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Ultrastructure and Nutrient Content of Waste Sago and The Potential as Compost Block for Plant Growth Media

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Abstract. One alternative industrial waste that has not been widely used by the public is sago waste . Sago solid waste into compost that has brown to black coor . The purpose of this study was to analyze the structure of fresh sago waste , compost and compost dry sago sago black by using SEM ; assess the nutrient content . The results showed that sago waste wet, half-dry and dry sago has a pore size and larger than the black sago waste so they have the potential as a store of water and causing aeration. Measurement of nutrient content of compost sago either fresh , dried and black for the content of N, P and K are relatively high, successive N (1.32 to 1.67 %) , P (0.15 to 0.47 %) and K (1 , 39 to 2.42 %). Based compost structure and water-holding power is relatively high, the composting of waste sago potential for growing media such as plant nurseries

Keywords: sago waste, compost, ultrastructure,nutrient, media

Introduction

Compost growing medium block is a block of compressed compost in a form. A block of compost serves as a forum to initiate and develop seeds, eliminating the need for plastic pots and trays for seedling transplantation. Seedlings planted in compost blocks form a root system that is more powerful than that grown in containers because of the increased oxygen to the roots and compost block the natural tendency to "cut" the roots. Compost has many blocks are made as of peat, soil and compost mixture. There are other alternatives, namely block composting of waste sago starch extraction industry.

Sago starch extraction industry produces 3 types of waste, namely cellular pith of sago fibrous residue, solid waste, and waste water. In general, the amount of bark sago and sago dregs respectively about 26% and 14% based on the total weight of the beam sago. Waste pulp and bark sago is lignocellulosic materials are largely composed of cellulose, hemicellulose, and lignin [1].

Sago waste that is not used and accumulate over the years, so it will decompose into compost. Sago waste which is used as a growing medium can not be directly used as a growing medium because it contains cellulose with a C / N ratio is high [2]. According to the owner of the plant, the time required wet sago waste into compost black sago range of more than 6 months. Waste age differences determine the nutrient content and physical structure of the waste so that it can affect the quality of compost blocks. The purpose of this study was to observe ultrastructure sago waste fiber from the various phases and measure the nutrient content, especially the content of nitrogen, phosphate and potash.

Methods

Materials used are sago waste taken from one of the industrial manufacture of corn starch in Plajan Village, District Pakis Aji, Jepara regency. Sago waste wet, half-dry, dry and black compost (Figure 1) was observed with a scanning electron micro-scope and also measured the content of NPK.

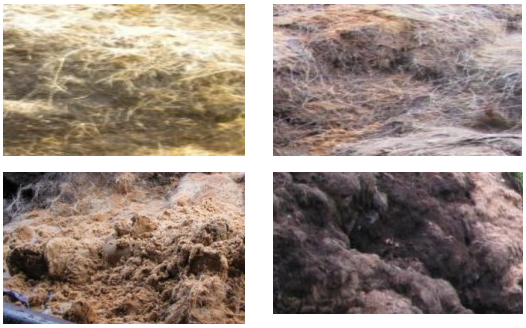

Figure 1. Waste wet sago (A), sago waste half dry (B), dried sago waste (C) and black sago waste (D)

Results and Discussion

The observation of sago waste wet, half-dry sago, sago and sago dried black with SEM shown in Figure 2.

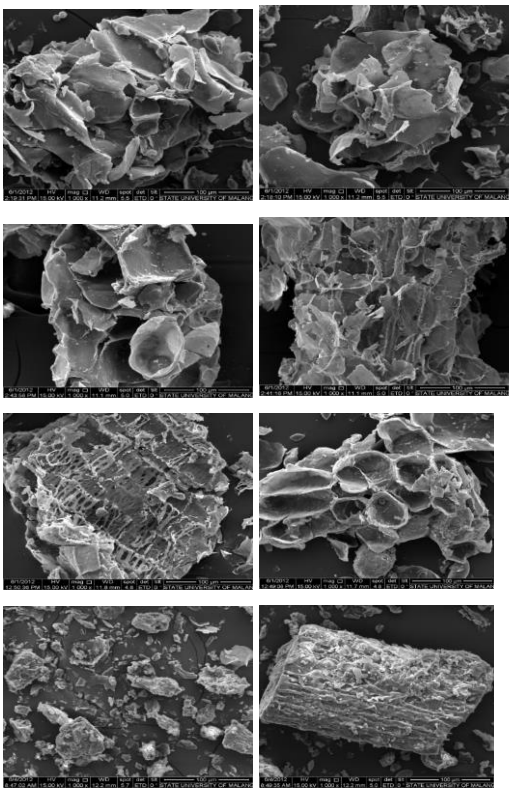

Figure 2. Ultrastructure wet sago waste (A), sago waste half dry (B), dried sago waste (C) and black sago waste (D) were observed with SEM magnification of 1000x.

Observations ultra wet sago waste structure (A), half-dry (B) and dry (C) has a fiber size and a large cavity than sago waste black (D). To get a grasp power and maximum water absorption seems structures A, B and C is better than D. Use fresh sago waste for orchid growing media showed better growth than the growth of the black media sago waste. Sago black has a form of short-grain and structure rarely, it causes the media is not able to bind and store the water properly so that water is provided during the process of flushing waste out of the media in a short time as a result of media become dry quickly and orchids water shortage so that the growth of orchids do not optimal [3].

NPK element content analysis on fresh sago waste and black sago presented in Table 1.

Table 1. NPK content in wet sago waste, dried sago waste and black sago waste

Waste	N (%)	P (%)	K (%)
wet sago waste	1,67	0,47	2,30
dried sago waste	1,64	0,36	2,42
black sago waste	1,32	0,15	1,39

NPK content measurement at the sago waste showed NPK content of wet and dry waste sago higher than sago waste black. In contrast to the results of research Shakir (2010) nutrient content sago waste consisting of N, P, K, Ca and Mg, and increased after composted compared to the initial content of the waste pulp of sago. Nevertheless in the manufacture of compost blocks NPK nutrient content is still possible to support the availability of nutrients in growing media.

Conclusion

Sago waste wet, half-dry and dry sago has a pore size and larger than the black sago waste so as to have a better potential to be composted block. Measurement of nutrient content of compost sago either fresh , dried and black for the content of N, P and K are relatively high, successive N (1.32 to 1.67 %) , P (0.15 to 0.47 %) and K (1 , 39 to 2.42 %). Based compost structure and water-holding power is relatively high, the composting of waste sago potential for growing media such as plant nurseries

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