Original Research Article

Study of Physio-Chemical parameters of waste water from food industries of Faisalabad

Abstract

Food waste or food loss is food that is unnecessary or lost uneaten. The reasons of food waste or loss are various, and take place at the stages of production, processing, transaction and utilization. The main objective of this study was to access the quality of ground water in Faisalabad city. From different food industries of Faisalabad water samples were collected to estimate their physiochemical parameters. The physiochemical parameters such as (pH, Electrical conductivity, Total dissolve solids, Calcium, Bi-carbonates, Total Hardness and chloride) were analyzed and their values were compared with the standard values. In majority of the industries waste, water was not up to the mark. pH, TSS, EC and Chlorides values was out of range in most of the samples. On the completion of data physiochemical parameters of ground water, statistical analysis was applied. Descriptive statistics was carried out to evaluate the significant different between means of samples.

Keywords: Food; Industries; Waster water; Parameters.

Introduction

Comment [N1]: THERE IS NEED FOR SHORTNOTE ON THESE PARAMETERS

Food waste or food loss is food that is unnecessary or lost uneaten. The reasons of food waste or loss are various, and take place at the stages of production, processing, transaction and utilization [1]. Current estimation of global food loss and waste stuck between one-third and one-half of all food produced. Loss and wastage takes place at all stages of the food supply chain or value chain. In low income countries, most loss takes place during production, while in industrial countries more food – about 100 kilograms per person per year is exhausted at the consumption phase [2].

Usually, useless or lost uneaten food is food waste. Though, correct definition is contentious, often based on situation. Professional bodies, concerning international organizations, state governments and secretariats may use their own definitions. Under the UN's Save Food scheme, the FAO, UNEP and stakeholders have established the consequent definition of food loss and waste [3].

In developed and developing countries which constrain either industrial or commercial agriculture, food loss occurs at most stages of the food industry and the amounts of food waste are unidentified, in subsistence agriculture but are likely to be unimportant by comparison, the narrow stages at which food loss can occur, and known that food is developed for projected need as different to a global marketplace demand. However, losses in storage in rising countries, mainly in African countries, can be high while the exact nature of such wastage is much debated. Food loss continues in the post-harvest stage, but the quantity of post-harvest loss concerned are comparatively hard to estimate and unknown. In storage, significant losses can be recognized to micro-organisms and pests [4].

Food wastes formed by processing are hard to minimize without disturbing the quality of the end product. Food safety regulations are able to argue foods which oppose standards before their arrival at markets. while this can disagreement with efforts to recycle food waste (as in animal feed), It makes sure the health of the consumer; they are importantly essential, especially in the dispensation of foodstuffs of animal origin (e.g. dairy and meat products), as impure products from these source can lead to and are linked with chemical and microbiolgical hazards [5].

An estimating amount of energy content of food waste by comparing the US food provide data with the calculated food inspired by the US population required by us. Waste removal and by-product management in food preparation industry pose troubles in sustainability and environmental defense [6].

Huge quantities of both solid and liquid wastes are formed annually by the food dispensation industry. These wastes contain principally recyclable organic contents and their dumping creates grave environmental troubles. These by-products may allow an extensive burden of phenol components [7]. The management of these wastes biologically was creating a proficient way for dropping their early COD more than 90% [8].

Food waste products from the house and industry have high levels of proteins and carbohydrates. Now, food wastes from the industry are treated an aerobically. Nevertheless, bio compost, lactic acid and energy from food wastes are importance added strategy for treatment of food wastes. The organic contents mostly carbohydrate in food wastes are probable substrate for anaerobic hydrogen production. During the elimination of basic palm oil (CPO), liquid waste produced by mills, palm oil mill effluent (POME) Palm oil is a main cash crop in many tropical developing countries i.e. Malaysia, where palm oil is major revenue earner. During the extraction of crude palm oil (CPO), liquid waste generated by mills, namely palm oil mill effluent (POME) [9].

Keeping in view the effects of waste products of different food industries of Faisalabad. The present study was designed to evaluate the analysis and study of different waste products and their effects produced in food industries of Faisalabad.

MATERIALS AND METHODS

2.1 Sample Collection

The present study was intended from different food industries of Faisalabad to estimate the water quality parameters. Sample was taken from wastewater channels of industries.

2.2 Preparation of Samples

In clean polythene bottles the samples were collected deprived of any air foams. Before sampling the containers were washed and firmly closed after collection and tagged. The temperature of the samples was precisely determined in the field at the time of sample collection. Samples were kept at 4ºC in freezer.

2.3 Analysis of Water Sample

Several water quality parameters were analyzed such as Total Alkalinity, Total Hardness, pH, TSS, Na, K, Sulphates, carbonates and bicarbonates.

2.5 Statistical Analysis

On the complete data of the physiochemical parameters, Statistical analysis was applied. Suitable tables were arranged, and means were assessed. Descriptive statistics was applied to check the difference at certain level.

Results and discussion

pH: Fluctuations in Ph of waste water along the normal value for different food industries shown in (Figure 1). The prescribed range 7.5 for ph. The maximum value of PH was recorded for Pak Sweets and Beakers. 8 and minimum value of PH 6.9 was recorded for Dawn food industry. Aamir and Nirala food industries water samples normal range of Ph. Similar results of Ph changes were endorsed in an Analysis of Physiochemical Parameters of Ground Water in Faisalabad by [10]. Waste water analysis was carried out in a in and around Peenya industrial area of Bangalore, South India with parallel results of current study [11].

Comment [N2]: pH

Comment [N3]: pH

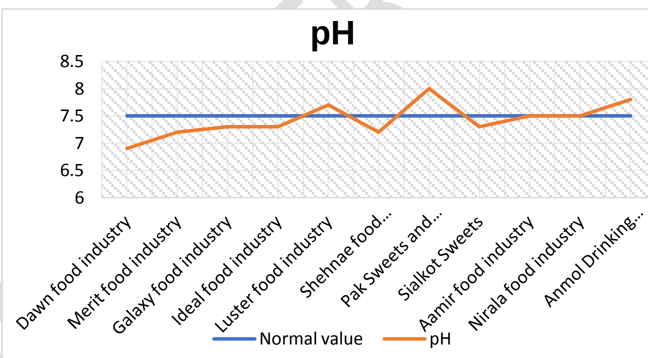

Figure 1: waste water PH of various food industries

EC: Oscillation of Electric conductivity recorded for various industrial wastewater was described in (Figure 2). Recorded data showed great fluctuations in Ec than the normal suggested range. The maximum value of EC (3.28 dS/cm) was plotted for Pak sweets and bakers and the lowest value recorded for Aamir food industry that was (2.07 dS/cm). This suggested that the waste water had the potency for EC that not meets the normal prescribed values. [12] and [13] worked separately at different places to check Physico-chemicals quality of water and reported the same results as mentioned in current study [14].

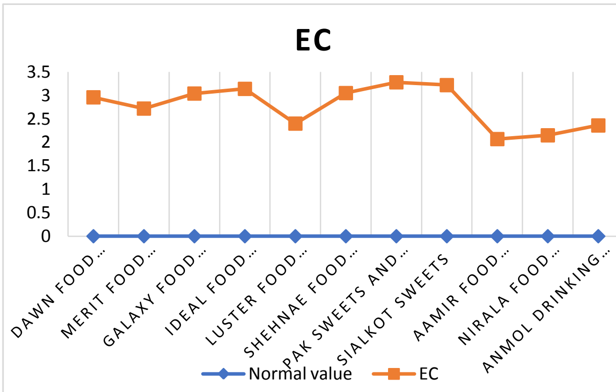

Figure 2: EC of various food industries waste water

TSS: The trend in TSS fluctuations for different industrial waste water was described in fig 3.3. according to this maximum TSS amount was recorded from Sialkot sweets (2061 ppm) and minimum value against it was plotted for Aamir food industry that was (1325 ppm**).** This suggested that values of documented data vary above and below the normal range that was 1750 ppm. [14] endorsed the parallel results, as described in present research work, in a study of physiochemical parameters of waste water in different food industries.

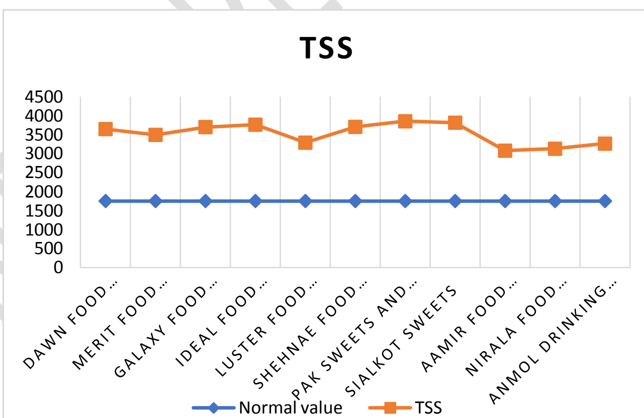

Figure 3: TSS of various food industries waste water

The graphical representations of different chemical parameters of waste waters was given in fig 3.4. The exorbitant of sodium ions from waste water was obtained 25 me/L from Pak sweets and bakers and minimum of it was recorded for Amir food industry. The amount of bicarbonates was recorded 16 me/L in abundance from waste water of Pak Sweets and Beakers and minimum amount 8 me/L logged for Dawn, Amir and Anmol food industries while, amount of sulphates, chlorides and potassium ions found as needle in haystack from the water samples. However, total hardness with its peak at 560 me/L reported for merit food industry and minimum for Pak sweets and bakers 382 me/L. The above and below trend from normal recommended value was observed in chemical parameters analysis. [15] endorsed the same results with parallel fluctuations in chemical parameters in their research [16].

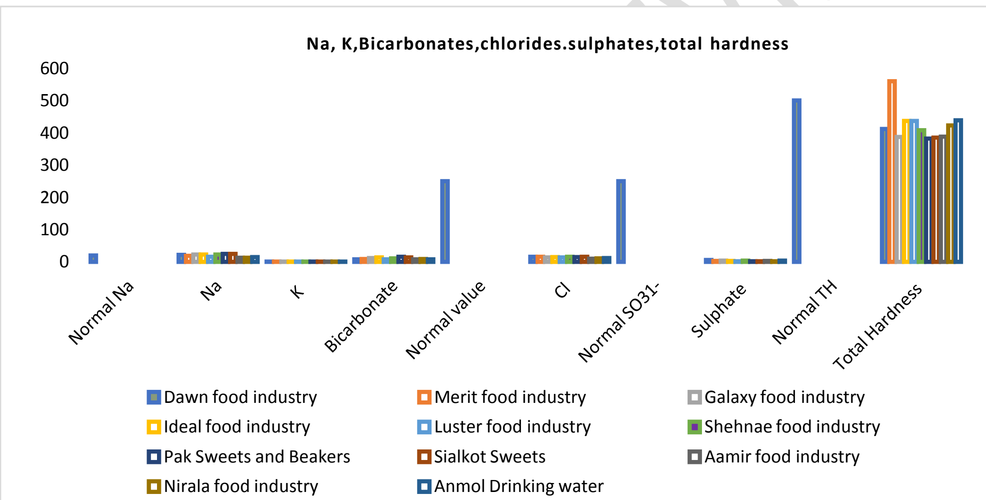

Figure 4: Na, K, Bicarbonates, chlorides. sulphates, total hardness of various food industries waste water

The statistical analysis of mean described that means sharing similar letters in a column are statistically non-significant (P>0.05) and these results also coherent to with results published by [17].

Table 1: Mean ± S.E of all the parameters and Tukeys test analysis

	pH	EC	TSS	Bicarbonates	Chloride (me/L)	Sulphate (me/L)	Total Hardness(me/L)	Na (me/L)	K (me/L)
Dawn food	6.97±0.07c	2.94±0.01d	1,894±0.32f	8.03±0.03e	15.83±0.44ab	5.47±0.09a	413.03±0.74d	21.40±0.06d	1.13±0.03bc

Merit food	7.10±0.06bc	2.73±0.01e	1,742±0.29g	8.50±0.06e	15.70±0.06ab	3.20±0.06c	561.23±0.61a	18.57±0.03e	0.76±0.01h
Galaxy food	7.20±0.06bc	3.05±0.03cd	1,947±0.60e	12.10±0.06c	14.33±0.09b	4.20±0.06b	387.60±0.32f	22.50±0.06c	0.98±0.01ef
Ideal food	7.17±0.09bc	3.13±0.01bc	2,009±0.35c	14.50±0.29b	14.47±0.09b	2.80±0.06d	437.23±0.50bc	22.57±0.03c	1.08±0.01cd
Luster food	7.60±0.06a	2.40±0.06f	1,536±0.76h	8.50±0.29e	15.00±0.58ab	2.03±0.04fg	436.13±0.33c	15.50±0.06f	0.75±0.01h
Shehnae food	7.10±0.06bc	3.05±0.03cd	1,953±0.29d	10.40±0.06d	15.83±0.44ab	4.17±0.04b	407.57±0.15e	22.33±0.09c	1.03±0.01de
Pak Swts&Bkrs	7.73±0.15a	3.25±0.02a	2,099±0.25a	16.50±0.29a	15.50±0.29ab	1.80±0.06gh	382.43±0.56g	25.13±0.03a	1.25±0.03a
Sialkot Sweets	7.20±0.06bc	3.23±0.01ab	2,062±0.29b	15.00±0.58b	16.50±0.29a	2.20±0.06ef	385.33±0.19f	24.47±0.12b	1.20±0.03ab
Aamir food	7.40±0.06ab	2.07±0.01g	1,325±0.44k	8.17±0.17e	10.30±0.06d	2.50±0.06de	387.50±0.70f	12.73±0.09g	0.93±0.01fg
Nirala food	7.43±0.07ab	2.15±0.01g	1,376±0.44j	8.80±0.06e	11.30±0.06cd	1.50±0.06h	412.87±0.32d	13.07±0.12g	0.90±0.01fg
Anmol Dr.wtr	7.70±0.06a	2.35±0.01f	1,511±0.32i	8.33±0.33e	12.33±0.33c	3.47±0.09c	439.17±0.17b	15.23±0.09f	0.89±0.01g

References

1. Galanakis CM. Food waste recovery: Processing technologies and industrial techniques. San Diego: Elesvier press. 2015; 4 pp.
2. Gustavsson JC, Cederberg, Sonesson U. Global food losses and food waste. Food and agriculture organization of unite nations. 2011; 812 pp.
3. Kantor. What is food waste? NSW love food and hate waste. 2016; 3 pp.
4. Janet DM. Food industry and the environment in the European Union: Practical issues and cost implications. Springer. 2000; 300 pp.
5. Szente L, Szetjli J. Cyclodextrins as food ingredients. Trends in food Science and Technology. 2004; 15:137-142.
6. Russ W, Pittroff RM. Utilizing waste products from the food production and processing industries. Critical Review Food Science Nutrition, 2004; 44:57-62.
7. Paramas AMG, Ruano SE, Buelga CS, Teresa SDP, Gonzalo JCR. Flavanol content and antioxidant activity in winery byproducts. Journal of Agriculture and Food Chemistry, 2004; 52:234-238.
8. Murado MA, Siso MIG, Gonzalez MP, Montemayor MI, Pastrana L, Miron J. Characterization of microbial biomasses and amylolytic preparations obtained from mussel processing waste treatment. Bioresource Technology. 1993; 43:117-125.
9. Chong MLV, Sabaratnam, Shirai Y, Hassan MA. Bio-Hydrogen production from biomass and industrial wastes by dark fermentation. International Journal of Hydrogen Energy, 2009; 34: 3277-3287.

10. Nasir S, Abdul S, Waqar M, Shahla N, Uzma R, Mahnoor I. 2019. Analysis of physiochemical parameters of ground water: A case study. Asian Journal of Advanced Research and Reports. 2019; 5(4):1-7.
11. Anitha P, Charmaine J, Nagaraja S. Evaluation of groundwater quality in and around Peenya industrial area of Bangalore, South India GIS techniques. Environment Monitoring and Assessment. 2012; 184:4067-4077.
12. Manjare SA, Vhanalakar SA, Muley DV. Analysis of Water Quality Using Physico-Chemical Parameters Tamdalge Tank in Kolhapur District, Maharashtra. International Journal of Advanced Biotechnology and Research. 2010; 1(2):115-119.
13. Salve VB, Hiware CJ. Study on water quality of Wanparakalpa reservoir Nagpur, Near Parli Vaijnath,District Beed. Marathwada region, Journal of Aquatic Biology. 2010; 21(2):113-117.
14. Ram S, Lokhande, Pravin US, Deepali SP. Study on Physico-Chemical Parameters of Waste Water Effluents from Taloja Industrial Area of Mumbai, India. International Journal of Ecosystem 2011; 1(1):1-9.
15. Akoto O, Adiyiah J. Chemical analysis of drinking water from some communities in the Brong Ahafo region. International Journal Environment Science Technology. 2007; 4(2):211-214.
16. Saravanakumar K, Kumar RR. Analysis of water quality parameters of groundwater near Ambattur industrial area, Tamil Nadu, India. Indian Journal of Science and Technology. 2011; 4: 25-31.
17. Jindal R, Sharma C. Studies on water quality of Sutlej River around Ludhiana with reference to physicochemical parameters. Environment Monitoring and Assessment 2011; 174:417-425.