

DESAIN PROSES PENGERINGAN GABAH MENGGUNAKAN FLUIDIZED BED DRYER DENGAN VARIASI MASSA BAHAN DAN KECEPATAN UDARA

INTISARI

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Gabah kering panen (GKP) pada umumnya memiliki kadar air yang cukup tinggi. Kadar air yang tinggi menyebabkan turunnya kualitas gabah, hal ini mengakibatkan GKP harus segera dikeringkan agar tidak rusak. Pengeringan gabah masih banyak dilakukan secara tradisional dengan penjemuran. Metode penjemuran memerlukan waktu yang lama dan tergantung pada cuaca, akibatnya ketika musim panen seringkali GKP tidak bisa langsung dikeringkan. Alternatif agar pengeringan dapat dilakukan dengan cepat adalah menggunakan mesin *fluidized bed dryer*. Penelitian ini bertujuan untuk mengetahui karakteristik pengeringan *fluidized bed dryer* dan hasil bahan setelah pengeringan dengan variasi massa bahan dan kecepatan udara. Dalam penelitian ini, variasi massa bahan yang digunakan adalah 300 gram, 400 gram, dan 500 gram serta variasi kecepatan udara 6 m/s, 8 m/s, dan 10 m/s. Pengeringan gabah dilakukan selama 3 menit, selama waktu tersebut diambil sampel untuk pengukuran kadar air tiap interval 30 detik. Pengukuran suhu juga dilakukan setiap 30 detik pada 6 titik. Penentuan kadar air dilakukan dengan metode termogravimetri. Hasil dari perhitungan karakteristik dianalisis statistik menggunakan SPSS 25. Kecepatan fluidisasi minimum pengeringan gabah dengan *fluidized bed dryer* adalah 1,229 m/s dan kecepatan terminal sebesar 9,72 m/s. Nilai laju pengeringan yang diperoleh sebesar 1,024-1,583 %/menit; konstanta laju pengeringan sebesar -0,104 hingga -0,134/menit; efisiensi panas pengeringan sebesar 10,92-30,32%; serta efisiensi sistem pengeringan sebesar 9,04-18,23%. Persentase biji retak sebesar 0,33-2,00% dan persentase tingkat kebersihan hasil pengeringan adalah 99,00-99,73%.

Kata kunci: *fluidized bed dryer*, gabah, karakteristik pengeringan, massa bahan, kecepatan udara

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DESIGN OF PADDY DRYING PROCESS USING FLUIDIZED BED DRYER WITH CAPACITY AND AIRFLOW VARIATION

ABSTRACT

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At harvest time, paddy contains high moisture that causes deterioration of the rice. It causes the paddy to be dried immediately so it is not damaged. Drying of paddy is still done traditionally by sun-drying method. This method not only takes a long time but also depends on the weather, as a result, during the harvest season, the paddy often cannot be dried immediately. There is an alternative that the drying can be done quickly by using a fluidized bed dryer machine. This study aims to determine the characteristics of the machine and paddy after having dried using the machine with variations in material mass and air velocity. In this study, variations in the material mass used were 300 grams, 400 grams, and 500 grams and variations in air velocity were 6 m/s, 8 m/s, and 10 m/s. The drying of the grain was carried out for 3 minutes, during the time, the samples were taken for measurement of water content each 30 second intervals. Temperature measurements are also carried out every 30 seconds at 6 locations. Determination of water content was carried out by thermogravimetric. The result of the characteristics counting was statistically analyzed by SPSS 25. The minimum fluidization speed of paddy drying using a fluidized bed dryer was 1.229 m/s and the terminal velocity was 9.72 m/s. The drying rate value obtained was 1.024-1.583%/minute; the drying rate constant was -0.104 to -0.134/minute; the drying heat efficiency was 10.92-30.32%; and the efficiency of the drying system was 9.04-18.23%. The percentage of cracked seeds was 0.33-2.00% and the percentage of cleanliness level of paddy drying was 99.00-99.73%.

Key words: fluidized bed dryer, paddy, drying characteristics, material mass, air velocity

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