CHEMICAL CHARACTERISTICS OF SOURCE SEPARATED MUNICIPAL ORGANIC WASTE DEGRADED WITH DIASTIC MICROBES (of *Achatina achatina*) AS ANIMAL FEED

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Abstract

In this study, the household municipal organic waste fractions originating from the Nigerian municipality of Umuahia was source separated and analyzed for chemical characteristics for farm animal feeding. This was done with respect to visible contaminations, degradation and chemical composition including the heavy metals, using samples from 2 tonnes of municipal solid waste (MSW) materials. After manual sorting and magnetic separation of the wastes, 80% was sorted as municipal organic waste (MOW), of which 8% of MOW was observed to be paper waste (PW) which stood at about 7.708 million tones. It is good to note that, about 122.36 million tress could be saved from been cut annually if the PW is been recycled into reusable paper. The MOW was dehydrated using diastic microbes obtained from the snail (*Achatina achatina*). As observed in this study, the carbon concentrations of the degraded municipal organic waste (DMOW) was reduced ($P<0.01$) over the non-degraded municipal organic waste (NDMOW); with deferential value of 68g kg-1 DM. This is equivalent to about 20% of carbon utilized by the microbes, that is been prevented in the destruction of the ozone. Where the carbon to nitrogen ratio has a concentration deferential value of 6.42g kg^{-1} DM, this is equivalent to about 40.89% all in favor of the DMOW feed. The nitrogen, phosphorus and potassium concentrations of the DMOW as metabolic nutrients was better ($P<0.05$, $P>0.05$) over the NDMOW; this can serve as good source of nutrient in farm animal nutrition. There was a difference in metabolized form of cellulose constituent at 39g kg^{-1} DM, crude fat 59g kg^{-1} DM, starch 59g kg^{-1} DM, lignin 33g kg^{-1} DM, hemicelluloses 50g kg^{-1} DM and sugar 18g kg^{-1} DM; all in favor of the DMOW which is in form of utilizable nutrients for farm animal nutrition, especially the ruminants. The energy value was at the region of 14.24 - 10.28 MJ kg^{-1} DM for both treatments, and in favor for DMOW feed in metabolic form. The concentrations of lead, cadmium and mercury found in the sorted waste and degraded with diastic microbes were slightly high as metabolic nutrients ($P<0.01$) on the DMOW feed over the NDMOW feed. Similar observations were noted on molybdenum, sodium, aluminum, chromium, manganese, iron, cobalt, copper, strontium, and some other heavy metals studied which was better ($P<0.01$) on the DMOW feed. This is within the tolerance level and acceptability for farm animal nutrition, especially for ruminants. Generally, there was a significant benefits noted in the DMOW over the NDMOW in respect to chemical characteristics analyzed. This was due to the microbial metabolic contributions in nutrient improvement to the waste, as well as in the purification of the wastes into feedstuff by the diastic microbes for the farm animal production. Further, it is good to note that, delivering 7.709 million tons of waste papers (WP) annually from Nigeria alone to paper factories for recycling will save 122,361,905 trees from being cut down each year. This will help to improve the environmental condition, for better health by reducing the high level of the green gases and other nitrogenous compounds in the environment. Also, will help in the minimizing the carbon circulation in the atmosphere.

Keywords: Diastic microbes, municipal organic waste, carbon, heavy metal, lignin, cellulose, nitrogen, degradation, metabolic nutrients.