Effluent Quality Index and the Regression Equations and Correlation Coefficients its with the Physico-Chemical Parameters in the West Karun Agro-Industry

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Abstract: In this research, Amir kabir and mirza koochak khan's agro-industry in west side of karoon river were considered and original drain of each unit was selected and at three station, beginning of the drain (first station), middle of the drain (second station) and end of the drain (third station), nine selected units parameters including (oxygen solution, temperature, Ph, BOD_5 COD, phosphate nitrate, Ec, Tarbidity) were measured. For a year, above reviews were performed in each season at three station of original drain of both units agro-ingustry. Then by using customary methods, a qualitative index of Sewage was measured at three stations of each unit's drain for every season. Finally annual qualitative index was measured for sewage of each unit. After statistic analysis of results, It is observed that: we had been faced to reduction of sewage's qualtative index along with original drains of both units of agro- industry from first station towards second station and finally third station. It means that. in all seasons in both drains, the quality of ending drain of sewage was always lower than that in beginning of drain. Also during the different seasons of year, meaningful changes were observed in sewage quality of original drainages of both units. Sewage qualitative index was reduced in both units during autumn and winter. In research, it was observed that this fact can be because of not only the sometime cultivation season of sugar can's cuttings and start of harvesting in different farms but because of operation including fertilizing and spraying , in another word with starting the season harvesting of cane's production farms of sugar cane also are starting to act , so the sewage of mentioned units directly is shed to original drain. All of these factors cause a full of sewage's qualitative index in meaningful limit during autumn and winter forwards spring and summer. In this research , correlation coefficients between sewage's qualitative index and each one of chemical physical nine units parameters were measure and based on those coefficients , simple Regresion equations between sewage's qualitative index and each factors were written , also multilateral RegResion relation between sewage's qualitative index and all factors were presented.
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Key words: Effluent quality index, physico chemical parameters, Agro-Industry

1.Introduction

In IRAN, sugar cane Agro- industries are the oldest of these units because of the old record of sugar plants cultiration such as sugar cane and beet and also because of the proper climate conditions of khuzestan province. have been already a notice center regarding this situationand along recent two decades in spite of construction and development of seven units of sugar cane agro- industry over the province, repeatedly the sugar cane's sub cultivation level has been increased in area and so that dependent industries and farms also are developing. Although this factc auses employment and economical development, but unfortunately it also causes expanded environmental pollutions in different parts of climate and soil. It is noticed that sugar cane is a plant with high water use, so sugar cane agronomy will be followed high rate of drains. Sewage resulted from farms of suger cane production and dependent industries also must be added.

Agricultural development to meet the growing demand for food, is inevitable. According to reports, the Food and Agriculture (FAO 2002) people suffering from hunger are quantitatively and qualitatively.The three air pollution, water and soil can be seen and today, have caused environmental crises.EPA studies indicate that annual industrial and agricultural effluent to surface water shed area, times the dangerous pollutants into aquatic form above, although the quality of surface waters including rivers and wetlands case, but studies done Qualitative evaluation and research so far on the status of agricultural and industrial wastewater has been done. Thus, knowledge of the status of the current effluent quality, predicting the likely effects of their discharges to water resources, and environmental management strategies in order to improve the effluent quality, conduct research of this kind is necessary.

The research on sugarcane agro waste units, including Amir Kabir and Mirza small West Karoon Khan took to achieve the following objectives:

1 The physicochemical parameters measured in the effluent West Karun Agro-Industry

2 effluent quality index in West Karun Agro-Industry.

2. Materials and Methods

The names of both culture and industry in West Amir Kabir and Mirza Kochakkhan Karoon River in Ahwaz and Khorramshahr are located 45 km road. The drainage system of open drainage is discharged to HOROLAZIM. In this experiment, three stations in the drainage were considered:

The first station (early drainage), the second station (the drain) and the third station (end drain). Then during the year as a seasonal sampling was conducted. 9 was used to measure factors. Mean values for three months each season, as these factors were considered, measured temperature, PH, dissolved oxygen, turbidity and electrical conductivity at the sampling location and by portable devices carried by the effluent samples in clean plastic containers 500 and 1000 volumes by ml of cold (4 °C) or chemical solutions to established and used to measure nitrate, phosphate, residual oxygen remaining biological and chemical oxygen was transferred to the laboratory. After examination during the four seasons, with the help of diagrams raw results of qualitative factors and Table 9, the effluent quality index was calculated at each station in different seasons.

Overall quality indicators in four seasons, the annual index will result. Finally, by performing statistical analysis (tests, ANOVA, Duncan, simple regression and multiple regression) and MINITAB software and EXCELL results were analyzed and evaluated.

3. Results

3.1. The results of physico-chemical parameters measured in Amirkabir unit was as follows

Dissolved oxygen during all seasons from the beginning to the end of the drainage decreased. The maximum amount of dissolved oxygen in the first station (early drainage) and in winter to the 6/8 mg per liter and the lowest dissolved oxygen levels in the third station (end drain) in summer to the 2/4 mg per liter were observed.

Furthermore, the amount of dissolved oxygen in winter with an average 26.8 mg maximum in summer and 73.4 mg was the minimum.

Effluent temperature changes significantly during drainage. The highest temperature in the third station (end drain) was observed. Duncan test, two groups of spring and summer had the highest average temperature in the first class and second class with the lowest in autumn and winter temperatures were observed.

PH changes during drainage from the beginning to the end of the drainage was not significant, but with the Duncan test for different seasons, the average of two classes of PH rate was observed. The first class consists of autumn, winter and spring and summer was the second class.

Table 1: Agro-industry effluent quality index Amirkabir

Season state	spring	sumer	Autumn	Winter
1	42.47	41.44	38.17	40.23
2	41.66	38.22	37.45	39.33
3	39.86	37.28	36.87	38.18
Mean	41.33	38.98	37.49	39.24

In the study of biochemical oxygen remaining in all seasons throughout the drainage, increasing trend was observed. Maximum BOD_5, the third station in autumn and minimum in summer was the first station.

In addition, Duncan test at different seasons of the mean BOD5, showed a mean of three classes. First class fall (maximum) second class winter and spring and summer were in third grade.

The rate of oxygen chemical residues in all seasons during the main drainage to the drain end, the increase was seen. Lowest COD COD highest in spring and autumn in the first station was at the third station.

Table 2: Agro-Industry Effluent quality index Mirza Kochakkhan

Season state	spring	sumer	Autumn	Winter
1	43.44	44.22	39.39	40.19
2	43.63	42.86	38.47	39.14
3	41.92	39.91	38.24	38.43
Mean	42.99	42.33	38.70	39.25

Duncan test for the year showed an average rate of COD in three groups. The first autumn, the second group in winter and spring and summer were the third group. Electrical conductivity during drainage was consistently increased in all seasons, the highest electrical conductivity at the end of drainage (Station III) was observed. Duncan test for different seasons of the electrical conductivity showed a mean of three classes. First class summer, spring and in the second

class, third class, autumn and winter, which showed the lowest electrical conductivity.

Drainage of nitrate during the growth was observed in all seasons. The highest nitrate in winter was the first station. In addition, Duncan test for nitrate levels in different seasons showed the class average. The first class in spring and summer and autumn and winter were the second class.Summer (the highest rate of phosphate), spring, autumn and winter (low phosphate levels), the turbidity in the main drain and the highest turbidity showed an increasing trend in the third station (end drain) in summer and lowest turbidity in the first station (early drainage) was observed in winter.

The Duncan test showed three classes mean for Kdrvt during the year, in first class during the summer (highest turbidity) in the second class, third class in autumn and spring and summer (with the lowest turbidity) was observed.

Table 3: Evaluation of regression equations and correlation coefficients (r^2) between quality indicators and physico-chemical parameters (Parameters= x and qualitative indicators= y)

X	PH	EC	turbidity
WQI	56.2-2.13x y= r^2 = %4.8	37.7+ 0.00106x y= r^2 = %3.7	38.4+0.188x y= r^2 = %3.2

X	DO	T	Nit
WQI	-0.764x y= 44.7 = %30.5 r^2	34.2+ 0.262x y= r^2 = %34.2	y=38+0.504x r^2 = %.13.9

X	phosphate	BOD_5	COD
WQI	38.4-34/6X y= = %16.9 r^2	41.8+ 0.678X y= r^2 = %46.5	42.6+0.273X y= r^2 = %47.7

3.2. Physico-chemical factors measured in units Mirza Kochakkhan results were as follows

Spring and summer (minimum DO) showed effluent temperature) and the second class in autumn and winter (minimum temperature of effluent) were shown.the trend was increasing.

Duncan test showed three classes of first-class autumn (maximum amount of COD), second class, third class winter and spring and summer (lowest COD) showed. Electrical conductivity during drainage Duncan test also showed an increasing trend in average three classes, first class summer (maximum electrical conductivity), second class, third class in spring and autumn and winter (minimum level of electrical conductivity) were shown.

Nitrate and phosphate showed an increasing trend during drainage, Duncan test for nitrate seasons of spring and summer showed two classes (maximum) in autumn and winter (minimum nitrate) of phosphate was observed that the mean of four classes, respectively, in summer (Most phosphate), spring, fall and late winter (low phosphate) showed.

Turbidity levels increased during the drainage of the face lift and drainage at the end of the turbidity maximum (station III) was observed. Duncan test of means showed three classes of first-class summer (highest turbidity), Class II, Class III in the spring and autumn and winter (lowest turbidity) was observed.

Results of qualitative indicators on both units and the culture industry showed that the quality index had decreased during the drainage process. During the season, there were no significant differences in changes in quality indicators, so that the highest quality of qualitative indicators in the spring and summer and lowest in autumn and winter. Between two cultures in Amir Kabir and Mirza Kochakkhan of annual effluent quality index was not significantly different.

4. Discussion

Qualitative analysis of variance in each agro during different seasons was significant at 1% level. The main reason for this change, direct or indirect effects of climatic conditions on the physicochemical factors. For example, temperature change, the change in water temperature and the change in the amount of dissolved oxygen.Seasonal fluctuations in rainfall on factors such as EC and turbidity was effective.

In addition, the beginning of autumn, the harvest started sugarcane, sugar factories, as well as the activity starts.

On the other hand, the new culture and the whole operation is performed in the autumn planting and harvesting, causing severe loss of agricultural waste is a qualitative indicator.Using correlation coefficients between physico-chemical factors 9 and the effluent quality was observed that temperature, dissolved oxygen, COD and BOD_5 having the highest correlation coefficients, were the most effective factors in the effluent quality index change.

Furthermore, simple regression equations for individual factors as independent variables and

dependent variables were presented as indicators of effluent quality:

$$WQI=62.6+0.42PH-0.003EC+0.017Turb-0.066Do-0.29T-1.96Nit+100Phos+0.15BOD_5-0.13COD$$

PH = pH
EC = electrical conductivity
Turb = turbidity
DO = dissolved oxygen
T = temperature
Nit = nitrate
Phos = phosphate
BOD_5 = residual biochemical oxygen
COD = chemical oxygen remains

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