

PENGARUH KOMPOSISI BAHAN DAN LAMA WAKTU PROSES GRANULASI TERHADAP SIFAT FISIK PUPUK ORGANIK GRANUL DARI LIMBAH RUMPUT LAUT

Putri Wullandari
13/357096/PTP/01325

INTISARI

Potensi sumber daya laut Indonesia sangat besar, dan salah satunya adalah rumput laut. Jenis-jenis rumput laut yang sudah diolah diantaranya yaitu *Gracilaria sp.*, *Gelidium sp.*, yang diolah menjadi agar-agar. Limbah dari proses industri agar-agar ini sekitar 50-90% merupakan limbah yang dapat dimanfaatkan karena mengandung unsur hara alkalis seperti Ca dan Mg, serta kandungan selulosa yang dapat meningkatkan porositas untuk menopang pertumbuhan tanaman. Oleh karena itu, limbah agar ini digunakan sebagai bahan baku untuk pembuatan pupuk organik granul. Sifat fisik dari pupuk, terutama pupuk organik granul, sangat sedikit yang diketahui. Padahal pengetahuan mengenai sifat fisik dari pupuk dapat digunakan untuk mengoptimalkan prosedur penyimpanan dan penanganan. Permasalahan yang ada saat ini yaitu komposisi bahan dan lama waktu proses yang dibutuhkan untuk granulasi pupuk belum diketahui. Tujuan penelitian ini adalah untuk mengetahui pengaruh variasi komposisi bahan dan lama waktu proses granulasi pupuk organik granul dari limbah agar terhadap sifat fisik pupuk organik granul yang dihasilkan, dan menetapkan komposisi bahan dan lama waktu proses granulasi untuk menghasilkan pupuk organik granul dari limbah agar yang terbaik. Perlakuan yang digunakan pada penelitian ini adalah variasi komposisi bahan (komposisi I : 50% limbah agar, 7% kapur pertanian, 43% air, komposisi II : 50% limbah agar, 7% molase, 43% air, komposisi III : 50% limbah agar, 7% kapur pertanian, 7% dolomit, 36% air, komposisi IV : 50% limbah agar, 7% molase, 7% dolomit, 36% air), dan variasi lama waktu proses granulasi 15, 45, 75, dan 105 menit.

Nilai Indeks Germinasi untuk limbah agar, baik dalam keadaan basah maupun kering, yaitu 1,13 dan 1,06. Limbah agar kering dipilih sebagai bahan baku karena kadar airnya kecil dan mudah dicampur dengan bahan lainnya. Kadar air pupuk granul berkisar antara 2,26%-5,64% (%wb). Nilai L (*lightness*) pupuk granul berkisar antara 13,41-42,99. Nilai chroma pupuk granul berkisar antara 5,66-18,24. *Fineness modulus* (tingkat kehalusan butiran) pupuk granul berkisar antara 3-4,63, diameter rata-rata pupuk granul berkisar antara 1-2,6 mm. Dimensi (sumbu minor) pupuk granul berkisar antara 1,45-3,05 mm, dimensi (sumbu intermediate) pupuk granul berkisar antara 4,33-5,16 mm, dimensi (sumbu major) pupuk granul berkisar antara 4,61-5,49 mm. Berat seribu butir pupuk granul berkisar antara 16,23-48,81 gram. *Loose bulk density* pupuk granul berkisar antara 422,22-639,37 kg/m³. *Compacted bulk density* pupuk granul berkisar antara 441,9-680 kg/m³. Densitas partikel pupuk granul berkisar antara 1686,67-2000 kg/m³. Kekuatan atau kekerasan pupuk granul berkisar antara 1,79-4,55 N. Kekuatan atau kekerasan pupuk granul dipengaruhi oleh kadar air, dimana semakin tinggi kadar air maka

kekuatan atau kekerasan granul akan semakin turun. Porositas pupuk granul berkisar antara 72,2-77,23%.

Penentuan komposisi bahan dan lama waktu proses granulasi yang terbaik dilakukan dengan metode AHP (*Analytic Hierarchy Process*) dengan cara membandingkan pasangan. Hasil pengambilan keputusan menunjukkan bahwa komposisi bahan dan lama waktu proses granulasi yang terbaik yaitu komposisi III dan lama waktu proses granulasi 75 menit dengan skor 8,23,

Kata kunci : limbah agar, pupuk organik granul, sifat fisik, AHP

EFFECT OF COMPOSITION AND GRANULATION PROCESS TIME ON PHYSICAL PROPERTIES OF ORGANIC GRANULES FERTILIZER FROM SEAWEED WASTE

Putri Wullandari
13/357096 / PTP / 01325

ABSTRACT

Indonesian marine resource potential is very large, and one of them is seaweed. The types of seaweed that has been processed are Gracilaria sp., and Gelidium sp., that are processed into jelly. Wastes from gelatin industrial processes is approximately 50-90% that can be used because it contains nutrients alkalis such as Ca and Mg, and the amount of cellulose in it can increase the porosity to sustain plant growth. Therefore, the waste can be used as a raw material for the manufacture of organic granules fertilizer. The physical properties of fertilizer, especially organic granules fertilizer, is very little known. Whereas knowledge of the physical properties of the fertilizer can be used to optimize the storage and handling procedures. The problems that exist today, is that the composition of the materials and the granulation process time are unknown.

The purpose of this study was to determine the effect of variations in the material composition and the duration of the granulation process time to the physical properties of organic granules fertilizer produced, and determine the best material composition and the best of the granulation processes time to produce organic granules fertilizer. The treatment used in this study is a variation of the material composition (composition I consists of 50% agar waste, 7% kapur pertanian, 43% water, composition II consists of 50% agar waste, 7% molasses, 43% water, composition III consists of 50% of agar waste, 7% kapur pertanian, 7% dolomite, 36% water, composition IV consists of 50% agar waste, 7% molasses, 7% dolomite, 36% water), and variations in the length of granulation process time for 15, 45, 75, and 105 minutes.

Germination index value for that waste, whether wet or dry, ie 1.13 and 1.06. Dry Waste is chosen as the raw material because the moisture content is small and it is easily mixed with other ingredients. The moisture content of the granular fertilizer ranging between 2.26% -5.64% (% wb). L value (lightness) of the granular fertilizer ranged from 13.41 to 42.99. Granular fertilizer chroma values ranged from 5.66 to 18.24. Fineness modulus (level of refinement granules) of the granular fertilizer ranges between 3 to 4.63, the average diameter of the granular fertilizer ranged from 1 to 2.6 mm. Dimensions (minor axis) of the granular fertilizer ranged from 1.45 to 3.05 mm, dimensions (intermediate axis) of the granular fertilizer ranged from 4.33 to 5.16 mm, the dimension (major axis) of the granular fertilizer ranged from 4.61 to 5.49 mm. Weight of a thousand grains of the granular fertilizer ranged from 16.23 to 48.81 grams. Loose bulk density of the granular fertilizer ranged from 422.22 to 639.37 kg/m³. Compacted bulk density of the granular fertilizer ranged from 441.9 to 680 kg/m³. Particle density of the granular fertilizer

particles ranges from 1686.67 to 2000 kg / m³. The strength of the granular fertilizer ranged from 1.79 to 4.55 N. The strength of the granular fertilizer is influenced by the water content, where the higher the water content, the strength or hardness of the granular fertilizer will decrease. The porosity of the granular fertilizer ranged from 72.2 to 77.23%.

Determination of the best composition and the best granulation process time is done by AHP (Analytic Hierarchy Process) by comparing the pair. Results showed that the best composition and the best granulation process time are composition III and granulation process time 75 minutes with a score of 8.23,

Keywords: agar waste, organic fertilizer granules, physical properties, AHP