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Persistence of Ordinary And De-Oiled Moringaoeifera Seed In Coli-Form Bacteria Treated Abattoir Wastewater.

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Abstract: *The efficacy of MoringaOleifera seed in wastewater treatment is not in question. In this study,the abattoir wastewater was treated for coli-form bacteria removal using ordinary and de-oiled Moringa, also referred to as Moringa powder solution (MPS) and Moringa cake solution (MCS) respectively. The treatment involved the use of the treatment substance at 10%, 20%,30%,40% and 50% concentrations, dosage from 0-1.5mg/l, speed, from 0-450rpm and settling time, from 0-270min, was also varied in the respective cases. After the treatment process, the treatedwastewater was stored at room temperature and weekly laboratory observations were conducted for 8weeks respectively and the changes were noted. The results revealed that the coli-form bacteria removedfrom the waste water retained its treated quality with marginal improvements for 3 weeks and 5 weeks for the abattoir wastewater treated with MPS and MCS respectively. After these periods, quality deterioration leading to re-contamination set in, thus revealing better persistence with the use of MCS over MPS treated wastewater.*

Keyword, s*: Moringa, Wastewater, De-oiled, Re-contamination, Persistent.*

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I. INTRODUCTION

Waste water is the water that has been adversely affected in quality by anthropogenic influence (Narasiah, 1998).It comprises liquid waste discharged by domestic residences; commercial properties industrial and or agricultural and can encompass a wide range of potential contaminants and concentrations. In the most common usage, it refers to the municipal waste water that contains a broad spectrum of contaminants resulting from the mixing of waste water from different sources.Waste water is generally characterized as a grey colour, musty odour, it is composed of 0.1% solid content and 99.9% water content about 30% of the solids can be suspended while 70% could be dissolved. The solids could be either in organic or inorganic nature where the organic usually consist of fecal matter, soap, garbage, vegetable, debris, fruit, skins, paper and rags, while the inorganic comprises ash sand clay and dissolved minerals. The proportion of these varies depending on their sources and the season in which the observation is made (Mara, 1986; Sen and Demirer, 2003;Youngabi, 2010).
MoringaOleifera has a wide range of application in most spheres of life of human and environment. The wonder tree as it is popularly known is useful in its entirety since the leaves, flower, seeds, root and the back are put to variety of uses. (Anwar et al, 2007). The oil when extracted is used as cosmetic, lubricant, medicinal and as a soup ingredient, (Springer 2012). Whereas both the leaf and seed are effective coagulants, the oil contained in this bio-coagulant is extracted and the cake is also found to be an effective coagulant (Dorea, 2006; Olsen, 1987; Sutherland *et al.,* 1989). Its seed serves as an antibiotic, anti-inflammatory, anti hypertensive (Elier*et al.,* 1981; Suarez *et al.,* 2002 and Suarez *et al.,* 2005) and in the reduction of cholesterol among others (Ghasi*et al.,* 1999;Sobsey, 2002 and Armando *et al.,* 2002). The leaves are also serving medicinal purpose, it is grounded and taken as tea as well as being a popular soup and salad, in many local settlements the tree serves as fencing stakes (Folkard, 1996;Onwuliri, 2006) in most parts of Northern Nigeria, it is also shed dried while the root and back is also medicinal. This tree is gaining ground and is a wide area of research in especially water treatment as a coagulant and disinfectant, this work is inclusive in the effort made by several other researchers.

Although abattoir operation are beneficial to man, as it provide meat for human consumption, large volume of waste water generated from abattoir and discharged into receiving water bodies untreated is a major source of pollution of both surface and ground water (Adasemoye*et al.,* 2006; Meadows 1995).
Abattoir waste water can introduce enteric pathogens and excess nutrients into waer and contaminate groundwater (Narfanda*et al.,* 2005). In developing countries, the operation of abattoir is responsible for generating foul odour and anaesthetic presentation (Akpan, 2004). Waste water treatment is carried out principally to eliminate or reduce the pathogenic organisms, and to diminish the oxygen depleting ability of micro-organisms in waste water (Bassehervre, 1996).The use of natural material for the clarification of turbid water is no longer a new idea. Herbal substances from plant have also been used for turbidity removal as well as the removal of harmful biological material that can affect human health (Fahey, 2005),Madsenet*et al.,* 1987). Sanskrit writing in India refers to seeds of the tree Strychnospotatorium seed obtained from a small tree occurring abundantly in central India as a clarifier of low turbid water Sen Bulusu,1962;Dhekane*etal.*,1990; Tripathi,1976; Jahn,1988; Folkland*et al*.,1995;Al-Khalili *et al*,1970).Powdered and roasted grains of Zea mays have been used for settling impurities in water (Bhishagratna (1991).Also the use of Tuna cactus(Opuntiafiscusindica) for rural water purification was reported Danish *et al*. (2003) and Sutherland *et al.* (1990).These have been in use before the application of synthetic chemicals like ferric salts and aluminiumsulphate (Mehinejad*et al.*,2009; Jahn 1986),which has a worldwide acceptance, Batby (1980).The use of these chemicals have however attracted the attention of some researchers in view of their ill effect to human and the environment hence the effort of sourcing some natural alternatives (Miller *et al.*,1984; Letterman and Driscoll 1988). Other researchers are also focusing on the use of natural coagulants especially in developing countries with the view to reducing the cost and hazards associated with the use of chemical coagulants includes Jahn (1981), Ndabingengesere and Narasiah (1998). Natural coagulant from plant families such as capparidacea and papilionacea have been used to clear turbid water in households and this has drastically reduced the cost of treatment by 50-90%.forKatayon et al; (2006) have investigated the influence of storage conditions on the coagulation efficiency of M. oleifera stock solution. In their study the aqueous extract of M. oleifera's seeds was kept in different storage durations and temperatures. Their finding indicated that the coagulation efficiency of M. oleifera stock solution decreased as storage duration increased. Results of a recent study by Katayon et al. (2006) revealed that the coagulation efficiency of M. oleifera's seeds declined as storage duration increased from 1 to 3 and 5 months. However, the influence of storage temperature was found to be insignificant at the duration of 5 months. Whereas research has been carried out to determine the shelve life of Moringaseed on its own under varying conditions, non of such investigated the persistence of this bio-coagulant in treated and stored abattoir water with particular reference to the total coli-form which this work is set out to establish

II. METHODOLOGY

MoringaOleifera seed was grounded in a domestic blender and sieved. Hexane solvent was introduced and stirred in weighed round bottom flask and a condenser is then fitted in the electrothermalSoxhlet extractor and the oil extraction was then executed.Six Jars containing various Moringa levels in a beaker with 500mls of the abattoir waste water was tested in parallel. The Flocculator was operated at varying speed of 30, 90, 150, 210, 270, 330, 390, 450 revolutions per minute (rpm), dosages of 0.6, 0.9, 1.0, 1.1, 1.2,1.3, 1.4,an1.5mg/l. Also, settling time was observed from 30, 60, 90,120, 150,180, 210, 240, and 270min. Dosages were applied at 10, 20, 30, 40, 50gm of Moringa powder respectively and readings taken at intervals. After the test, the paddles was stopped and removed from the beakers and the water allowed settling. 25mls was removed from each beaker using a graduated pipette for the various tests. The setting time for the coagulated water was also noted. The test was carried out before and after the addition of ordinary and de-oiled Moringa respectively.The treated abattoir waste water quality which includes all the parameters investigated before and after the treatment process using ordinary and de-oiled Moringa respectively were stored under room temperature each of their qualities analyzed after every 7 days for the period of 8weeks This was done to assess any rate of change or otherwise of the quality noting the residual effect of Moringa in the treated abattoir waste water. The laboratory procedure was carried out until the rate of deterioration of the treated waste water quality attained its optimum and no further loss of quality was observed.

III. RESULTS AND DISCUSSION.

The initial coli-form at storage after treatment with MPS at 10% concentration was as high as 40CFU. After a week storage period this amount reduced to 6CFU. This bacteria population was maintained for two consecutive weeks and after 3 weeks, this value started increasing indicating recontamination. The sample treated with MCS and stored at 17CFU also reduced drastically to 3CFU on checking this quality parameter in the 2nd week. A value of 2CFU was consistently maintained to week 5 after which deterioration set in. This significant improvement in quality reveals that at storage, the bacteria population was high and after a week of storage in quiescence, settlement of dissolved and suspended solids that hitherto were floating further settled

with additional storage time,with better advantage of MCS, this trend is represented in figure 1. Similar trend was displayed by the MPS treated abattoir wastewater at 20% concentration, in this case, the quality of 35CFU reduced to 6CFU at week 4, from which this point the value started to rise. But 17CFU from the MCS treated reduced to 4CFU and remained same till the 5th week when it started deteriorating in quality, see fig. 2
From fig.3, 30% concentration MPS treated waste water showed a remarkable improvement from 35 to 4CFU in the week 3 subsequently, the quality began to get re-contaminated, while the MCS treated reduced from 17 to 2CFU for 5 weeks, a very low value, which is tending to total elimination of bacteria. This observation is of great importance as it is an indication that this bio-coagulant is demonstrating a characteristic of a disinfectant. Indeed this quality could serve to confirm the findings of Bichi*et al*. (2012) who determined the kinetics of water disinfection with Moringa seed. The researcher de-fatted the Moringa seed using hexane in a Soxhlet extractor after extracting the active ingredient, the extract was used as to disinfect raw water samples through the process of culturing and incubating to assess the cell survival and the response of bacteria to this treatment. The mode of attack of the Moringa seed on E.coli cell was that it ruptured the cell and damaged the intercellular components leading to swelling and bursting to death. The efficacy of MoringaOleifera at 30% concentration has continued to show its efficacy hence confirming this to be the optimum concentration as determined by Lagasi (2017). The 40% concentration treated wastewater with ordinary MoringaOleifera also reduced from 35 to 6CFU at week 3 while sample treated with MCS reduced from 17 to 4CFU at week 4, this is shown in fig.4. However, with higher concentration, the persistence of this bio-coagulant is being retarded, this could be due to the fact that the treatment substance is bio-degradable and with increase storage time, degradation will be faster and hence a recontamination process.Samples treated with 50% concentration of MPS had its coli-form bacteria reduced from 40 to 25CFU at week 4 to 16cfu at week 5 after these weeks, green coloration indicating algal growth was noticed in each sample that attained its optimum storage efficiency revealing a reduced strength of persistence of this bio-coagulant in the treated abattoir wastewater, see fig.5.The trends of the Moringa persistence show a decline as storage weeks increases, this is simply, and this is in conformity with the characteristic of bio-degradable substance such Moringa.Also the fact that the research is dealing with wastewater that had a very high organic load, a condition that is capable of accelerating re-contamination process is a reason for the level of persistence attained.This work however shows that the absence of oil in the bio-coagulant limits the chances for bacteria continuous survival when compared to ordinary Moringa.

IV. CONCLUSION

The action of Moringa in treated waste water is continuous with need for a period of quiescence when the bio-coagulant effect further purification and attains a steady state where no further quality is acquired. De-oiled Moringa persist for a longer period than the ordinary Moringa at 5 against 3 weeks. The removal of oil content in Moringa seed enhanced its potency and resistance to re-contamination of the treated abattoir wastewater.

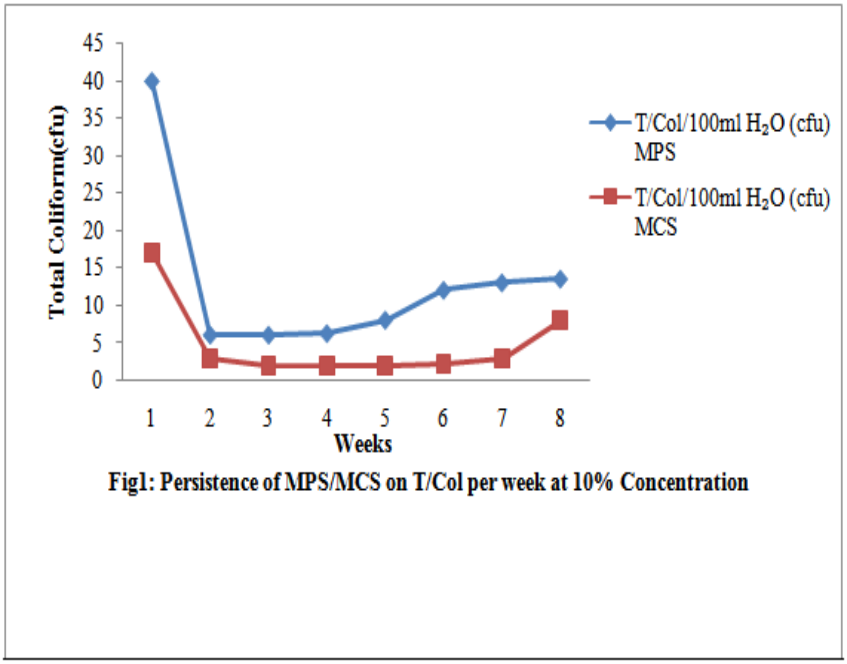

Fig1: Persistence of MPS/MCS on T/Col per week at 10% Concentration

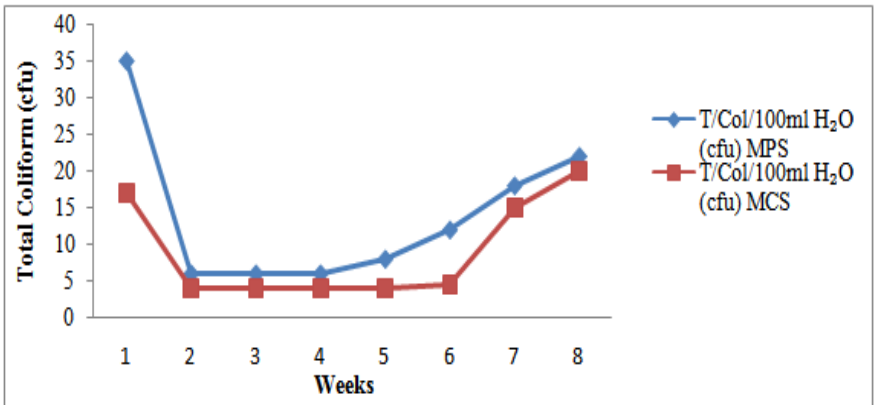

Fig 2: Persistence of MPS/MCS on T/Col per week at 20% Concentration

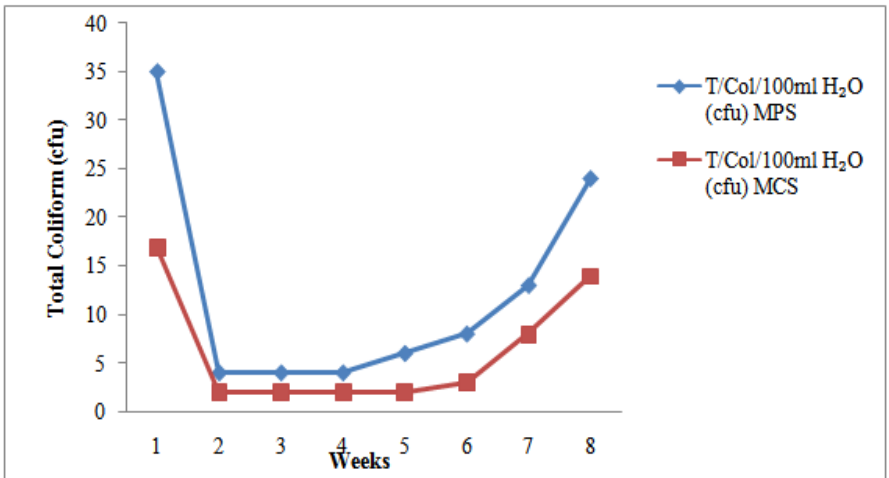

Fig 3: Persistence of MPS/MCS on T/Col per week at 30% Concentration

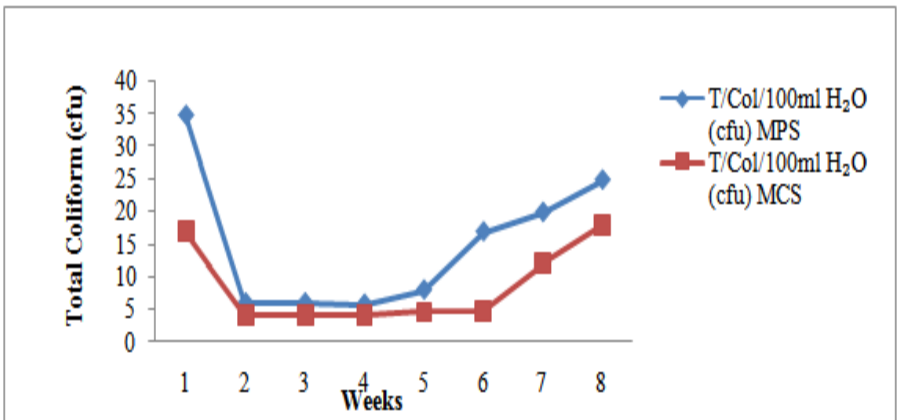

Fig 4: Persistence of MPS/MCS on T/Col per week at 40% Concentration

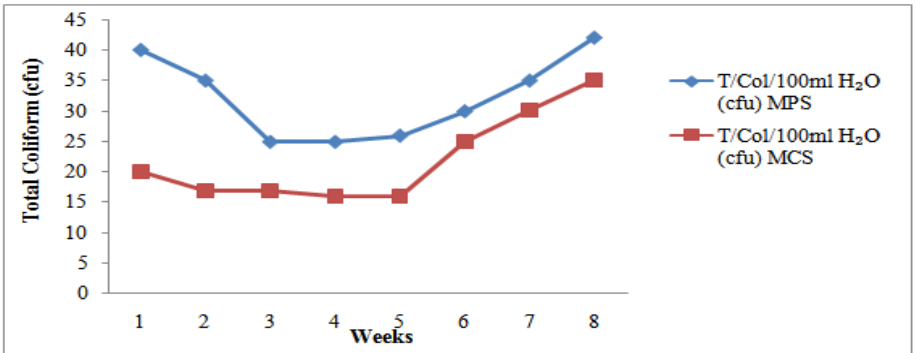

Fig 5: Persistence of MPS/MCS on T/Col per week at 50% Concentration

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