

[P3] Abiotic Stress for Crop Production

Thu. Sep 9, 2021 12:15 PM - 2:00 PM Room 3 (Poster) (Abiotic Stress for Crop Production)

12:15 PM - 1:00 PM

[P3-03] Membrane Lipid Unsaturation Confers Cold Germination Ability to Seeds of Upland Cotton (*Gossypium hirsutum*)

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The rapid influx of water during imbibition of a mature, dry seed triggers cell membrane re-organization from the hexagonal to the lamellar phase. During this transition, the cell membrane becomes highly permeable, resulting in cytoplasmic leakage and ultimately to poor seed germination. Membrane unsaturation has been reported to reduce cell membrane permeability by increasing its flexibility during reorganization in water-imbibing seeds. We screened cotton mutants with varying fatty acid (FA) profiles for their ability to germinate at 12°C and 15°C. FA mutants with lower palmitic acid and higher linoleic acid content (LP/HL) showed a higher and more uniform germination at both low temperatures compared to the wild type. Hydropriming at 30°C prior to cold treatment resulted in the faster and more uniform germination of the wild type, although the observed improvements were not at par with the cold germination ability of non-imbibed LP/HL mutants. Electrolyte leakage was higher in the wild type than in the LP/HL mutants after imbibition at 12°C and 15°C for up to 4 hours. Phospholipidomic studies showed higher incorporation of unsaturated linoleic acid in membrane lipids of the LP/HL mutants compared to the wild type. Results of the study indicate that the higher proportions of unsaturated fatty acids in the seeds of the LP/HL mutants enhanced the fluidity of cell membrane during reorganization, allowing the rapid restoration of cellular functions at low temperatures and facilitating the faster and higher germination of seeds.