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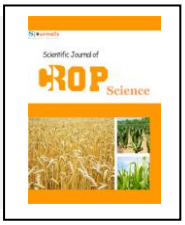

Short communication

The response of embryo explant to tissue culture in wheat varieties

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ABSTRACT

Callus induction of three wheat varieties Sardari 101, were assessed by mature embryo in MS and B5 media with three levels of 2,4-D. Analysis of variance indicated that variety effect was significant on callus induction frequency, callus size and callus fresh weight. The best callus induction condition and callus size was obtained in 2 mg/l 2,4-D and the highest callus induction frequency was in MS medium.

1. Introduction

Knowing callus induction for in vitro selection of somaclonal variation is essential to the effective operation (Ozgen et al., 2005). Callus production and regeneration of the colony to reproduce, resistance to biotic and abiotic environmental stresses advantage- taking somaclonal variation of culture and genetic engineering to transfer genes of interest from a foreign source is used to crop (Dahleen, 1999).

Turhan and Baser (2003) has been used embryo culture for callus induction in wheat. The highest observed callus induction was 33.88% in the MS medium containing 4 mg/l 2,4-D and 1mg/l NAA. Zale et al. (2004) were examined callus induction and regeneration wheat genotypes from mature embryo explant. There was significant difference in regeneration, the culture efficiency and regeneration capacity. Culture efficiency had positive correlation with callus induction (r=0.42) and regeneration capacity (r=0.29), but this correlation was moderate or low. The cultured embryos are used for callus induction, obtain hybrids in incompatible crosses of interspecies and intergenus haploid production (Kolbitz, 1988).

Some advantages of mature embryos as explants on callus induction and plant regeneration are as follows:

-Conservation of time and space

-Reducing of greenhouse costs for collection of immature embryos

-From mature embryos can regenerated enough plant with savings in cost and time required to collect immature embryos (Zale et al., 2004).

Although mature embryos from dry seeds are available at any time but its limitation is low frequency of callus induction (Torbert et al., 1998).

2. Materials and methods

Seeds of each genotype washed in 70% ethanol for ten minutes with shaking, were surface sterilized with 5% commercial bleach for 30 min with intermittent shaking and were rinsed in water three times with sterile distilled water. Seeds of each genotype immersed for two hours under a laminar hood in the final rinse to soften and separate embryos. Embryos separated from endosperm and cultured in MS and B5 media with three levels (1, 2, 3 mg/l) 2,4-D so that the cutting edge was low. Petri dishes were stored for four weeks in complete darkness and 25±2˚C; explants that had produced callus were counted. Samples were subcultured monthly in fresh medium. The obtained calli were subcultured three times at intervals of about every four weeks. Petri dishes were kept in a growth chamber at dark 25±2˚C. In this experiment the effects of genotype, medium and hormone levels (3 genotypes Sardai, Azar ,Sardari 101, 2 media, 3 levels of 2,4-D) were surveyed on callus induction as factorial experiment in a randomized complete block design with four replications and 10 sampling unit each petri dish. The measured traits were callus size, callus induction frequency, callus fresh weight, callus dry weight (48 h at 72˚C) and callus water content.

Before to analysis of variance, normal distribution with Kolmogorov- Smirnov test and homogeneity of variance was checked. Correlation coefficients between traits were calculated. For data analysis used SPSS.

3. Results and discussion

Table 1 shows the analysis of variance. The effect of variety was significant on the callus induction frequency, callus size and callus fresh weight. Mean comparison by Duncan's method showed that Sardari 101 had higher means than two other varieties. Different concentrations of 2,4-D was significant on callus induction frequency and callus size and the best status is observed in 2 mg/l 2,4-D. Zapata et al., (2004) also reported same results. Callus induction frequency had significant different in MS with B5 but medium did not affect other traits.

Callus induction frequency with callus size, callus size with fresh and dry weight callus, callus fresh weight with dry weight had significant positive correlations and correlation of callus water content with callus dry weight was significant negative. Ozgen et al., (2005) also have been reported same results.

Table 1
Analysis of Variance of Traits.

Source of Variation	df	MS			
		Callus frequency	Callus size	Callus fresh weight	Callus dry weight
Variety	2	0.19**	17.007**	0.004**	0.002**
Hormone	2	0.153**	2.717**	0.001	0.002
Medium	1	0.423**	0.640	0.002	0.001
Variety*Hormone	4	0.020	0.501	0.002	0.002
Variety*Medium	2	0.014	0.797	0.000	0.003
Hormone*Medium	2	0.031	0.551	0.002	0.003
Variety*Hormone*Medium	4	0.019	0.443	0.001	0.001
Error	54	0.011	0.271	0.001	0.002

* and ** significant at the 5 and 1 percent, respectively.

References

Dahleen, L.S., 1999. Donor-plant environment effects on regeneration from barley embryo-derived callus. Crop Sci., 39, 682-685.

Kolbitz, H., 1988. Barley (Hordeum vulgare L.): Establishment of cultures and regeneration of plants. In: Y.P.S. Bajaj (ed.). Biotechnol. Agr. Forest., Crops (1). Springer-Verlag., pp. 181-203.

Ozgen, M., Birsin, M.A., Onde, S., 2005. The effect of hybrid vigor on callus induction and plant regeneration from mature embryo culture of barley (Hordeum vulgare). Plant Cell, Tissue Organ Cult., 82, 67-74.

Torbert, K.A., Rines, H.W., Somers, D.A., 1998. Transformation of oat using mature embryo-derived tissue cultures. Crop Sci., 38, 226-231.

Turhan, H., Baser, I., 2003. Callus induction with mature embryo culture technique in winter wheat (Triticum aestivum L.). Indian J. Agr. Sci., 73, 399-401.

Vazquez, A.M., Ruiz, M.L., 1988. Barley: Introduction of genetic variability through callus cultures. In: Y.P.S. Bajaj (ed.). Biotechnol. Agr. Forest., Crops (1). Springer-Verlag., pp. 204-219.

Zale, J.M., Wier, H.B., Kidwell, K.K., Steber, C.M., 2004. Callus induction and plant regeneration from mature embryos of a diverse set of wheat genotypes. Plant Cell, Tissue Organ Cult., 76, 277-281.

Zapata, J.M., Sabater, B., Martin, M., 2004. Callus induction and in vitro regeneration from barley mature embryos. Biol. Plantarum., 48, 473-4.