

ABSTRACT

THE IMPACT OF STORAGE DURATION AND TEMPERATURE ON THE CONTENT OF ORGANIC COMPOUND AND PHYSIOLOGICAL QUALITY OF SOYBEAN SEEDS (*Glycine max* L. Merr)

By

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National soybean demand in Indonesia continues to rise, yet productivity remains low at only 14.56 tons per hectare. Additionally, seed quality often deteriorates during storage, particularly in tropical regions with high temperatures and humidity. This deterioration is closely related to internal biochemical changes in the seeds, particularly due to temperature and storage duration, which affect membrane integrity and seed physiology. This study aims to evaluate the effects of storage temperature and duration on the content of organic compounds (ascorbic acid, citric acid, carbohydrates, protein, and fat) as well as the physiological quality of Anjasmoro soybean seeds. The study was conducted over a period of 6 months at the Seed Laboratory and Technology Innovation Center of the University of Lampung, using a strip plot design in a Randomized Block Design (RCBD) with two factors: storage temperature (room temperature 25°C and cold temperature 18°C) and storage duration (1–6 months). The results showed that room temperature storage caused faster seed deterioration compared to cold temperature storage. For example, at room temperature, moisture content increased from 7.00% (month 1) to 11.60% (month 6), electrical conductivity increased to 4.58 $\mu\text{S}/\text{cm}$, vigor index decreased to 71.66%, and germination rate decreased to 82.00%. Carbohydrate content decreased by 17.52%, protein content dropped to 32.42%, while fat content increased to 22.70% after 6 months. Conversely, in cold storage, seed deterioration occurred more slowly; moisture content reached only 10.70%, electrical conductivity was 4.04 $\mu\text{S}/\text{cm}$, vigor index remained at 79.33%, and germination rate was 91.16%. Carbohydrate and protein levels decreased by 21.10% and 35.54%, respectively, with a 18.79% increase in fat content. Ascorbic acid and citric acid levels tended to increase over time, but the increase was

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more pronounced at room temperature. Overall, the longer the storage period, the more the seed quality deteriorated; however, the rate of deterioration could be mitigated through cold storage. There is a significant interaction between temperature and storage time on seed viability and chemical composition, where room temperature shows a decline in quality starting from the second month, while cold storage only shows a significant decline from the fourth month. These results indicate the importance of temperature control during storage to maintain the quality and viability of soybean seeds optimally.

Keywords: Soybean, Storage, Temperature, Physiologic quality, Seed viability.

ABSTRAK

DAMPAK LAMA SIMPAN DAN SUHU PENYIMPANAN TERHADAP KANDUNGAN SENYAWA ORGANIK DAN MUTU FISILOGI BENIH KEDELAI (*Glycine max L. Merr*)

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Permintaan kedelai nasional di Indonesia terus meningkat, namun produktivitasnya tetap rendah, hanya 14,56 ton per hektar. Selain itu, kualitas benih sering menurun selama penyimpanan, terutama di daerah tropis dengan suhu dan kelembapan tinggi. Penurunan kualitas ini erat kaitannya dengan perubahan biokimia internal pada benih, terutama akibat suhu dan lama penyimpanan, yang memengaruhi integritas membran dan fisiologi benih. Penelitian ini bertujuan untuk mengevaluasi pengaruh suhu dan durasi penyimpanan terhadap kandungan senyawa organik (asam askorbat, asam sitrat, karbohidrat, protein, dan lemak) serta kualitas fisiologis biji kedelai Anjasmoro. Penelitian ini dilakukan selama 6 bulan di Laboratorium Benih dan Pusat Inovasi Teknologi Universitas Lampung, menggunakan desain plot strip dalam Rancangan Blok Acak (RAK) dengan dua faktor: suhu penyimpanan (suhu ruangan 25°C dan suhu dingin 18°C) dan durasi penyimpanan (1–6 bulan). Hasil menunjukkan bahwa penyimpanan pada suhu ruangan menyebabkan penurunan kualitas biji lebih cepat dibandingkan penyimpanan pada suhu dingin. Misalnya, pada suhu ruangan, kandungan air meningkat dari 7,00% (bulan 1) menjadi 11,60% (bulan 6), konduktivitas listrik meningkat menjadi 4,58 $\mu\text{S}/\text{cm}$, indeks vigor menurun menjadi 71,66%, dan tingkat perkecambahan menurun menjadi 82,00%. Kandungan karbohidrat menurun sebesar 17,52%, kandungan protein turun menjadi 32,42%, sementara kandungan lemak meningkat menjadi 22,70% setelah 6 bulan. Sebaliknya, dalam penyimpanan dingin, kerusakan biji terjadi lebih lambat; kandungan air mencapai 10,70%, konduktivitas listrik 4,04 $\mu\text{S}/\text{cm}$, indeks vitalitas tetap pada 79,33%, dan tingkat perkecambahan 91,16%. Kandungan karbohidrat dan protein menurun masing-masing sebesar 21,10% dan 35,54%, dengan peningkatan kandungan lemak sebesar

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18,79%. Kandungan asam askorbat dan asam sitrat cenderung meningkat seiring waktu, tetapi peningkatan tersebut lebih signifikan pada suhu ruangan. Secara keseluruhan, semakin lama periode penyimpanan, semakin buruk kualitas biji; namun, laju penurunan kualitas dapat dikurangi melalui penyimpanan dingin. Terdapat interaksi yang signifikan antara suhu dan waktu penyimpanan terhadap viabilitas biji dan komposisi kimia, di mana suhu ruangan menunjukkan penurunan kualitas mulai dari bulan kedua, sementara penyimpanan dingin hanya menunjukkan penurunan signifikan mulai dari bulan keempat. Hasil ini menunjukkan pentingnya pengendalian suhu selama penyimpanan untuk menjaga kualitas dan viabilitas biji kedelai secara optimal.

Kata kunci: Kedelai, Penyimpanan, Suhu, Mutu Fisiologis, Viabilitas Benih.