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WHEAT BREEDING USING TISSUE CULTURE TECHNOLOGY

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Plant tissue culture, as a method of growing explants extracted from the mother plant, is a good way to prepare a significant quantity of plant materials in a short period of time and boost natural levels of in vitro processing of useful compounds (Pandeb *et al.*, 2013). It has also encouraged researchers to advance their expertise in a variety of fields, including biology and molecular plant breeding. Plant cells and tissues' ability to respond optimally in tissue culture medium and later developmental stages may be beneficial in agriculture, horticulture, plant breeding, genetic engineering, and the chemical industry (Evans *et al.*, 2003).

Importance of Tissue Culture in Wheat

During the formation of callus in cereal tissue culture, the chemical 2,4-Dichlorophenoxy acetic acid is used to regulate growth (naturally synthetic auxin). Naqvi *et al.*, (2002) used a combination of 2,4-D and cytokinins to induce callus in wheat plants. When various doses of 2,4-D were used, different effects were observed on all genotypes (Elwafa and Ismail, 1999). The genotypes, forms of ex-plants, physiological state, geographical origin, culture mediums, and their interactions all influence the callogenesis and organogenesis responses of tissue culture techniques in wheat plants (Chen *et al.*, 2006).

Mature Embryo Culture in Wheat

Mature embryo cultures revealed significant variations in wheat cultivars in terms of plant regeneration and callus effectiveness (Zale *et al.*, 2004). In wheat, mature embryos with or without endosperm were used to form calluses and regenerate plants. Embryogenic callus proportion was shown to be higher in endosperm-free embryos (Turhan and Baser, 2004). At a rate of 1.28% to 1.77 %, mature embryos cultured in *Triticum aestivum* and *Triticum durum* result in the growth of transgenic plants (Patnaik *et al.*, 2006).

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Immature Embryo Culture in Wheat

Wheat callus reaction to ABA was demonstrated using immature embryo culture (Morris *et al.,* 1989). Immature embryo culture can be used to study the floral developmental mechanisms in wheat. Immature embryos are the best ex-plant sites for callus induction and somatic embryogenesis in cereals. Immature embryos cultured in wheat can quickly produce callogenesis and organogenesis (Redway*et al.,* 1990).

Somaclonal Variations in Wheat

Plant regeneration from embryogenic tissues of somatic cells revealed that morphological and chromosomal modifications occurred during culturing as well. Variations in Mt DNA plantlets were observed in immature embryo culturing, and these distinctions were easily stabilised during Callogenesis (Hartmann *et al.,* 1987). Variations in Mt DNA were also observed in green plant regeneration arising from somatic tissue culture (Aubry *et al.,* 1989). Plants that have undergone in-vitro culturing have phenotypic modifications that are real representations of genetic variants (Liu and Chen, 1978 a and b; Orton, 1980). Some plants retained their original morphology, demonstrating that changes in field conditions are caused by physiological factors rather than genetics (Callebaut *et al.,* 1978)

Conclusion

Plant Tissue Culture has a major impact on both agricultural and ornamental plants. In-vitro embryo culture can help with a variety of realistic plant breeding issues. Embryo culture may aid in the research of plant feeding, metabolism, and developmental stages. Somatic embryogenesis, cell biological techniques, and molecular approaches, in addition to traditional breeding programs, have been shown to be useful instruments for improving the genetics of various crop plants. Callus induction and plantlet regeneration is greatly influenced by media structure, genotype, and their interactions. The regeneration capability of media can be increased by using various growth regulators.

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