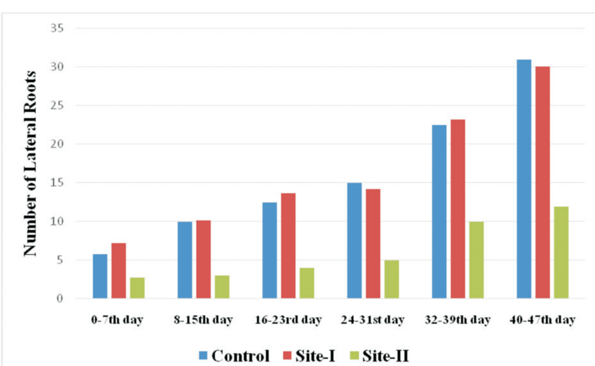

Fig. 4. Number of Lateral Rootsin Experimental *Oryza sativa*

numbers (Fig. 4: Plate 1).

Number of Leaves

The data on thenumber of leaves of *Oryza sativa* treated with different soil and water samples were presented in Figure 5. Minimum of 9 leaves were observed in plant growing (47th day) in soil collected

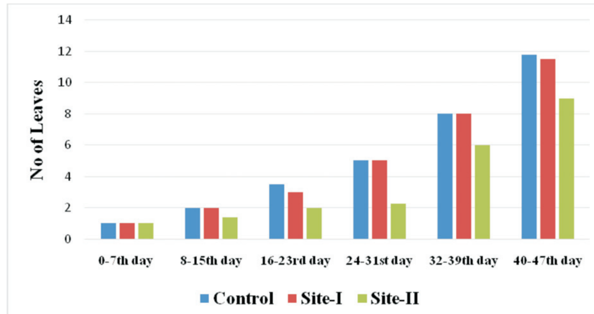

Fig. 5. Number of Leaves of Experimental *Oryza sativa*

from site II and was treated with pond water from that site while maximum of 11.8 leaves were observed in seedlings treated with tap water (control). The site I pond water treated plants produce 11.5 numbers of leaves (Fig. 5: Plate 1).

Yield of Plant

The changes in yield of *Oryza sativa* plants grow in collected soil samples and treated with different water samples after 126th days is represented in Fig. 6. The minimum numberof grains 239 nos was counted in the plants grown in soil from site II and watered with pond water form that site. Maximum number of grains 474 nos was counted in plants grown in soil collected from tap water source and given tap water. Site I pond water treated plants gave 252 no of grains. The maximum weight of grains (i.e.) 10.47 g was observed in tap water

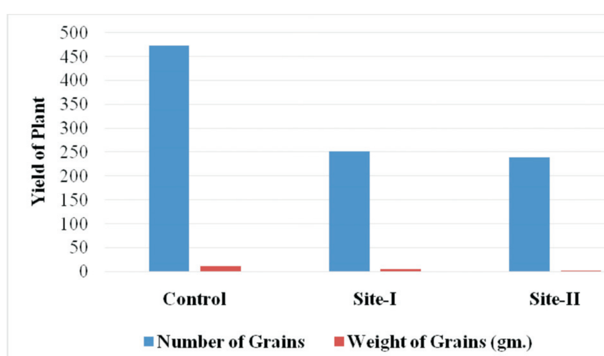

Fig. 6. Yield of Experimental *Oryza sativa*

treated plants. Minimum grains weight of 2.22 g was observed in site-II pond water treated plant (Fig. 6: Plate 1).

Weight of Experimental Plants

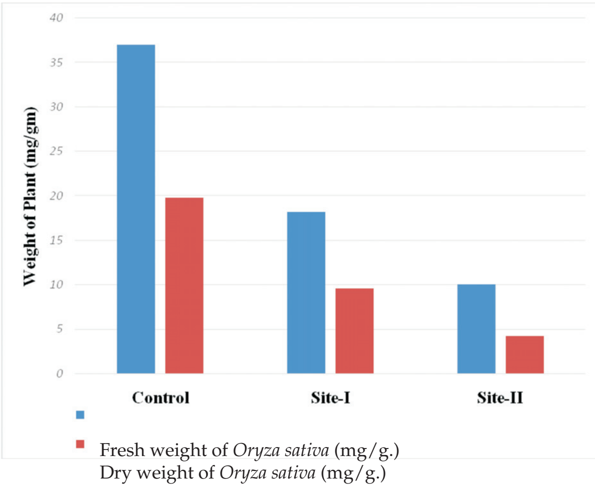

Fig. 7. Weight of Experimental *Oryza sativa*

The changes in fresh and dry weight of *Oryza sativa* plants grown in selected soil and treated with different water samplesis given in Fig. 7. Maximum fresh and dry weight of 37.95 and 19.75 mg/g respectively were observed in plants grown in soil taken near tap water source andtreated with tap water. And the minimum fresh and dry weight, i.e. 10.06 and 4.23 mg/g respectively was recorded in plants grown in soil from site II and treated with water from pond of that area (Fig. 7).

One way ANOVA analysis for germination percentage of *Oryza sativa* seedlings showed significance with value of P = 0.0213 (P< 0.05) between treatment with tap water and pond water from site II. Similarly the variance between pond water of site I and site II was also significant showing aP value of 0.0307 (P < 0.05). One way ANOVA analysis for shoot length, root length and yield of *Oryza sativa* also showed significant variation with value of P =

Germination of Experimental *Oryza savita* Seeds

Growth parameters of Experimental *Oryza sativa*

Yield Parameter in Experimental *Oryza sativa*

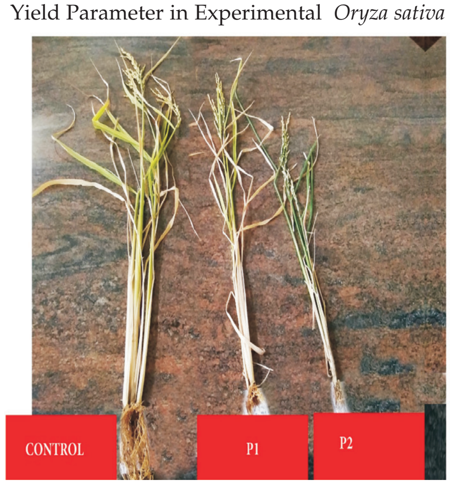

Plate-1. Morphometric Parameters of *Oryza sativa* when Exposed to Experimental Water Samples

0.0001 ($P < 0.05$) between associated soil and site II pond water exposure.

Discussion

Water is essential for life on planet earth. Fresh water is emerging as one of the most critical natural resources limiting humanity. The supply of fresh water available to humanity is shrinking because many fresh water resources have become increasingly polluted. Water quality analysis of pond water is relevant when the water is utilized for domestic purposes and irrigation. The present investigation was undertaken to find out the physico chemical profile of water and soil samples taken from selected sites and their influence on germination, growth and yield of *Oryza sativa* (L).

Water quality parameters like hardness, fluoride and calcium content in the water samples were within the acceptable limit according to Bureau of Indian Standards (BIS 2012). Hardness of water is the parameters used to describe the effect of dissolved minerals mainly Ca and Mg determining suitability for domestic and industrial purposes. It is attributed to the presence of bicarbonates, sulfates, chlorides and nitrates (Solomen *et al*., 2013). In the present study hardness of water samples ranged from 50 to 500 mg/l. Low hardness value of 50mg/l was noted in tap water and highest value of 500 mg/l was observed in site II pond water. Singh *et al*. (2010) has reported that hardness ranging between 25 – 100 mg/l is good for fish culture. As the level of hardness in pond water from site II falls in at the high end stating that if not conserved this site can become unusable for irrigation and domestic use. According to Bhatnagar *et al*., 2004 high hardness in the polluted pond water is due to low water level and high rate of evaporation of water and addition of calcium and magnesium salt from natural and anthropogenic activities.The nitrate content of pond water form site II was higher (45 mg/l) than other analyzed water samples. It was due to high biological activities with inorganic loading in the waterdue tothe presence of bacteria, dead phytoplankton, decaying organic matter (Rukera *et al.,* 2011; Victory *et al.*, 2018). In the present work, chloride content of pond water from site II was higher than other two water samples. Ansari and Prakash (2000) in their studies on Tulsidas Tal of Tarai region of Balrampur in relation to fisheries and reported that calcium is important nutrient and present in all water bodies. The present study confirmed the above findings by presence of low calcium content in tap water (10 mg/l) and site I pond water (20 mg/l). The pH, alkalinity, iron, turbidity and phosphate content of water samples were varied from acceptable limit. Almost neutral pH value was noted in tap water (control) and water samples from site I, while a low pH value was noted in site II pond water. Sajitha and Vijayamma (2016) studied the physicochemical parameters and pond water quality assessment by using water quality index at Athiyanoorpanchayath, Kerala and reported that 4.62 to 7.21 pH value in the study area which showed slight deviation towards acidity in some samples. In the present investigation this acidic pH observed in site II pond watercan be attributed to the anthropogenic activities like sewage drainage, rubber processing seen in the area, improper irrigation process and weathering process. Alkalinity of water sample is higher in site IIwater sample compared with other water samples. Asok*et al.,* 2015 studiedthe water quality index determination of pond and reported that the change in alkalinity depends on carbonates and bicarbonates, which in turn depends on the release of $Co_{2,}$ which is in accordance to the present findings, which may additionally bedue to washing of clothes fromwhich detergent ions get accumulated in these water sources. The range of turbidity noted in the present study was 0 NTU to 80 NTU. Steven (2007) says turbidity is a measure of the ability of water to transmit the light that restricts light penetration and limit photosynthesis. According to Sangeeta and Neha 2015, 20-30 NTU turbidity is suitable for fish culture. But in present study thesite IIpond water sample showedhigher turbidity value of 80 NTU, accounting its pollution status.

Bradly and Weil (2002) reported that soil texture has an important role in soil nutrient management. In this study the texture of the soil varied from sandy, clay to loamy soil. According to Kajiru*et al.*(2015) assessment of soil fertility status under rainwater harvesting systems in the **Ndala** river catchment in northwest Tanzania, reported that clay content is suitable for rice production because of their capacities to retain plant nutrient and soil water (moisture). In the present study the pH of soil ranged from 5.4 to 6.8. A pH value of 6.48 was observed in soil from site II and low pH value of 5.4 was noted in site I. This pH towards alkalinity in soil is due to many nutrients. Marbet *et al.* (2000) reported that essential nutrients that are obtained from the soil only when a nutrient has dissolved in the soil solution. Most minerals and nutrients are more soluble or available in acid soils than in neutral or slightly alkaline soils. The present study thoughagrees with the above sentence findings thelow pH value of 5.4 observed in soil near site I, has decreased the assessed morphological and quantitative parameters of the rice plant, suggesting that this pH in the present case can interfere with plant growth, due to depletion of availability of nutrients. Soil acidity has been a limiting factor in plant growth as H + toxicity can be the limiting factor as explained by Kid and Proctor, (2001). Macronutrients such as Nitrogen (N), Phosphorus (P), Potassium (K) (NPK) are the most essential nutrient to plant development and are needed in high quantity. In the present study the soil from site II contained more of these nutrients-nitrogen, phosphorus and potassium, compared with the site I soil. The micronutrients such as iron, Mg, Zn, Cu which are needed in smaller quantity, still crucial for plant development and growth. In the present study Cu & Zn content were more in soil from site II compared with the soilfrom site I. This increase in these micronutrients may be from agricultural runoff (fertilizer usage) and domestic sewage. Moreover pesticide usage can also cause increased heavy metal deposition in soils. The present results agrees with this explanations given by Wuanaand Okieimen, (2011).

The results of germination of *Oryza sativa* seeds treated with different water samples were showed variant in the percentage of germination. Low percentage of seed germination was observed in polluted pond water compared with other water samples. These results were coincided with the results of Huy and Iwai (2018). They reported that the germination of all rice varieties were lower (swine farm waste water, domestic waste water, aquaculture activity waste water) when compared with the control, i.e. distilled water. Similar results were observed by Kaur and Sharma 2017; Khaleel *et al*., 2013; Olayinka and Arinde, 2012; Dash, 2012; Niroula *et al*., 2003; Sharma *et al*., 2002. Zheng *et al*., (2016) studied the effect of Kelp waste extracts on the growth and development of Pakchoi (*Brassica chinensis*) and showed that the Pakchoi seeds treated with low concentration of Kelp waste germinate and grow better than the seedlings treated with high concentration of Kelp waste extract. It was due to the lower tolerance to the salinity during germination and seedling growth.

Shoot length of *Oryza sativa* seedlings in different water samples were given in Table 4. High shoot length was observed in tap water treated seedlings. But in normal and polluted pond water treated seedlings, shoot length was decreased. Similar findings were noted by Niroula (2003) in the whole seedling growth of rice, It was significantly affected by the effluent of leather industry. However, other effluents or sewage had no significant effect on rice seedling. Similar results was observed by Dash, 2012 and reported that rice and wheat seedling growth increased up to 50% domestic waste water, thereafter it declined gradually towards high concentrations (75 and 100%) both in rice and wheat. It was also confirmed by the studies of Bazai and Achakzai 2006.

The results on the effect of different water samples on the root length of *Oryza sativa* seedlings showed maximum length of root was observed in tap water treated seedlings. But when exposed to water from site I and site II, decreased in length of root was noted. Similar findings were observed by Niroula (2003), in studies on the seedling growth of rice, which significantly affected by the effluent of leather industry. Muthalagi and Mala 2007, found that effect of sewageon *Trigonela foenum* (Fenugrick) seeds, decreased the germination, length of root and shoot from 42 to 32%, 2.10 to 1.49 cm and 2.08 to 1.49 cm respectively. Studies by Muthalagi and Mala 2007 also support the present findings.

Maximum number of lateral roots was observed in the seedlings treated with tap water (control) and minimum numbers of lateral roots were observed in the seedlings treated with water from site II grown in soil from the area. Similar results were reported by Augusthy and Sherin (2001) in *Vigna radiata* treated with effluent. Maximum numbers of leaves were noted in the tap water treated plants, while minimum number of leaves was observed in site II water treated plants grown in soil from the area. This results coincided with the findings of Wang *et al*., 2000, Olayinka and Arinde (2012). Plant irrigated with tap water produce the maximum yield, while site II pond water treated plants. Similar findings were reported by Moradi *et al.,* 2016. They showed that plant irrigated by 100% waste water, the yield was 17% compared to plants irrigated with well water (100%). Agbogidi *et al*., 2006 showed that, crude oil application to soil significantly reduced the crop growth and yield in okra and five cultivars of soya beans.

The fresh and dry weight of *Oryza sativa* grown in soil near tap water source and water with tap water was higher when compared to plants grown in soil from site II and water from water from pond of the same site. These results were contrary to the findings of Huy and Iwai 2017, who reported that the fresh weight of Jasmine rice was significantly increased when irrigated with domestic and aquaculture waste water. Kaur and Sharma (2017) studied the impact of dairy industrial effluent of Punjab on seed germination and early growth of *Triticum aestivum* and reported that the fresh and dry weight increased in the plant treated with 50% diluted effluent. Fresh and dry weight decreased when plant treated with 100% effluent, which supports the present investigation.

Conclusion

The present investigation has analysed the physico-chemical parameters of water samples from selected ponds and the soil from near the selected area, on the germination and growth of *Oryza sativa*, a major crop of Asia. The analysis showed that there was an increase in many parameters likehardness, turbidity, alkalinity, levels of nitrogen, phosphorus, fluoride, chloride, iron and calcium in the water from pond of site II, and also a hike in themacro and micro nutrient in its associated soil. Significant reduction inthe germination percentage and growth parameters were also visualized in *Oryza sativa* when grown in soil from site II and water with water from pond of the same site. The study clearly indicate that water samples and associated soil from site II is polluted when compared with water and soil from site I and that water with such water quality in which the parameters are not up to the standards has to be treated before using it for domestic and irrigation purposes. Though a basic study this work can be substantiated with bioremediation methods to decrease the pollution load of such water samples, which will result in its use in agriculture and also the conservation such precious fresh water sources.

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