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ORIGINAL ARTICLE

Survey of Possible to Produce Compost from Waste Residues of Agricultural Products in order to Reduce Environmental Hazardous

Ali Ajili Lahiji[1], Parisa Mohammadpour[2]
1. Department of Soil and Water, Guilan Agricultural and Natural Resources Research and Education Center, Rasht, Iran
2. Assistant Prof. of Agricultural and Natural Resources Research Center of Guilan - Department of Natural Resources, Iran
Email : Lahigy_123@yahoo.com

ABSTRACT
Due to the increasing world population and limited arable land, the necessary to attention the sustainable agriculture is greater than ever before. Sustainable agriculture requires to sustainable and productive land and sufficient attention must paid for the need to increase organic material that mostly is in less than one percent. Given that rice straw and peanut skin discarded in Guilan and in some cases, a lot of pollution caused by burning them, a plan was implemented to compost the plant waste for optimal use. Peanuts skin is legumes that have a high percentage of nitrogen. In addition to becoming compost it can improve soil chemical and physical properties and contribute to supply part of nitrogen and straw increases the organic and mineral matter and the compost can be exploited in the potting soil in fields and greenhouses of Guilan. So, in order to investigate the possibility of producing compost, the present experiment with eight treatments had been carried out in completely randomized block design. The results show a considerable decrease in C/N ratio at the beginning and end of the experiment. Earthworms and soil organisms found in compost is a suitable environment for plant growth and complete decomposition of roughage residue was confirmed this case.
Keyword*: waste residues of agricultural, composting, peanut, rice straw*

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INTRODUCTION

Different forms of organic agriculture have positive effects on environmental sustainability. Biological agriculture is an integrated farming system based on ecology principles. Agricultural biological with the operations in soil, rather than using chemical fertilizers and buy the help of nutrient cycling in the soil, make it fertile. The main objectives of organic production systems is optimization of production, enhance environmental quality and social welfare. In biological systems, it is try to decreased or absent use of natural or synthetic compounds that may harm beneficial soil organisms, destruction of non-renewable resources, compromising the quality of water, soil and atmosphere. Straw, which are usually considered as waste in the fields are valued in organic farm as a source of valuable nutrients and organic matter. These fields are important centers of biodiversity. Agriculture can reduce atmospheric carbon, as trees and agricultural products needed abundance carbon dioxide for photosynthesis and get it out of the air. In recent decades, global warming from an unexpected fear has become a scientific reality. Carbon dioxide, methane, nitrous oxide is important greenhouse gas. In 1997, representatives from more than 160 countries have gathered in Tokyo and signed an agreement for the Kyoto climate change at the end of their negotiations and were defined the allowable emissions for each country[4-7]. Nowadays, people use a process to disposal and recovery organic waste to control and rapid use called composting. In this process, bacteria, fungi, yeasts, insects and many other animals grown on organic materials and feed them and causes the transformation of matter into more stable forms. In order to optimize the use of raw

materials used in production and improving productivity in agriculture, peanut and straw residue was used. Due to the fact that in our country each year a large amount of straw produced and too much cost was spent to obtain this level of straw and various inputs such as fertilizer, labor, water, land etc have been involved in its formation, often it is observed that with a spark, farmer transformed the result of their product into ashes and we see that peanut skins discarded in the Northern provinces [1]. Due to the fact that half a peanut product consisted of almond and the other half with its skin, so, considerable amounts of compost can be produced from peanut skin [8]. In recent years, excessive use of chemical fertilizers has caused environmental pollution. However, during these years has been little attention to the role of organic fertilizers. A good compost to feed plants is compost that is produced under aerobic conditions where the bulk of the carbon turned to energy source for the microorganisms and after burning in the form of carbon dioxide enters into the air. Since carbon acts both as an energy source and as an element in the cell protoplasm, more than nitrogen is needed that 2.3 carbons as carbon dioxide and 1.3 in living cells is combined with nitrogen. If the carbon to nitrogen ratio is very high, then biological activity is reduced. However, if the materials are as roughage, composting process take longer and high temperature enhances biological activity. Height required to obtain the desired temperature is at least 2.1 to 1.5 m. However, the environment temperature will have a significant impact on the temperature of the compost. However, humidity is one of the main requirements for composting, an anaerobically situation should not be produced. Residue with a high carbon-nitrogen ratio increased competition between soil microorganisms and composting can reduced this ratio. Nutrients such as nitrogen is frequently used by microorganisms and stabilized. So as long as organic carbon continuously decreased (as carbon dioxide enters into the atmosphere) its N remains constant and consequently the ratio of carbon to nitrogen will decrease. In addition, it increases the amount of nutrients in this case [2]. Some sources have stated that the amount of nitrogen in compost is low and this has resulted in long-term evolution in compost [3]. For the peanut skin, as it is the plant from the legume family contain N (1.2%), so this form will not occur due to nitrogen deficiency [9]. Skin peanuts and straw was formed from roughage wooden materials that contain cellulose and lignin and hemicellulose and protein and waxy material. Peanut skins contain 1.2 %N, 0.5% Phosphorus pentoxide and 0.8% potassium oxide [9]. Peanut skins are also rich in calcium [8]. Takeshi Watanabe, et al [11] in a study entitled "Application of rice straw compost for sustainable production of rice", concluded that simultaneous application of straw compost with chemical fertilizer had a significant effect on the yield of rice in comparison with the use of chemical fertilizers alone. SL. Magdi T, et al., [12] concluded that the use of straw and peanuts compost in organic farming systems of mung (*Vicia faba* L.) create sustainable agriculture and cause to return of crop residue to the production cycle.

MATERIALS AND METHODS

Composting process in this experiment is as follows. It is commonly called outdoor compost preparation and includes preparing raw materials, crushing, mixing, aeration and moisture. To prepare compost, a box with a length of 60 cm and a width of 50 cm and a height of 50 cm were taken from the skin of peanut and straw. Crushing of the material will be more susceptible to insects and animals, and microbes and also prevent the development of anaerobic conditions. This leads to speed up the decomposition and prepare the compost as soon as possible. Lack of moisture will cause the organisms are deprived of the needed water; it will thereby inhibit their activity (As it seen there were no evaporation at the surface). As Compost was prepared as in normal conditions and in the beginning we were faced with rain and snow and cold winter we did not add water to the compost, so that even severe cold weather and water decreased compost temperature to 7.5°C. However, in the summer there was a strong need for sprinkling. Because of treatment low height and low volume the process takes time. With increasing temperature and volume of material as well as creating plastic coating can increase the temperature inside the compost and ultimately the activity of microorganisms to accelerate the decomposes [3]. In this study, the ratio of carbon to nitrogen was measured and tested. To determine N, Kejeldahl method was used. Gram method we used to measure organic carbon. It should be noted that when a fertilizer is favorable for plant that its carbon to nitrogen ratio is about 10-12 [9].

Table1. Carbon percentage, Nitrogen percentage and carbon-nitrogen ratio in the start of compost preparation

Row	Treatments	Carbon percentage		Nitrogen percentage		carbon-nitrogen ratio	
		Repetition 1	Repetition 2	Repetition 1	Repetition 2	Repetition 1	Repetition 2
1	20% peanut skin+80%straw	30.624	14.496	1.459	1.145	20.990	12.660
2	30% peanut skin+70%straw	24.672	23.232	1.264	1.049	19.519	22.147
3	40% peanut skin+60%straw	30.432	27.840	1.297	1.081	23.463	25.754
4	50% peanut skin+50%straw	36.384	25.824	1.283	1.200	28.359	21.520
5	60% peanut skin+40%straw	21.216	25.728	1.350	1.207	15.716	21.316
6	70% peanut skin+30%straw	23.232	20.544	1.275	1.064	18.221	19.308
7	80% peanut skin+20%straw	18.432	32.5444	1.175	1.110	15.687	29.319
8	90% peanut skin+10%straw	21.504	27.936	1.203	1.035	17.875	26.991

Table2. Carbon percentage, Nitrogen percentage and carbon-nitrogen ratio in the final compost preparation

Row	Treatments	Carbon percentage		Nitrogen percentage		carbon-nitrogen ratio	
		Repetition 1	Repetition 2	Repetition 1	Repetition 2	Repetition 1	Repetition 2
1	20% peanut skin+80%straw	12.864	6.240	1.323	1.001	9.723	6.234
2	30% peanut skin+70%straw	9.600	11.520	1.216	1.211	7.895	9.513
3	40% peanut skin+60%straw	12.000	12.288	1.157	1.329	10.372	9.246
4	50% peanut skin+50%straw	12.288	10.080	1.325	1.411	9.724	7.144
5	60% peanut skin+40%straw	9.984	12.480	0.964	1.234	10.375	10.040
6	70% peanut skin+30%straw	10.08	8.832	1.276	1.172	7.900	7.536
7	80% peanut skin+20%straw	7.200	9.024	1.236	1.105	5.849	8.167
8	90% peanut skin+10%straw	11.328	12.768	1.161	1.279	9.757	9.867

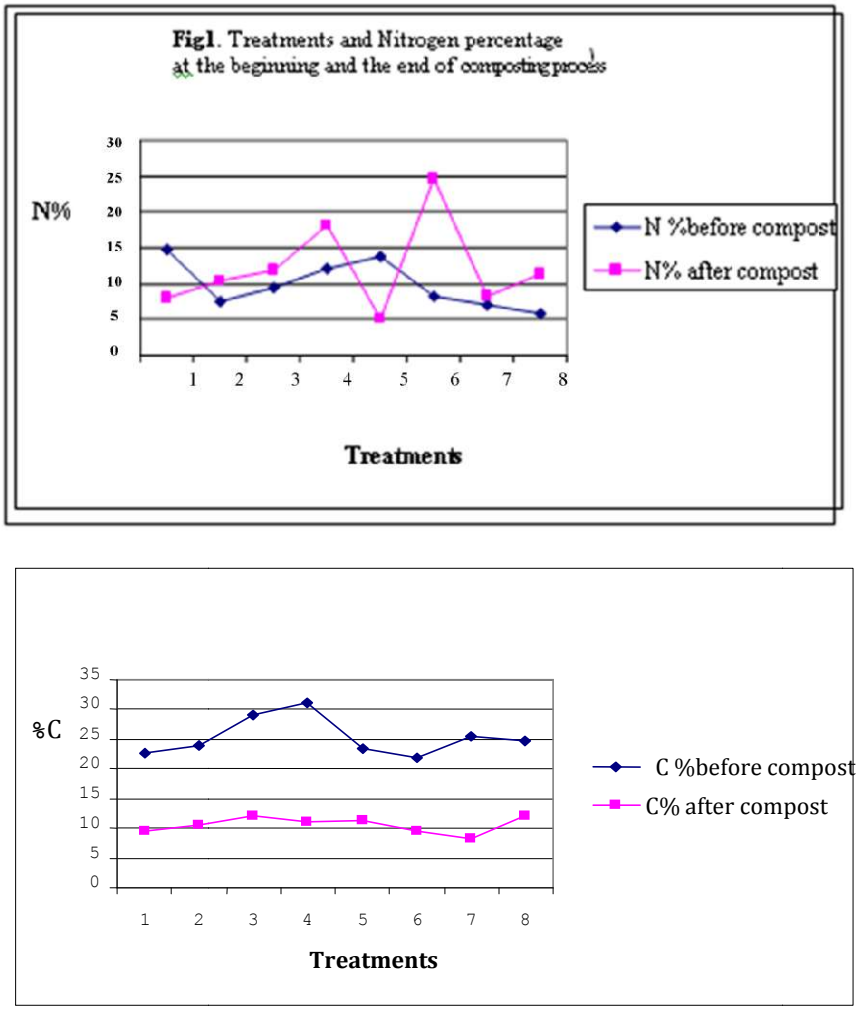

Fig2. Treatments and Nitrogen percentage at the beginning and the end of composting process

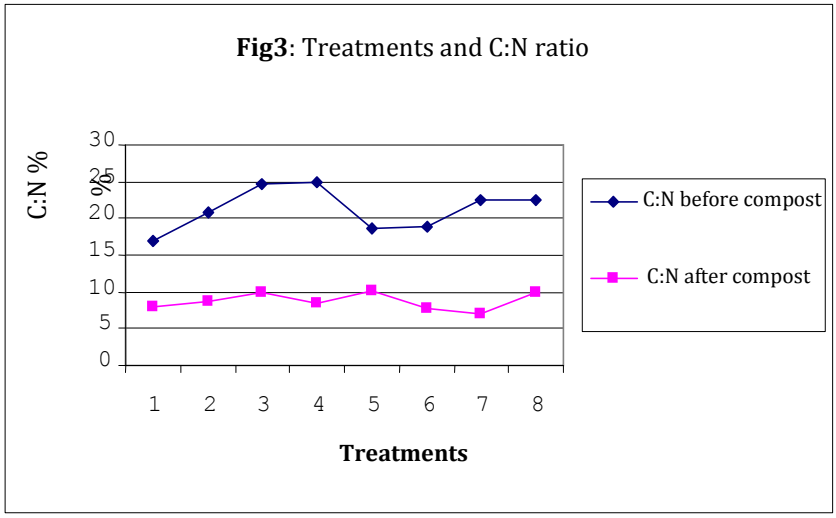

Fig3: Treatments and C:N ratio

RESULT AND DISCUSSION

The results were analyzed in a randomized block design. It was found that there was no significant difference between the treatments, but between the block or in other words, the numbers obtained at the beginning and end of the experiment there was no significant difference at 99%. This was the result from the reduction of carbon to nitrogen in the composting process and implying their decomposition and humus and prepare for use in agriculture. The black and green compost ((10yr3 / 2 = very dark dranish brown) is indicated soil humic that is another reason for the quality of organic fertilizer production. Note that during the decomposition, at first the straw is decomposes and then the upper layer of peanut, then middle layer and in the final step, cellulose fibers in the skin of peanut was obtained from mixture of completely decomposed and not decomposed. Many insects and animals that were involved during the decomposition were: Ticks, Centipede, Pairpod, Woodlouse, Soil beetles, Snails and etc. The existence of large amounts of compost earthworms is a sign for its desirable. All the soil is in the form of spherical and individual aggregates as well as slimy (Ingested by earthworms) and conjoined and has a porous structure. The result has been shown that when the compost is high percentage of straw, the soils content formed is greater, that is the decomposition was severe. Conversely, in the high percentages of peanut skin (because of being roughage and wood) soils formed was less. And the greater amount of soil formation, the greater was also earthworm. According to Tables 1 and 2 that clearly specified in the Fig 2 and 3, C / N ratio is reduced from the range of 20 to 30 to the range of 5 to 10. This is due to the use of carbon by micro-organisms and in turn decreases in C / N ratio that this corresponded with the results of Magdi *et al* [12]. Since there was no significant difference between treatments in the experiment and the rate of C / N are all less than 10 and due to less proportion of roughage in the first treatment (20% peanut skin + 80% straw) and the ratio of carbon to nitrogen obtained at the end of the experiment was accepted, is appropriate to accelerate the reduction of decomposition time.

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