Characterization of material pyrolytic biomass agricultural

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Abstract

There are a lot of agricultural waste in agriculture. These are causes of pests in the soil due to its excess and further complicate agricultural work. A possible solution is to transform agricultural waste into organic additives, through a process of pyrolysis, these additions to the soil help to change their physical properties such as: porosity, apparent density and infiltration in the short term. Therefore, this work focused on quantities of materials pyrolytic encountered in corn, sorghum, chickpea, and cane, sawdust waste. The latter served as a witness. To achieve this, were collected 5 specimens of each material in the municipality of Guasave, Sinaloa, Mexico. The materials were ground and is sieved with a 2mm particle diameter. Subsequently implemented a bath of 50 ml of extract from orange peel and dried in the oven at 60 ° C. Finally the pyrolysis process was applied to 380 ° C for 35 minutes. The amount of pyrolytic material was used to determine the method of initial weight less final weight of processed materials. The results obtained were analyzed with the statistical method of mean differences. Treatments of corn and sorghum were which resulted with most material pyrolytic. The above give an added value to crop residues, which are usually sold at low cost to feed cattle.

Pyrolytic, Orange, biomass, organic residue extract.

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Introduction

Agriculture exist in a lot of product in the threshing corn plots (Figure 2), chickpea, sugarcane and sorghum (Arauzo, 2014) agricultural waste. These wastes are causing pests in the soil due to its excess and further complicate farming. However, this waste can be profitable and innovative if they become retaining moisture materials because they are inexpensive and are abundant in the state of Sinaloa (Jiménez, 2013). In the state of Sinaloa as in many regions of Mexico and the world it needs more efficient use of crop residues in organic agriculture. One possible solution is to transform agricultural waste into organic additives, by a pyrolysis process, these aggregates to the ground help to change their physical properties such as porosity, bulk density and infiltration in the short term (Ricardo, 2014). Pyrolytic production materials from agricultural biomass (Casini, 2014) have great economic potential and impact on the environment (Mora, 2014). Pyrolysis converts low value waste moisture adsorbents with a high utility value. Also, they can be used to retain macro and micro elements (Martinez, 2014) and as substrate in protected agriculture. Finally, you can export as activated filter (Liew, 2014) coal, which benefits the state's economy and the country. Pyrolysis, carbonization is based on agricultural waste, and is carried out at a temperature of 380 ° C for 35 minutes (Figure 1). To activate and accelerate the increase in porosity extract orange juice (Valencia, 2005) is added. According to Ekpete, pyrolytic material has applications such as micro and macro retainer chemicals in the water, water filter, odor eliminator and flavors in animal fat and others. The pyrolytic material can produce waste from cardboard, sawdust, raw timber and others (Penjumrasa, 2014). This work focused on knowing the quantities of pyrolytic materials found in waste corn, sorghum, chickpea, sugarcane and sawdust.

In Figure 1, the process shown in vitro pyrolysis.

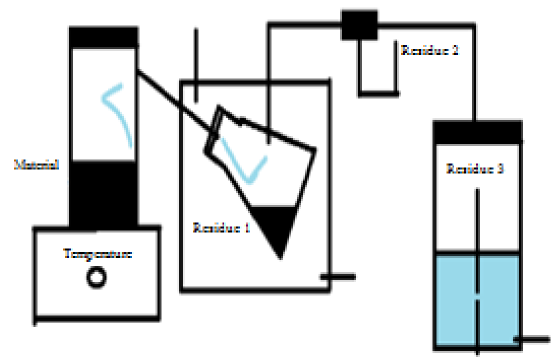

Figure 1 *pyrolytic process*

Materials and methods

In Figure 2, the threshing process is shown in an agricultural farm. As seen after threshing are organic residues.

Figure 2 *Process for obtaining threshing waste.*

Figure 3 *Collection of organic waste.*

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Figure 4 *Grinding process*

Figure 5 *Particle size*

Figure 6 *pyrolysis*

Figure 7 *Raw Material (initial)*

Figure 8 *Material processing (final)*

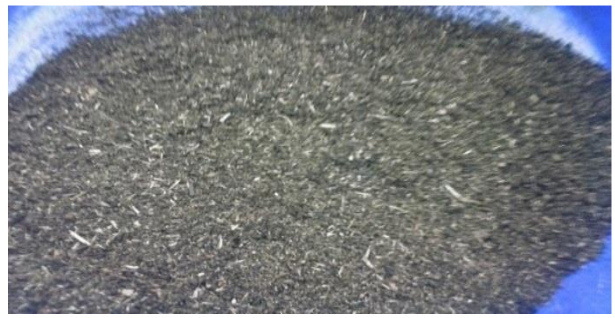

Figure 9 *pyrolytic material*

5 samples of 10 kg of agricultural waste were collected in the municipality of Guasave Sinaloa, Mexico (Figure 3). These residues were: corn, sorghum, chickpea, sugarcane and sawdust. The latter served as a control. Samples were then crushed with a power mill Aztec mark (Figure 4) and sieved with a diameter of 2mm particle (Figure 5). 100 g of each sample was weighed on an electronic scale (Brand Arda) (Figure 6). The samples were dried in an oven at a temperature of 60 degrees centigrade for 24 hours to 5 treatments., Then 50 ml bath of orange peel extract is applied and got the stove again, for final drying, finally the pyrolysis process, proposed by Varriano (2010), in physics laboratory of the Universidad Autónoma Chapingo, Texcoco, Edo Mexico, was applied in February of 2015.. To determine the amount of pyrolytic material initial weight method less final weight of the processed materials (Figure 7 and 8) was used.

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The results of pyrolytic material (Figure 9) obtained were analyzed using the statistical method of mean differences with an experimental design of 5 treatments with 5 repetitions. Data analysis was performed on MAT-LAB 2013.

Results

Table 1 shows that mean difference exists in the 5 treatments (maize (T-5), sorghum (T-4), chickpea (T-2), reed (T-3) and sawdust (T-1 is observed)), a method using pyrolysis at a temperature of 380 ° C and a time of 35 minutes.

	R-1 (gr)	R-2 (gr)	R-2 (gr)	R-4 (gr)	R-5 (gr)	Media (gr)
T-1	34	33.5	33.7	32.9	33.1	33.4
T-2	22.3	22.4	21.3	22.5	22.2	22.14
T-3	36	36.6	35.6	34.5	33.5	35.24
T-4	47.5	45.9	47.9	46.7	46.6	46.92
T-5	54.5	54.8	55.2	54.2	54.8	54.7

Table 1 *Experimental design*

In Figure 10 the averages of the 5 treatments content pyrolytic material obtained in the process pyrolisis observed. Treatments 4 and 5 were those that were most pyrolytic amount of material compared to T1 according to the pyrolysis process at a temperature of 380 ° C and 35 minutes with a particle size of 2 mm.

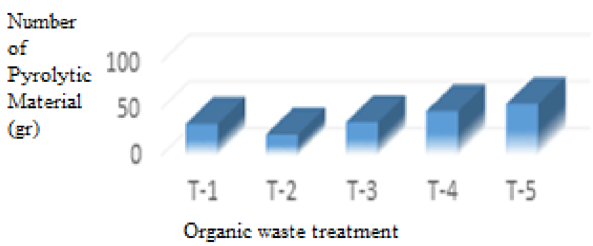

Figure 10 *Treatment of processed organic waste*

This is corroborated by the statistical test of mean difference where T-2, T-4 and T-5 treatments have a significant difference from the control (Figure 11).

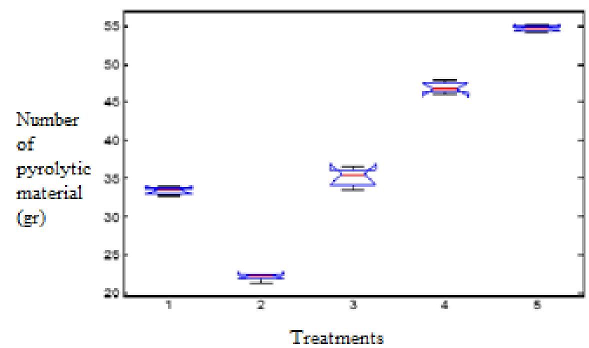

Figure 11 *Difference in treatment means*

Conclusions

According to the results of the calculations, it can be concluded that sorghum and maize are the materials from which most pyrolytic material can be obtained. This gives added value to crop residues, which are usually sold at low cost to feed livestock.

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