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Exogenous Application of GA and ABA Regulate Rice Seed Germination under Low Temperature Conditions

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[Introduction]

Seed germination is a crucial and complex process in whole plant life, including exogenous and endogenous factors. The impact of temperature on seed germination is associated with the biosynthesis and signaling of ABA and GA. ABA and GA are the major endogenous regulators that antagonistically control seed dormancy and germination in several plant species. A low temperature during seed development enhances the accumulation of ABA and reduces GA. Therefore, it is significant to figure out the effects of plant hormones in rice seed germination under low temperature conditions.

[Materials and Methods]

To identify the effects of exogenous application in rice seed germination, we used Cheongcheong, Nagdong, CNDH 77 (resistant line), and CNDH 30 (susceptible line) as plant materials. We applied 100 μM and 300 μM of GA₃ and ABA per each line. Through the application of exogenous hormones, we checked the germination percentage (GP), coleoptile length, quantification of endogenous hormones, morphology, and phenotypes of rice seed germination response to control, 100 μM and 300 μM of GA₃ and ABA at 15°C.

[Results and Discussion]

To summarize the results, mostly 300 μM of GA₃ expressed high GP. On the other hand, 300 μM of ABA suppressed seed germination more remarkably than other treatments. In the case of the coleoptile length, GA₃-treated seeds showed highly longer coleoptile length than the ABA-treated seeds. Through the quantification of endogenous GA₃ and ABA, it showed a highly significant increase under both concentrations of GA₃ treatment while a significant decrease was indicated in ABA treatment. Taken together, exogenous GA and ABA regulate antagonistically in rice seed germination under low temperature conditions.

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