

P144

Effect of light, ultrasonication and liquid smoke on germination of proso millet (*Panicum miliaceum* L.) seeds

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Abstract

High quality seed of proso millet that has high germination percentage, germination speed, and uniformity demanded to increase rates of mechanization in cereal crop cultivation. In order to improve germination characteristics, proso millet seeds were treated with red light, ultrasonication and liquid smoke (LS) solution that generated from hickory wood. All treatments were performed in seed priming solution with 100mM NH₄NO₃ at 15°C for 24hrs under aeration condition. Seeds were exposed under light intensity of 2000 lux for 15m, 30m, 60m, and 120m in priming solution. Ultrasonic treatment was performed at 60%, 80%, and 100% intensity of 21.6 KHz for 5m, 10m, and 20m in priming solution. For LS treatment seeds were soaked in 0%, 0.5%, 1.0%, 5.0% and 10.0% of diluted solution with dH₂O or 100mM NH₄NO₃ solution. The effect of seed treatment was evaluated with germination percentage (GP), mean germination time (MGT), germination index (GI), germination rate (GR), Germination uniformity (GU) and health seed percentage (HS). Our results demonstrate that red light (15min) or ultrasonication (21.6kHz, 5min) treatment improved MGT, GI, GR, and GU comparing to untreated control. Importantly, we show that LS treatments have significant effect on the health seedling and germination characteristics. Proso millet seeds that treated with 5% LS solution for 24hrs improves HS up to 97% that similar results obtained in 100mM NH₄NO₃ priming for 24hrs. The combined treatment with LS solution and 100mM NH₄NO₃ priming were not effective in all treatments. Our results demonstrate that treating seeds with LS or 100mM NH₄NO₃ priming or ultrasonication improves germination characteristics. The methods described here will help advance research using this species by increasing the germination performance at which successive seed pellet process.

Keyword: proso millet, seed treatment, light, ultrasonic, Liquid smoke

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