SUSTAINABLE FOOD PRODUCTION TECHNOLOGY (SFPT) BY COMPARISON BETWEEN DIFFERENT LEVELS OF WASTEWATER IN IRAN

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ABSTRACT

In order to comparison between different levels of wastewater in Iran and its application at agriculture, this study was carried out in Islamic Azad university, Shahr-e-Qods Branch, Tehran at 2011. The use of wastewater (domestic, industrial and urban) studied in livestock production, industrial production and Agricultural production. The result showed that highest wastewater in Iran was urban wastewater from 2000 to 2010. Also, highest use of wastewater was in industrial production but it very used for agricultural production. In some urban areas, sewage is carried separately in sanitary sewers and runoff from streets is carried in storm drains. Access to either of these is typically through a manhole. During high precipitation periods a sanitary sewer overflow can occur, forcing untreated sewage to flow back into the environment. This can pose a serious threat to public health and the surrounding environment.

KEYWORDS: Sustainable Agricultural Management (SAM), wastewater control, food products.

INTRODUCTION

Wastewater or sewage can come from (text in brackets indicates likely inclusions or contaminants): Human waste (fæces, used toilet paper or wipes, urine, or other bodily fluids), also known as blackwater, usually from lavatories; Cesspit leakage; Septic tank discharge; Sewage treatment plant discharge; Washing water (personal, clothes, floors, dishes, etc.), also known as greywater or sullage; Rainfall collected on roofs, yards, hard-standings, etc. (generally clean with traces of oils and fuel); Groundwater infiltrated into sewage; Surplus manufactured liquids from domestic sources (drinks, cooking oil, pesticides, lubricating oil, paint, cleaning liquids, etc.); Urban rainfall runoff from roads, carparks, roofs, sidewalks, or pavements (contains oils, animal fæces, litter, fuel or rubber residues, metals from vehicle exhausts, etc.); Seawater ingress (high volumes of salt and micro-biota); Direct ingress of river water (high volumes of micro-biota); Direct ingress of manmade liquids (illegal disposal of pesticides, used oils, etc.); Highway drainage (oil, de-icing agents, rubber residues); Storm drains (almost anything, including cars, shopping trolleys, trees, cattle, etc.); Blackwater (surface water contaminated by sewage);

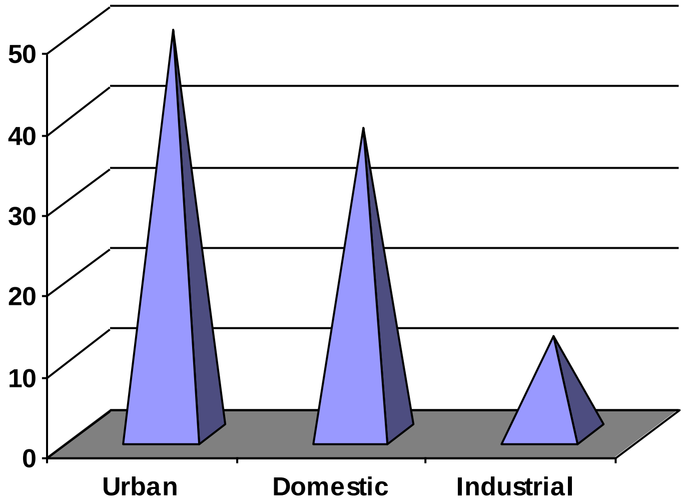

Figure 1- Different wastewater in Iran at 2010

Industrial waste industrial site drainage (silt, sand, alkali, oil, chemical residues); Industrial cooling waters (biocides, heat, slimes, silt); Industrial process waters; Organic or bio-degradable waste, including waste from abattoirs, creameries, and ice cream manufacture; Organic or non bio-degradable/difficult-to-treat waste (pharmaceutical or pesticide manufacturing); extreme pH waste (from acid/alkali manufacturing, metal plating); Toxic waste (metal plating, cyanide production, pesticide manufacturing, etc.); Solids and Emulsions (paper manufacturing, foodstuffs, lubricating and hydraulic oil manufacturing, etc.); Agricultural drainage, direct and diffuse.

WASTEWATER CONSTITUENTS

The composition of wastewater varies widely. This is a partial list of what it may contain: Water (> 95%) which is often added during flushing to carry waste down a drain; Pathogens such as bacteria, viruses, prions and parasitic worms; Non-pathogenic bacteria; Organic particles such as feces, hairs, food, vomit, paper fibers, plant material, humus, etc.; Soluble organic material such as urea, fruit sugars, soluble proteins, drugs, pharmaceuticals, etc.; Inorganic particles such as sand, grit, metal particles, ceramics, etc.; Soluble inorganic material such as ammonia, road-salt, sea-salt, cyanide, hydrogen sulfide, thiocyanates, thiosulfates, etc.; Animals such as protozoa, insects, arthropods, small fish, etc.; Macro-solids such as sanitary napkins, nappies/diapers, condoms, needles, children's toys, dead animals or plants, etc.; Gases such as hydrogen sulfide, carbon dioxide, methane, etc.; Emulsions such as paints, adhesives, mayonnaise, hair colorants, emulsified oils, etc.; Toxins such as pesticides, poisons, herbicides, etc. Pharmaceuticals and other hormones.

WASTEWATER QUALITY INDICATORS

Any oxidizable material present in a natural waterway or in an industrial wastewater will be oxidized both by biochemical (bacterial) or chemical processes. Since all natural waterways contain bacteria and nutrients, almost any waste compounds introduced into such waterways will initiate biochemical reactions (such as shown above). Those biochemical reactions create what is measured in the laboratory as the Biochemical oxygen demand (BOD). Such chemicals are also liable to be broken down using strong oxidizing agents and these chemical reactions create what is measured in the laboratory as the Chemical oxygen demand (COD). Both the BOD and COD tests are a measure of the relative oxygen-depletion effect of a waste contaminant. Both have been widely adopted as a measure of pollution effect. The BOD test measures the oxygen demand of biodegradable pollutants whereas the COD test measures the oxygen demand of oxidizable pollutants. The so-called 5-day BOD measures the amount of oxygen consumed by biochemical oxidation of waste contaminants in a 5-day period. The total amount of oxygen consumed when the biochemical reaction is allowed to proceed to completion is called the Ultimate BOD. Because the Ultimate BOD is so time consuming, the 5-day BOD has been almost universally adopted as a measure of relative pollution effect. There are also many different COD tests of which the 4-hour COD is probably the most common.

There is no generalized correlation between the 5-day BOD and the ultimate BOD. Similarly there is no generalized correlation between BOD and COD. It is possible to develop such correlations for a specific waste contaminants in a specific waste water stream but such correlations cannot be generalized for use with any other waste contaminants or waste water streams. This is because the composition of any waste water stream is different. As an example and effluent consisting of a solution of simple sugars that might discharge from a confectionery factory is likely to have organic components that degrade very quickly. In such a case the 5 day BOD and the ultimate BOD would be very similar. I.e there would be very little organic material left after 5 days. . However a final effluent of a sewage treatment works serving a large industrialised area might have a discharge where the ultimate BOD was much greater than the 5 day BOD because much of the easily degraded material would have been removed in the sewage treatment process and many industrial processes discharge difficult to degrade organic molecules.

The laboratory test procedures for the determining the above oxygen demands are detailed in many standard texts. American versions include the "Standard Methods for the Examination of Water and Wastewater".

SEWAGE DISPOSAL

Sewage may drain directly into major watersheds with minimal or no treatment. When untreated, sewage can have serious impacts on the quality of an environment and on the health of people. Pathogens can cause a variety of illnesses. Some chemicals pose risks even at very low concentrations and can remain a threat for long periods of time because of bioaccumulation in animal or human tissue.

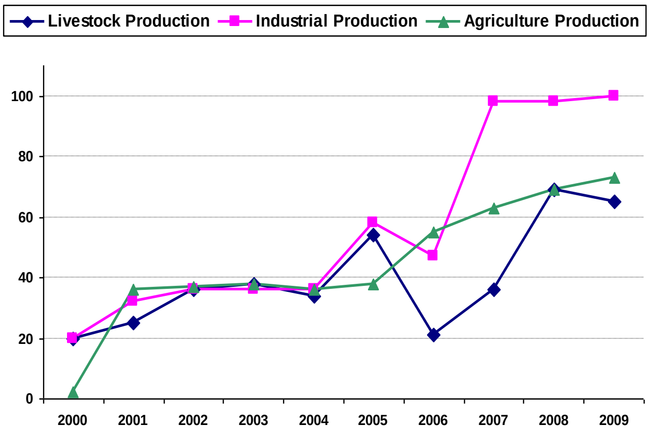

Figure 2- The use of wastewater in different production at Iran

TREATMENT

There are numerous processes that can be used to clean up waste waters depending on the type and extent of contamination. Most wastewater is treated in industrial-scale wastewater treatment plants (WWTPs) which may include physical, chemical and biological treatment processes. However, the use of septic tanks and other On-Site Sewage Facilities (OSSF) is widespread in rural areas, serving up to one quarter of the homes in the U.S.[2] The most important aerobic treatment system is the activated sludge process, based on the maintenance and recirculation of a complex biomass composed by micro-organisms able to absorb and adsorb the organic matter carried in the wastewater. Anaerobic processes are widely applied in the treatment of industrial wastewaters and biological sludge. Some wastewater may be highly treated and reused as reclaimed water. For some waste waters ecological approaches using reed bed systems such as constructed wetlands may be appropriate. Modern systems include tertiary treatment by micro filtration or synthetic membranes. After membrane filtration, the treated wastewater is indistinguishable from waters of natural origin of drinking quality. Nitrates can be removed from wastewater by microbial denitrification, for which a small amount of methanol is typically added to provide the bacteria with a source of carbon. Ozone Waste Water Treatment is also growing in popularity, and requires the use of an ozone generator, which decontaminates the water as Ozone bubbles percolate through the tank.

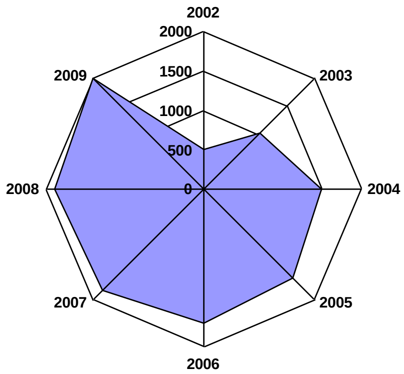

Figure 3- The use of domestic wastewater in agriculture at Iran

Disposal of wastewaters from an industrial plant is a difficult and costly problem. Most petroleum refineries, chemical and petrochemical plants [3][4] have onsite facilities to treat their wastewaters so that the pollutant concentrations in the treated wastewater comply with the local and/or national regulations regarding disposal of wastewaters into community treatment plants or into rivers, lakes or oceans. Other Industrial processes that produce a lot of waste-waters such as paper and pulp production has created environmental concern leading to development of processes to recycle water use within plants before they have to be cleaned and disposed of.

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