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Influence of Laser Treatment on the Growth of Sprouts of Different Wheat Varieties

Authors : N. Bakradze, T. Dumbadze, N. Gagelidze, L. Amiranashvili, A. D. L. Batako

Abstract : Cereals are considered as a strategic product in human life and it demand is increasing with the growth of world population. There is always shortage of cereals in various areas of the globe. For example, Georgia own production meets only 15-20% of the demand for grain, despite the fact that the country is considered one of the main centers of wheat origin. In Georgia, there are 14 types of wheat and more than 150 subspecies, and 40 subspecies of common wheat. Increasing wheat production is important for the country. One of the ways to solve the problem is to develop and implement new, environmentally and economically acceptable technologies. Such technologies include pre-sowing treatment of seed with a laser and associative nitrogen-fixing of the Azospirillum brasilensse bacteria. In the region there are Dika and Lomtagora which are among the most common in Georgia. Dika is a frost-resistant wheat, with a high ability to adapt to the environment, resistant to falling and it is sown in highlands. Dicka excellent properties are due to its strong immunity to fungal diseases; Dicka grains are rich in protein and lysine. Lomtagora 126 differs with its winter and drought resistance, and, it has a great ability to germinate. Lomtagora is characterized by a strong root system and a high budding capacity. It is an early variety, fall-resistant, easy to thresh and suitable for mechanized harvesting with large and red grains. The plant is moderately resistant to fungal diseases. This paper presents some preliminary experimental results where, a continuous CO2 laser at a power of 25-40 W/cm2 was used to radiate grains at a flow rate of 10-15 cm/sec. The treatment was carried out on grains of the Triticum aestivum L. var. of Lutescens (local variety name - Lomtagora 126), and Triticum carthlicum Nevski (local variety name - Dika). Here the grains were treated with Azospirillum brasilensse isolate (108-109 CFU / ml), which was isolated from the rhizosphere of wheat. It was observed that the germination of the wheat was not significantly influenced by either laser or bacteria treatment. In the case of the variety Lomtagora 126, when irradiated at an angle of 90°, it slightly improved the growth within 38 days of sawing, and in the case of irradiation at an angle of 90°+1, by 23%. The treatment of seeds with Azospirillum brazilense in both irradiated and non-irradiated variants led to an improvement in the growth of ssprouts. However, in the case of treatment with azospiril alone - by 22%, and with joint treatment of seeds with azospiril and irradiation - by 29%. In the case of the Dika wheat, the irradiation only led to an increase in growth by 8-9%, and the combine treatment of seeds with azospiril and irradiation - by 10-15%, in comparison with the control. Thus, the combine treatment of wheat of different varieties provided the best effect on the growth. Acknowledgment: This work was supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG) (Grant number CARYS 19-573)

Keywords : laser treatment, Azospirillum brasilensse, seeds, wheat varieties, Lomtagora, Dika
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