Precision in Planting Cotton Seed

V.1.2026

Sand Emergence for Maximum Potential

SoDak Labs recommends the sand germination test to determine the maximum emergence percentage of planting seed cotton. Sand emergence (TCS method, 8d @ 30°C) AOSA Rules (2025) provides uniform water uptake (Figure 1.) and emulates emerging up through sand/soil. This allows seedlings to express either strong or slower emergence and the grower knows the potential of the seed lot when deciding on the planting population and date. Rolled towel method is shown in Figure 2.

FIGURE 1. Cotton seedling growth at 7 days at 170 GDUs (AOSA TCS standard germination method).

FIGURE 2. Cotton seedlings in a rolled towel test, note the fungal colonization of seeds.

50°F Cold Test for Stress Potential –

SoDak utilizes a 50°F aerobic sand cold test to emulate early season chilling stress on cotton seedling vigor (Figure 4.). Delouche and Baskin (1970) stated a 54°F cold test was useful in separating cotton seed lots for vigor and especially useful on the 80 to 85% warm germination seed lots. They used 54°F for 3 days followed by a warm temperature growout. Hake et al. (1990) explored cotton seed sensitivity to chilling and identified that seed will absorb up to 60% of the water necessary for germination in the first 30 minutes (Figure 3.). Recent work by Dhaliwal and Angeles-Shim 2022 discusses the imbibition chilling shock consequences on cell membrane reorganization during early germination and they present this in a recent review article (see backside of this page).

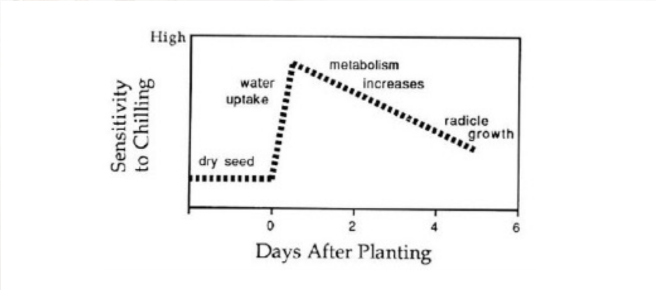

FIGURE 3. Relative sensitivity of cotton to chilling in the first several days after planting. The first 30 minutes after planting, the seed will absorb up to 60% of the water necessary for germination. Hake, et al. 1990.

FIGURE 4. Closeup of variable seedling growth after 50F imbibitional chilling shock during a 50F cold test.

Literature Cited

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Delouche, James C. and C.C. Baskin. 1970. Vigor Determines Performance of Cottonseed. Cotton International, 37, 65-70.

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K. Hake, W. McCarty, N. Hopper, and G. Jividen. 1990. Seed Quality and Germination. Cotton Physiology Today. https://www.cotton.org/tech/physiology/cpt/variety/upload/CPT-Mar90-REPOP.pdf

SoDak LABS, INC. — EMPLOYEE-OWNED —

CONTACT US:

236 32nd Avenue
Brookings, SD 57006

605.692.2758
samples@sodaklabs.com
SoDakLabs.com

plants

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Review

Cell Membrane Features as Potential Breeding Targets to Improve Cold Germination Ability of Seeds

Lakhvir Kaur Dhaliwal and Rosalyn B. Angeles-Shim *

Department of Plant and Soil Science, Davis College of Agricultural Sciences and Natural Resources, Texas Tech University, Lubbock, TX 79409-2122, USA
* Correspondence: rosalyn.shim@ttu.edu; Tel.: +1-806-834-6121

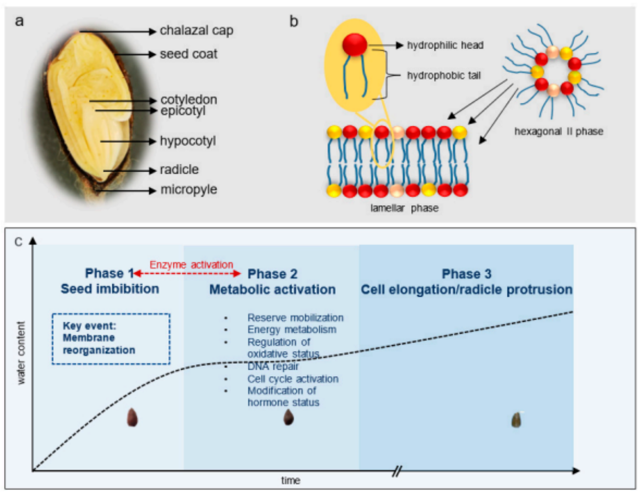

Figure 1. Cross-section of the cotton landrace Hopi seed showing the point of water entry during imbibition (**a**). Illustration of membrane lipids in the lamellar and hexagonal II configuration (**b**). Triphasic pattern of water uptake. The patterns of water uptake at phases I, II and III are indicated by the black dashed line. Key cellular and metabolic processes occurring during each phase of water uptake are described. Membrane reorganization from the hexagonal II to lamellar configuration occurs at phase 1 of water uptake (**c**).

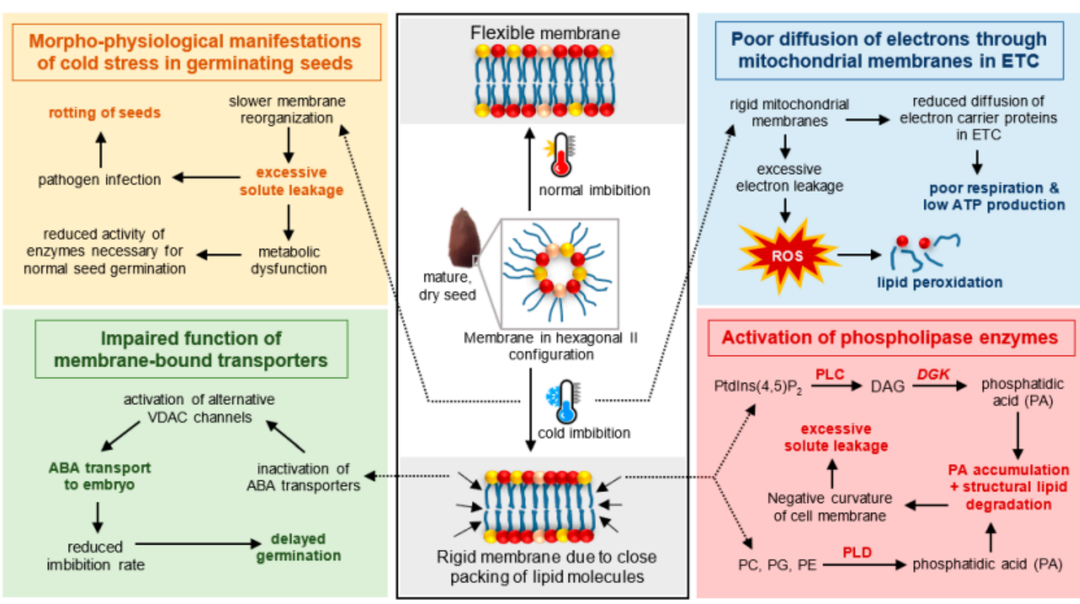

Figure 3. An overview of the seed responses to cold stress at the germination stage. Center panel illustrates the process of membrane reorganization from hexagonal II to lamellar configuration during water imbibition under cold and normal conditions. Cold-induced loss in membrane fluidity impairs the process of membrane reorganization and generated downstream responses, which has been explained at the physiological, biochemical and molecular level in the figure.