Improved High-efficiency Protocol for Plant Regeneration through Somatic Embryogenesis in *Cenchrus ciliaris*

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Abstract—*An efficient in vitro plant regeneration protocol through callus mediated somatic embryogenesis and shoot organogenesis has been developed for Cenchrus ciliaris. Seeds, shoot apices and immature inflorescences, of four genotypes (IG-3108, IG-718 IG-74 & DBC15-8/32/10) of buffel grass formed callus when cultured on Murashige and Skoog (MS) medium supplemented with 3 mg/l 2, 4- D and 0.5 mg/l 6- benzyladenine (BA). The level of 2, 4-D, explants type, and genotype significantly affected the callus induction. Calli from shoot apex and immature inflorescence explants developed into somatic embryos on MS medium containing 0.5 mg/l BA with 3 mg/l 2,4-D and in case of seed explants higher concentration of auxin (2,4- D) at 6 mg/l was required. For improving the quality of embryogenic calli, growth adjuvants such as L-Proline (400 mg/l), L-Glutamine (400 mg/l) and Casein hydrolysate (300 mg/l) alone or in combination were used. Plant regeneration via somatic embryo germination as well as shoot organogenesis from all the three explants took place on MS medium containing high levels of BA (3 mg/l) combined with 0.25 mg/l 2,4-D. The calli from the immature inflorescences exhibited maximum percentage (89.6%) of somatic embryogenesis and shoot regeneration (78%). In addition, these calli yielded the highest number (12) of differentiated shoots per callus. Ultra-structural details of somatic embryos confirmed successful induction and progression of somatic embryogenesis. Histological studies of calli indicated the formation of somatic embryos and the presence of shoot apical meristem with leaf primordia.*