

ABSTRACT

STUDY OF SEED COAT INTEGRITY AND PHYSICAL QUALITY OF SOYBEAN SEED (*Glycine max L. Merr*) DURING STORAGE AT TWO DIFFERENT STORAGE TEMPERATURES

By

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Soybean is as a palawija crop has a high protein content, which is equal to 37%. Soybean also contains quite high fat, which is equal to 16%. The high protein and fat content causes soybean seeds to quickly decline, especially if the storage conditions are unfavorable (sub optimum). Previous studies revealed that the seed deterioration process is related to biochemical changes in the seed, caused by storage temperature factors, both open storage and controlled storage which cause damage to the integrity of the membrane and decrease the quality of soybean seeds. Therefore, this study aims to determine differences in membrane integrity and quality of soybean seeds after the shelf life with two different storage temperatures. This study was an experiment arranged in a Strip Plot design in RAK (Randomized Block Design) with 3 replications and using 2 factors. The main plot is the effect of temperature (S), which consists of 2 levels, namely Si at room temperature, S.-cold temperature. Sub-plots were storage time (W), which consisted of 6 levels, namely, W_1 1 month, W_1-2 month, $W_1 = 3$ month, $W_1 - 4$ month, W_1-5 month and $W_1 = 6 =$ month. Homogeneity of variance was tested by Bartlett's test and addition of data was tested by Tukey's test. The results of the research showed that seeds stored at room temperature damaged the integrity of the seed coat more quickly, whereas at cold temperatures the damage could be slowed down. At room temperature, damage to the morphology of the seed coat was seen after 2 months of storage based on the SEM test, the variables of seed viability and vigor were indicated by the concentration water (10.57%), vigor index (82%), germination power (86%), germination speed (83%), normal sprout dry weight (0.04 gr), electrical conductivity (4.10 $\mu\text{S/cm}$), tetrazolium (88%), carbohydrate content decreased (19.91%), protein content decreased (35.61%), free fatty acid content increased (18.70%). Meanwhile, at cold temperatures, the storage period can be maintained, damage can be seen at a storage time of 4 months based on the SEM test, the variables of seed viability and vigor are indicated by water content (9.91%), vigor index (85%), germination capacity (89%), speed germinated (87%), normal dry weight of sprouts (0.05 gr), electrical conductivity (3.48 $\mu\text{S/cm}$), tetrazolium (90%), decreased carbohydrate content (21.89%), protein content decreased

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(35.87%), free fatty acid content increased (16.06%). This means that the longer the storage time, the more the quality of soybean seeds will decrease. Seeds stored for 6 months cause damage to the integrity of the seed coat and the quality of the seeds decreases at both room and cold temperatures. At room temperature, damage to the integrity of the seed coat and seed quality occurs more quickly based on SEM tests, vigor index (72%), germination power (75%), germination speed (74%), normal dry weight of sprouts (0.04 gr), power electrical conductivity (5.02 $\mu\text{S}/\text{cm}$), carbohydrate content decreased (17.52%), protein content decreased (32.42%), free fatty acid content increased (22.70%). Meanwhile, at cold temperatures, the damage to the integrity of the seed coat and the decline in seed quality can be slowed down based on the SEM test, vigor index (79%), germination power (82%), germination speed (80%), normal sprout dry weight (0.04 gr), electrical conductivity (4.22 $\mu\text{S}/\text{cm}$), carbohydrate content decreased (21.10%), protein content decreased (35.54%), free fatty acid content increased (18.79%). There is a difference in response between storage temperature and storage time. Storage at room temperature, a decrease in the integrity of the seed coat and the quality of soybean seeds was seen 2 months after storage based on water content (9.87%), germination speed (89%), and electrical conductivity (3.51%). Cold temperature storage decreased the integrity of the seed coat and the quality of soybean seeds seen 4 months after storage based on water content (10.43%), germination speed (86%), and electrical conductivity (3.69 $\mu\text{S}/\text{cm}$).

Keywords: soybean seed, seed coat integrity, quality, storage, temperatur

ABSTRAK

STUDI INTEGRITAS KULIT BENIH DAN MUTU FISIK BENIH KEDELAI (*Glycine max L. Merr*) SELAMA PENYIMPANAN PADA DUA SUHU SIMPAN YANG BERBEDA

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Kedelai termasuk kedalam tanaman palawija yang memiliki kadar protein yang tinggi, yaitu sebesar 37%. Kedelai juga mengandung lemak cukup tinggi, yaitu sebesar 16%. Kandungan protein dan lemak yang tinggi menyebabkan benih kedelai cepat mengalami kemunduran, terutama jika kondisi lingkungan simpan kurang menguntungkan (sub optimum). Studi sebelumnya mengungkapkan bahwa proses deteriorasi benih berhubungan dengan perubahan biokimia didalam benih, yang disebabkan oleh faktor suhu penyimpanan, baik penyimpanan secara terbuka maupun penyimpanan secara terkontrol yang menyebabkan kerusakan integritas kulit benih dan menurunnya mutu benih kedelai. Oleh karena itu, penelitian ini bertujuan untuk mengetahui perbedaan integritas membran dan mutu benih kedelai setelah masa simpan dengan dua suhu penyimpanan yang berbeda. Penelitian ini merupakan percobaan yang disusun dalam rancangan Strip Plot dalam RAK (Rancangan Acak Kelompok) dengan 3 ulangan dan menggunakan 2 faktor. Petak Utama yaitu pengaruh suhu (S), yang terdiri dari 2 taraf yaitu S_1 = suhu ruang, S_2 = suhu dingin. Anak Petak yaitu waktu simpan (W), yang terdiri dari 6 taraf yaitu, W_1 = 1 bulan, W_2 = 2 bulan, W_3 = 3 bulan, W_4 = 4 bulan, W_5 = 5 bulan dan W_6 = 6 bulan. Homogenitas ragam diuji dengan Uji Bartlett dan kementerian data diuji dengan Uji Tukey. Hasil penelitian menunjukkan bahwa benih yang disimpan pada suhu ruang integritas kulit benih lebih cepat rusak sedangkan pada suhu dingin kerusakan dapat diperlambat, pada suhu ruang kerusakan morfologi kulit benih terlihat pada waktu penyimpanan 2 bulan berdasarkan uji SEM, variabel viabilitas dan vigor benih yang ditunjukkan dengan kadar air (10,57%), indeks vigor (82%), daya berkecambah (86%), kecepatan berkecambah (83%), bobot kering kecambah normal (0,04 gr), daya hantar listrik (4,10 μ S/cm), tetrazolium (88%), kandungan karbohidrat menurun (19,91%), kandungan protein menurun (35,61%), kandungan asam lemak bebas meningkat (18,70%). Sedangkan pada suhu dingin masa simpan dapat dipertahankan kerusakan terlihat pada waktu penyimpanan 4 bulan berdasarkan uji SEM, variabel viabilitas dan vigor benih yang ditunjukkan kadar air (9,91%), indeks vigor (85%), daya berkecambah (89%), kecepatan berkecambah (87%), bobot kering kecambah normal (0,05 gr), daya hantar listrik (3,48 μ S/cm), tetrazolium (90%), kandungan karbohidrat menurun (21,89%),

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kandungan protein menurun (35,87%), kandungan asam lemak bebas meningkat (16,06%). Hal ini semakin lama waktu simpan maka mutu benih kedelai akan semakin menurun. Benih yang disimpan selama penyimpanan 6 bulan menyebabkan kerusakan integritas kulit benih dan mutu benih menurun baik pada suhu ruang dan suhu dingin. Pada suhu ruang lebih cepat terjadinya kerusakan integritas kulit benih dan mutu benih berdasarkan uji SEM, indeks vigor (72%), daya berkecambah (75%), kecepatan berkecambah (74%), bobot kering kecambah normal (0,04 gr), daya hantar listrik (5,02 $\mu\text{S}/\text{cm}$), kandungan karbohidrat menurun (17,52%), kandungan protein menurun (32,42%), kandungan asam lemak bebas meningkat (22,70%). Sedangkan pada suhu dingin kerusakan integritas kulit benih dan menurunnya mutu benih dapat diperlambat berdasarkan uji SEM, indeks vigor (79%), daya berkecambah (82%), kecepatan berkecambah (80%), bobot kering kecambah normal (0,04 gr), daya hantar listrik (4,22 $\mu\text{S}/\text{cm}$), kandungan karbohidrat menurun (21,10%), kandungan protein menurun (35,54%), kandungan asam lemak bebas meningkat (18,79%). Terdapat perbedaan respons antara suhu simpan dan waktu simpan. Penyimpanan suhu ruang penurunan integritas kulit benih dan mutu benih kedelai terlihat 2 bulan setelah simpan berdasarkan kadar air (9,87%), kecepatan berkecambah (89%), dan daya hantar listrik (3,51%). Penyimpanan suhu dingin penurunan integritas kulit benih dan mutu benih kedelai terlihat 4 bulan setelah simpan berdasarkan kadar air (10,43%), kecepatan berkecambah (86%), dan daya hantar listrik (3,69 $\mu\text{S}/\text{cm}$).

Kata kunci: Benih Kedelai, Integritas Kulit, Mutu, Waktu Simpan, Suhu