



IMPACT OF AGRICULTURE PRODUCTION BY USING THIRUMANIMUTHARU RIVER IN SALEM DISTRICT

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ABSTRACT

Sustainable crop production is highly depending on the quality of environment. Water is the essential element for all living organisms including human, food production and economic development. The quality of water is affected by human activities. Water pollution is the contamination of water bodies like lakes, rivers, groundwater etc. Water pollution is a major environmental concern in India as a most of the rivers are polluted. Poor quality of water adversely affects the plant growth and decreases agriculture production. Thirumanimutharu is the river in Salem district, Tamil Nadu originate in region of Ayothiyapattinam block, where non polluted water is observed. In Veerapandi block the water contaminated due to discharge of domestic sewage and industrial effluents which contain organic substances, chemicals and heavy metals. In our study we focus to analyze the significant agricultural impact particularly paddy crop due to using polluted water of Thirmanimutharu river in Veerapandi block.

KEYWORDS: food production and economic development , population growth, industrial production.

1.INTRODUCTION

Water is the most vital element among the natural resources and is critical for survival of all living organisms including human, food, production and economic development [1]. The environment, economic growth and development are all highly influenced by water. The quality of water is affected by human activities [2] and is declining due to the population growth, industrial production, climate change and other factors. The resulting water pollution is a serious threat to the well being of both the earth and its organisms [3]. Water pollution is the contamination of water bodies example lakes, rivers, oceans and groundwater [4].

Water pollution may be defined as any impairment in its native characteristics by addition of anthropogenic contaminants to the extent that it either cannot serve to humans for drinking purposes and/or to support the biotic communities, such as fish. Water pollution is the contamination of water bodies such as lakes, rivers, oceans, and groundwater by human activities. All water pollution affects organisms and plants that live in these water bodies and in almost all cases the effect is damaging either to individual species and populations but also to the natural biological communities. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful constituents [5].

According to the water (prevention & control of pollution) Act 1974, pollution of water is defined as contamination of water (or) such alteration of the physical, chemical, biological water (or) such discharge of any other liquid, gaseous (or) solid substance into water which cause harmful (or) injurious to public health, commercial, and industrial agriculture [6].

Water pollution is a major environmental concern in India.[7] The main sources of water pollution are discharge of domestic sewage and industrial effluents, which contain organic pollute , chemical and heavy metals which flow directly through stream water drains into water system without any treatment.[8,9] Poor quality of water adversely affects the plants growth and human health. Adverse conditions increases investment in irrigation and health and decrease agriculture production which in turn negatively affect economy [10]

Water pollution creates a serious problem due to its impact on a large number of economic activities. Water pollutions have emerged as important issues in India. As most of the rivers are polluted it may contribute to low crop production. Sewage water application badly impacts soil productivity. The effect of water pollution on agricultural production could include decrease in crop quantity, quality [11]. In our study we focused on water quality for Thirumanimutharu river basin. The possible excellent agriculture water source of Salem district, Tamilnadu. The quality of water in two study areas that is Ayothiyapattinam and Veerapandi blocks of Thirumanimutharu basin was analyzed by the parameters includes P^H , turbidity, BOD, TDS, Calcium, Sodium, Potassium. The disposal of industrial waste effluent into river system has given rise to heavily localized pollution and threatens seriously to the environment.

1.1 Recommendation

Agriculture productivity largely influenced by using polluted water. It is necessary to treat the polluted water which contaminates the river water. To achieve the growth of crop production in region of polluted water using land, few recommendations have to be suggested to individual level, industrial level, and administrative level, they are

1. To separate the sewage water from the river.
2. To carry out polluted water treatment which reduce pollution of water.
3. Administration should care of recycling water.
4. People participation should be give vital importance for river water protection.
5. Government should concentrate to maintain the sustainable river water.

1.2 Limitation

1. The cultivation of paddy not in the same duration time for both study areas.
2. Rainfalls affect plant growth during the study period.

1.3 Scope of the study

This study explains the quality of river water which is necessary for crop growth which increases the economic development and also this study gives the importance of river water protection which might give good health and good environment.

2. MATERIAL AND METHODS

2.1 Sample Collection

Surface water samples of the river were collected from two different areas of the river (Ayothiyapattinam and Veerapandi blocks). Various water quality parameters were monitored and detailed field survey has been conducted within the study area. Proper sampling procedure was followed.

2.2 Laboratory Test for Physico-Chemical Parameter

The experiment on a selected segment of the river was carried out. To analyze the water quality we conducted test on 24 water parameters with the standard procedure and significant level was determined using Student T-test by SPSS Software 17.0.

3. RESULT AND DISCUSSION

The Physico-Chemical parameter of the river sample was done (Table 1) and discussed as follows

TABLE 1: PHYSICO- CHEMICAL PARAMETER

SI NO	TEST PARAMETERS	UNIT	AYODHIPATTINAM BLOCK	VEERAPANDI BLOCK	SIGNIFICATION
1	Ph	-	8.31±0.01	7.72±0.00	Significant at p<0.05
2.	Total Alkalinity	mg/dl	80.66±0.94	610.0±0.00	Significant at p<0.05

3	Total Dissolved Solids	mg/l	172.66±1.88	1899±0.94	Significant at p<0.05
4	Total Suspended Solids	mg/l	3±0.00	46±0.00	Significant at p<0.05
5	Electrical Conductivity	µs/cm	0.26±0.07	2.92±0.00	Significant at p<0.05
6	Total Hardness as CaCO ₃	mg/l	129.33±0.47	499.0±1.41	Significant at p<0.05
7	Calcium as Ca	mg/l	12±0.00	64±0.00	Significant at p<0.05
8	Magnesium as Mg	mg/l	24±0.00	83±0.00	Significant at p<0.05
9	Chloride as SO ₄	mg/l	23.66±0.94	374.33±0.94	Significant at p<0.05
10	Sulphate as SO ₄	mg/l	21.33±0.47	45.33±1.24	Significant at p<0.05
11	Iron as Fe	mg/l	BDL (DL:0.13±0.04)	0.43±0.04	Significant at p<0.05
12	Sodium as Na	mg/l	55±0.00	50±0.00	Significant at p<0.05
13	Potassium as K	mg/l	1.53±0.04	24±0.00	Significant at p<0.05
14	Bio Chemical Oxygen Demand, 3 days@27° C	mg/l	BDL(DL:2±0.00)	43.0±0.00	Significant at p<0.05
15	Chemical Oxygen Demand	mg/l	BDL(DL:2±0.00)	132.33±0.47	Significant at p<0.05
16	Phosphate as P	mg/l	BDL(DL 0.1±1.38)	0.2±0.78	Significant at p<0.05
17	Carbonate	meq/l	0.8	Nil	-
18	Bicarbonate	meq/l	0.76±0.04	12.2±1.78	Significant at p<0.05
19	Residual Sodium Carbonate	meq/l	-0.99±1.11	2.09±0.00	Significant at p<0.05
20	Sodium Adsorption Ratio	meq/l	2.06±0.04	0.97±0.00	Significant at p<0.05
21	Boron as B	mg/l	BDL(DL 0.01±0.00)	0.02±0.00	Non-Significant at p<0.05
22	Managanese as Mn	mg/l	BDL(DL 0.1±1.38)	0.14±0.00	Non-Significant at p<0.05
23	Nitrate as NO ₃	mg/l	BDL(DL 2±0.00)	BDL(DL 2±0.00)	Non-Significant at p<0.05
24	Fluoride as F	mg/l	0.36±0.04	0.56±0.04	Non-Significant at p<0.05

Note : BDL-Below Detection Limit, DL-Detection Limit, meq-milliequivalent.*Limits- Based on interpreting irrigation water quality reports by school of Agriculture , Forests and Environmental Sciences, Clemenson University and Values are average of the three determinants.

The parameters analyzed in both study area represent in Table -1. All the parameter which we have analyzed shows significant different observed between two blocks. The negative logarithm of hydrogen ion (P^H) concentration in Veerapandi (P^H 7.73) blocks indicating the harmful effects. Further we also find out the alkalinity, in both of the study area. In Aythiyapatium block the total alkalinity of the water level is 80mg /dl. In veerapandi block the polluted water for irrigation purpose, it may affect the plants which grows with depends on this water. This has been confirmed by analyzing the difference on sweetness of tender coconut which grows in both study area.

In Ayothipattinum the sweetness of tender coconut more when compared to veerapandi. In veerapandi block saltiest taste observed in tender coconut. As the production is not valuable in Veerapandi the farmer who depends that production leads to the decline of their economic prosperity. The total dissolved solids (TDS) in Veerapandi block (1899±0.94) was higher than Ayothipattinum block (172.66±0.94). The total suspended solid in Ayothipattinum 3 mg/dl and 46 mg/dl which significantly different indicate the hardness of water in veerapandi study area.

Higher electrical conductivity was noted in Veerapandi block region 2.92 $\mu\text{s}/\text{cm}$ when compared to Ayothiapattinam block 0.26/ $\mu\text{s}/\text{cm}$. In our study the significant different in both study area indicating the polluted nature of river water in Veerapandi block. Calcium carbonate, calcium, magnesium level in Veerapandi block is 499 mg, 64 mg, 83mg, respectively which give increased level when compare to Ayothiapattinam block 129 mg, 12mg, 24mg. In previous study also lakeshmanan et al 2003 reveals these mineral might be derived from dissolution of magnesium calcite and gypsum. In our study the higher level of calcium, magnesium in Veerapandi block indicate the pollution of water in this area.

The level of Chloride, Sulphate, Iron, Sodium, Potassium Ions are higher in Veerapandi block when compared to Ayothiapattinam block. The significant different observed in following parameters tion of BOD, COD, phosphate, carbonate, Bicarbonate, Sodium, carbonate, Sodium adsorption Ratio which leads the deficiency of the essential element in Veerapandi block. That leads to reduction of crop production. Boron, manganese, nitrate, Fluoride which shows non significance in this study area. It might be due to rainfall of the study area.

Agriculture is the prime mover of the state economy supporting 62% of the population and contributing 13% of the state income, government is aiming to achieve 100% food security in the state and also to create avenue for export of agriculture produce for economics. In our study we explain the reduction of paddy plant growth is due to using of untreated polluted water in veerapandi block.

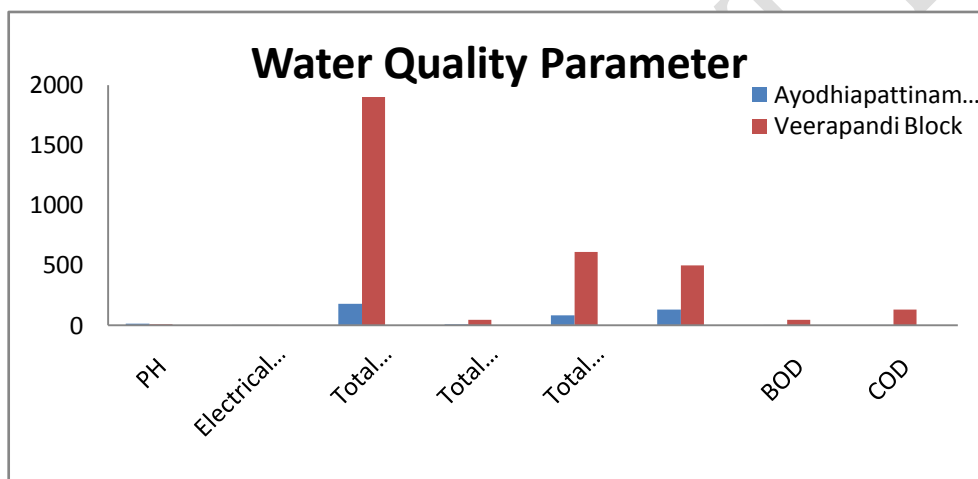


FIGURE-1

As shown in the figure -1 in veerapandi block the get more polluted when compare to Ayothipattinam block. The total alkalinity and hardness of water increased in Veerapandi block which give increased salinity of water the production of paddy by using this water is very less quantity when compare to Ayothipattinam block.

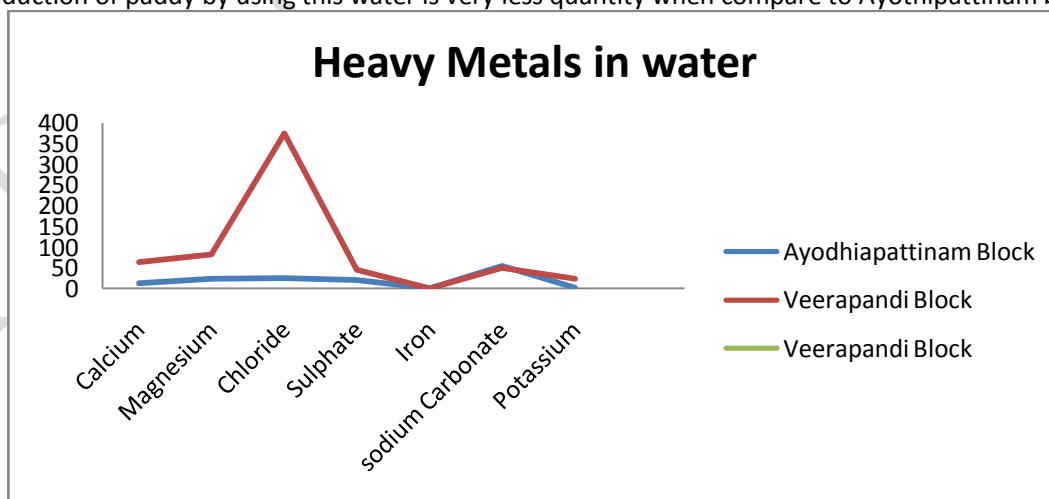


FIGURE-2

As shown in the figure-2 the heave metal are increased in Veerapandi block which shows the pollution of water in Veerapandi block. This indicate the industrial water which untreated waste water directly polluted the river.

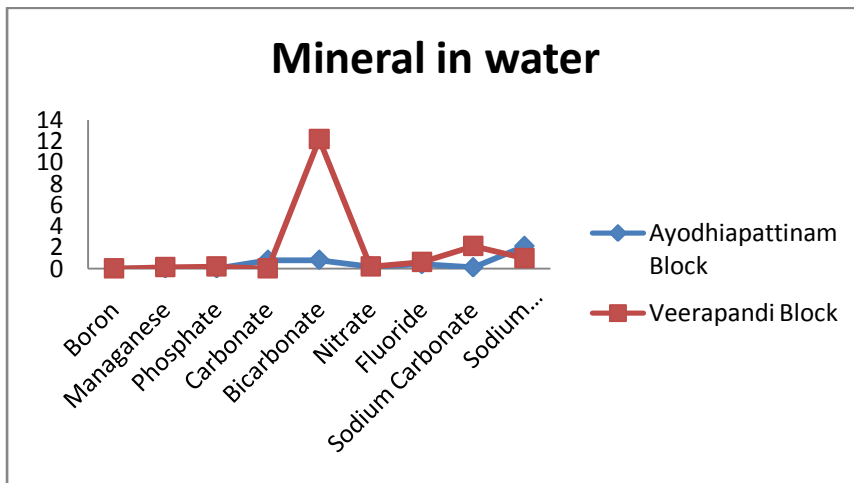


FIGURE -3

As shown in the figure-3 the mineral which are rich in Veerapandi block. The precipitation of the mineral spoil agricultural land in Veerapandi block which decrease the production of paddy

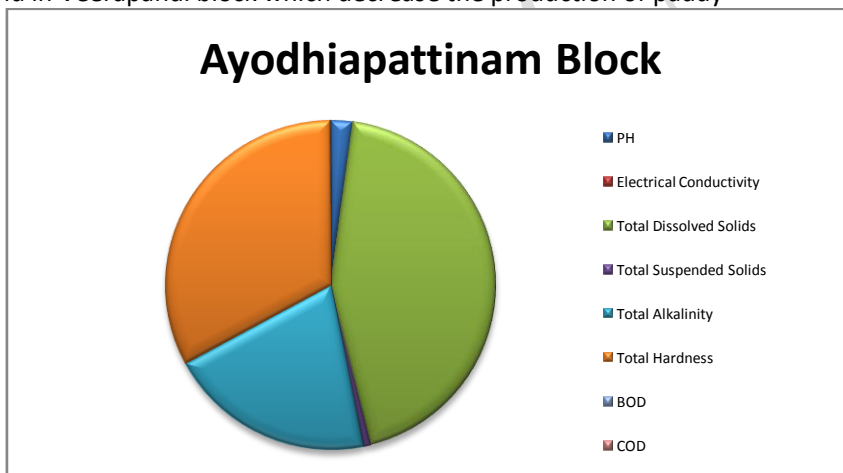


FIGURE-4

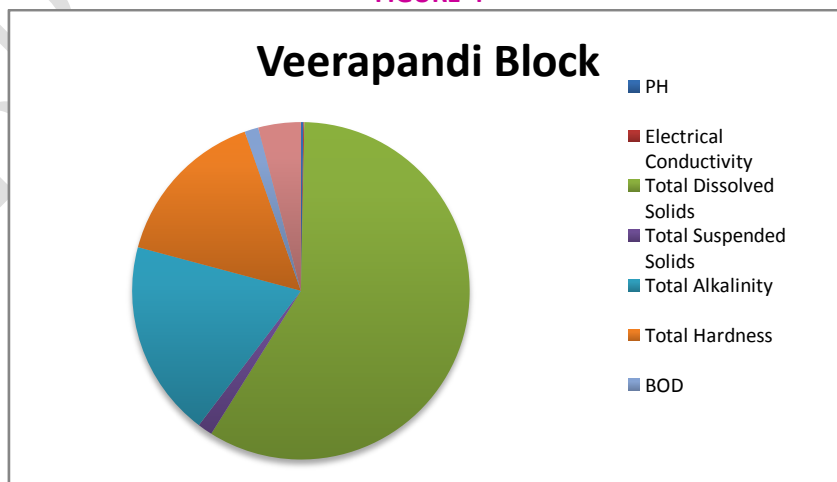


FIGURE-5

Figure 4&5 give the difference between two study areas. When block compare to Ayothiyapattinam block Verrapandi block has more polluted and cause decreased production of crop.

CONCLUSION

The results of our study determine that the water quality of thirumanimutharu river may not be in the position to sustain the aquatic life as well as not suitable for agricultural purpose. As per the data which we collected that conclude the veerapandi block river was mostly polluted and it significantly reduce the rate of crop production in this study area. The reduced rate of crop production in veerapandi block directly affects farmers and automatically reduce the economic status of our country.

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