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Effect of ultrasonication, light and liquid smoke treatment on germination of lettuce seeds

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Abstract

Seed priming leading to improved emergences, germination speed and uniformity under unfavorable conditions without loss of longevity are the best level of techniques. We studied the possibility to obtain primed seed with reduced mean germination time (MGT) and uniformity but with simple, fast and effective methods. The experiments were carried out at 15°C for 16 hours with priming treatment. To compare the effects of each treatment, we used 200mM CaCl₂ priming or hydro priming or no imbibition after ultrasonication or red light treatment. The light treatment was performed by irradiating 2000 lux of red light for 15, 30, 60, and 120 minutes. Addition, in order to investigate the effect of the priming solution, treated at 200mM CaCl₂ for 8 hours. Ultrasonication treatment was performed for 5, 10, and 20 minutes at exposures of 13.0, 17.3, and 21.6 kHz during priming. For liquid smoke (LS) treatment, seed soaked in 0%, 0.5%, 1.0%, 5.0% and 10.0% of diluted water and 200mM CaCl₂ solution. After each treatment, the seeds were dried to moisture content ranged 5-8% at 25°C for 24 hours. The effect of seed treatment was evaluated with germination percentage (GP), MGT, germination index(GI), germination rate(GR), Germination Uniformity(GU) and health seed percentage(HS). For several factors tested, we found that the desired germination improvement could be obtained by treating the seed with ultrasonication at 17.3 kHz for 5 minutes in water or red light exposure at 2000 lux for 120 min in water that resulted very similar to those used to 200mM CaCl₂ priming for 16 hrs. However, LS treatment showed no improvement in all diluted solution. Therefore, the methods applied ultrasonication and red light treatment showed high potential for fast and easy treatment avoiding pollution of salt solution waste.

Keywords: *Lactuca sativa*, Light, Ultrasound, Priming, Liquid smoke

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