Evaluasi Kinerja Teknis Vacuum Seeder Berdasarkan Variasi Tekanan Hisap pada Berbagai Karakteristik
Fisik Benih Hortikultura
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EVALUASI KINERJA TEKNIS *VACUUM SEEDER* BERDASARKAN VARIASI TEKANAN HISAP PADA BERBAGAI KARAKTERISTIK FISIK BENIH HORTIKULTURA

INTISARI

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Kebutuhan peningkatan efisiensi waktu dan tenaga kerja dalam budidaya pertanian mendorong penerapan mekanisasi, salah satunya melalui penggunaan *vacuum seeder*. Penelitian ini bertujuan menguji kinerja *vacuum seeder* menggunakan tiga variasi tekanan hisap pada tiga jenis benih. Hasil yang diamati meliputi karakteristik benih, distribusi benih, pengaruh alat terhadap kualitas fisiologis benih, serta perbandingan waktu operasional alat dengan penyemaian manual. Benih bawang daun (*Allium fistulosum* L.), kubis (*Brassica oleracea* L. var. *capitata*), dan cabai rawit (*Capsicum frutescens* L.) memiliki karakteristik fisik yang berbeda karena faktor genetik dan perbedaan fisiologi. Kinerja penjatahan dievaluasi berdasarkan *Miss Rate* (MR), *Single Seed Rate* (SSR), *Double Seed Rate* (DSR), dan *Multiple Seed Rate* (MTR). Perubahan tekanan hisap memengaruhi persentase benih tidak terambil (MR) maupun terambil lebih dari satu (DSR dan MTR), tetapi tidak mengubah distribusi benih tunggal secara signifikan sehingga parameter SSR tidak terpengaruh. Sebaliknya, variasi jenis benih berpengaruh terhadap seluruh parameter distribusi karena karakteristik fisik setiap benih yang berbeda. Variasi jenis benih berpengaruh terhadap kecepatan pertumbuhan dan daya perkecambahan benih karena berkaitan dengan faktor genetik. Selain itu, penyemaian menggunakan *vacuum seeder* dengan variasi tekanan hisap tidak berpengaruh terhadap kualitas fisiologis benih. Kapasitas kerja *vacuum seeder* tidak dipengaruhi oleh variasi tekanan hisap karena penyemaian benih dalam jumlah besar dilakukan dalam satu sesi. Perbandingan penyemaian menggunakan *vacuum seeder* dan manual menghasilkan kapasitas kerja yang bervariasi pada benih kubis dan cabai rawit. Kondisi optimal penyemaian menggunakan *vacuum seeder* untuk benih bawang daun, kubis, dan cabai rawit berturut-turut terdapat pada variasi tekanan hisap 7,33 kPa, 10,67 kPa, dan 9,33 kPa.

Kata kunci : *vacuum seeder*, tekanan hisap, jenis benih, distribusi benih, kualitas fisiologis benih, kapasitas kerja.

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EVALUATION OF THE TECHNICAL PERFORMANCE OF A VACUUM SEEDER BASED ON SUCTION PRESSURE VARIATIONS ACROSS VARIOUS PHYSICAL CHARACTERISTICS OF HORTICULTURAL SEEDS

ABSTRACT

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The need to improve time and labor efficiency in agricultural cultivation has encouraged the adoption of mechanization, one of which is the use of a vacuum seeder. This study aimed to evaluate the performance of a vacuum seeder under three suction pressure levels using three types of seeds. The observed parameters included seed characteristics, seed distribution, the effect of the machine on seed physiological quality, and a comparison of operational capacity between vacuum seeding and manual sowing. Welsh onion (*Allium fistulosum* L.), cabbage (*Brassica oleracea* L. var. *capitata*), and bird's eye chili (*Capsicum frutescens* L.) seeds exhibited different physical characteristics due to genetic and physiological differences. Metering performance was evaluated based on Miss Rate (MR), Single Seed Rate (SSR), Double Seed Rate (DSR), and Multiple Seed Rate (MTR). Variations in suction pressure affected the percentages of missed seeds (MR) and multiple-picked seeds (DSR and MTR), but did not significantly affect single-seed distribution (SSR). In contrast, seed type significantly affected all seed distribution parameters because of differences in the physical characteristics of each seed. Seed type also influenced seed growth rate and germination percentage due to genetic factors. Furthermore, sowing using the vacuum seeder at different suction pressure levels did not affect seed physiological quality. The operational capacity of the vacuum seeder was not influenced by suction pressure because large quantities of seeds were sown in a single operating session. A comparison between vacuum seeding and manual sowing showed variations in operational capacity for cabbage and bird's eye chili seeds. The optimum suction pressures for sowing Welsh onion, cabbage, and bird's eye chili seeds were 7.33 kPa, 10.67 kPa, and 9.33 kPa, respectively.

Keywords : vacuum seeder, suction pressure, seed type, seed distribution, seed physiological quality, work capacity.