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Modelling Seed Aging Effects on Wheat Emergence under Drought Stress Condition

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Abstract

Emergence is one of the most important phenological stages of crop. Reduced emergence percentage and rate lead to low establishment and is followed by negative effects on final yield, indirectly. Some researchers have modeled germination and emergence. The advantage of these functions is that they have parameters that are meaningful from a biological point of view, such as cardinal temperatures and germination or emergence rate. There is little information about emergence quantification of seeds under different quality in water stress conditions. Therefore, prediction of emergence can be effective to improve crop management in this condition. Accelerated aging treatments were created by aging the seeds (with initial moisture content of 11.8 %) at 43°C and relative humidity of 90–95 % for 0, 48, 72, 96 and 144 h periods. The pot experiment was conducted at Gorgan University of Agriculture Sciences and Natural Resources, Gorgan, Iran. A factorial combination of 5 seed aging treatments (0, 48, 72, 96 and 144 h accelerated aging periods) and 2 levels of environmental factors were considered as experiment treatments. Soil water potentials (-1 and -5 bar) were created based on soil moisture release curve, which indicate the relationship between soil water potential and soil moisture. Chapman—Richards function adequately described cumulative emergence in all aging treatments and two environmental conditions. Observed thermal time for emergence decreased as accelerated ageing periods increased and drought stress also resulted in increased thermal time too. Emergence percentage (**a**) reduced linearly by seed aging periods, with the same slope in both conditions. Emergence rate (**b**) also was decreased by seed aging periods, but reducing slope in the drought stress was higher than control condition. Finally, the results revealed that emergence rate was the parameter which was affected solely by seed aging periods and characterised differences between seed aging periods with respect to emergence rate at various conditions (control vs. drought stress).

Keywords: Drought stress, emergence , seed aging, thermal time model