

Effect of KNO₃ Priming to Surge Kenaf Seed Germination in Non-Stress and Stress Conditions

In-Sok Lee^{1*}, Chan-Ho Kang¹, Ki-Kwon Lee¹ and Cheong-Kon Kim¹

¹Jeollabukdo Agricultural Research Extension Service, Iksan, 54968, Korea.

[Introduction]

Kenaf is an annual crop adaptable to a wide range of climates and soil types. It is native to parts of Africa and closely related to cotton, okra, and hibiscus, kenaf is similar in appearance to hemp. Seed priming has been used to accelerate the germination, uniform seedling emergence and improve a germination performance under the temperature or drought stresses. The priming with nitrate solutions stimulates the germination. Therefore, the objective of this trial was to investigate the effects of KNO₃ on kenaf seed (Jangdae) germination and vigour.

[Materials and Methods]

The kenaf variety was Jangdae released from Korea Atomic Energy Research Institute. At the end of experiment, germination rates, growth degree of shoots and roots in NaCl solutions, T50 (times to reach 50% of the final germination rate), MDG (mean no. of days to germination), dry weight were recorded to evaluate germination performance. Dry weight was measured by four digit balance and expressed in gram. About EC value, seeds were treated with various KNO₃ concentration (0~500mM) for 24 hours at constant temperatures of 20°C the dark in an incubator, and its value was measured with EC measuring instrument. Growth degree of shoots and roots was evaluated in 5 days of germination beginning.

[Results and Discussions]

In this study, the germination rate of kenaf seed ranged from 11.3 to 58.8 after 24 hours of immersion on the medium containing from 0 to 0.5% NaCl, resulting in decrease tendency of germination rate with salt level increasing. But, plant dry weight was similar about 0.2g under all salt treatments after 5 days of germination. About seed moisture, the priming treated seeds, particularly by 3 hours (18.1%), had rapid water uptake compared with 0 hour (10%). For EC value, as time passed, EC value of HP (hydro-priming) consistently increased by 8.7mS/cm at 24 hours of immersion. However, seeds primed with KNO₃ showed no difference in EC value even if times passed. As to a priming effect, priming in 100mM KNO₃ concentration for 12 hours increased the germination upto 85% under H₂O solution and in 0mM KNO₃ concentration upto 73.8% under 0.3% NaCl solution compared to Control. Germination synchronization, shoot length, and leaf unfolding of primed seed was greater than those of Control. Also, main root or hair root appeared faster in the treated seeds and grew abundantly compared to Control. The T50 of Control under both H₂O and 0.3% NaCl solutions was 18 and 22 times, respectively. However, when treated KNO₃ priming (0 to 100mM) under H₂O and 0.3% NaCl solution, 9 times was enough to reach T50. Primed (hydro-priming and KNO₃) seeds (0.6~0.62) had lower MDG compared to Control (1.13~1.31) under H₂O and 0.3% NaCl solutions. In dry weight of plants after priming, it was shown a increasing tendency after the priming treatment under H₂O solution. And, no significant difference of plant dry weight under abiotic stress (0.3% NaCl) was observed between Control and primed seeds. The results suggest that 50mM KNO₃ priming for 24 hours optimized seed germination and vigour. Therefore, it is recommended for kenaf seed invigoration treatment before planting.

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*Corresponding author: Tel. 063-290-6038, E-mail. bioplant325@korea.kr