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Optimization of Doubled Haploid Production for Enhancing Efficiency of Wheat Mutation Breeding

Doubled haploid (DH) technology produces homozygous plants fast and increases efficiency of selection in mutation breeding. The Plant Breeding and genetics Laboratory (PBGL) is carrying out R&D to integrate efficiency enhancing technologies such as DH, rapid generation cycling and marker-assisted selection to speed up the breeding of mutant varieties. Anther culture was optimized to produce haploid plants from four spring wheat varieties and their derived M1 plants. These M1 plants were developed by irradiating seeds at 12 – 15% moisture content with 150, 200 and 250 Gy of Gamma and X-ray using in-house irradiation sources. The material was grown in a glass-house following the optimized condition for wheat growth at the PBGL. Established protocol of anther culture was used with minor modifications in pre-treatment and induction media. Spikes were collected at the appropriate early to mid uni-nucleate stage and stored at 4℃ for 5 – 7 days before in vitro culture. Different combinations of hormones in solid and liquid induction medium were evaluated for haploid induction. The four wheat varieties and their M1 generation were comparable in their response to anther culture with varying degrees across different combination of hormones and media. Relative response to the untreated control varied between 55.8 to 112.5% over the three doses (150, 200 and 250 Gy). Response of M1 to anther culture varied with the varieties from comparable between the three treatments such as in Khalifa (90-112.2%) to reduced response with increase in irradiation dose in the other three varieties. The relative response dropped to around 60% with 250 Gy however, it is still sufficient to generate reasonable mutant population size for screening purpose. The optimized protocol is expected to enhance efficiency of wheat mutation breeding and accelerate delivery of mutant varieties.

Country or International Organization

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