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Effect of ultrasonication, salt solution and liquid smoke treatment on germination of *Setaria italica* seeds

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Abstract

The preference for domestic cereal crop of *Setaria Italica* has been increased with the recent interest in healthy foods. However, the productivity of Korean domestic produce, which has been decreasing due to the lack of cultivation technology and the low rate of mechanization during cultivation. Increase of germination ability will have a positive effect on the cultivation by reducing the labor of the manpower consuming and weeding work. Therefore, red light, ultrasonication, liquid priming and liquid smoke treatment that are effective for the germination of the seeds evaluated. The seeds of 1.4mm or more were used for the experiment. The priming solution used in the experiment was 1% KH₂PO₄ (74mM). During the priming, the light treated seeds at 2000 lux for 15, 30, 60 and 120 minutes. Ultrasonication treatment was performed for 5, 10, and 20 minutes at exposures of 60%, 80%, and 100% of ultrasound up to 21.6 kHz during priming. Light or ultrasound treated seeds transferred to priming treatment at 15 ° C for 24 hours. The treatment of the liquid smoke was divided into the treatment of the liquid smoke alone and the treatment of the liquid smoke with the priming. The liquid smoke alone was diluted with distilled water without priming solution and the treatment of the liquid smoke was diluted with the salt priming solution. Both treatments were performed at 0.0%, 0.5%, 1.0%, 5.0%, and 10.0% of the liquid smoke (pH7) concentration at 15 ° C for 6 hours. After each treatment, the seeds were dried to moisture content ranged 5-8% at 25° C for 24 hours. All treatments showed better results than the non-treated control. Light treatment for 120 minutes improved for germination percentage (GP), Germination uniformity (GU) and health seed percentage (HS). Ultrasonication treatment was most effective when treated with ultrasound at 21.6 kHz for 5 minutes in all germination characteristics. Ten % of the liquid smoke increase in 92% GP, 1.8 days MGT, , 54 %·day⁻¹ GR, 0.76 GU and 88% HS comparing to non-treated control (72% GP, 2.3 days MGT, 45 %·day⁻¹ GR, 1.48 GU, and 63 % HS). This study showed that it is possible to obtain high germination by adding liquid smoke treatment to the seeds supplied to the farmers. The efficacy of light, ultrasonication, inorganic salt priming, and liquid smoke treatment on the seeds found in the experiment will be a positive alternative to labor force problems in the cultivation by improving germination.

Keywords: Italian millet, Light, Seed treatment, Ultrasound treatment, Salt Priming, Liquid smoke

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