

ABSTRACT

The purpose of this study was to investigate the effectiveness of different plant growth regulators on different explants of *Cicer arietinum* L. cv. CM-2008 for callogenesis, regeneration, and to test the genetic variability in regenerated plants. The parameters for callus induction included callus induction duration, callus frequency, callus index and morphology of callus. Different concentrations of auxins (NAA, 2, 4-D) and cytokinins (BAP) were tried alone and in combination for callus induction. From all the explants, cotyledonary node and node showed best results for callus formation. Maximum and minimum callus induction frequency was noticed on 2 mg/l NAA individually and in the combination at 0.5 mg/l NAA + 2 mg/l BAP respectively. Maximum callus mediated shoot induction frequency was observed on the half concentrations of primary medium (2 mg/l NAA) with (6 cm) shoot length. Different concentrations of IAA, IBA individually and in combination were tried for indirect root induction. Best response for root was observed on the combination of 1 IAA+1 IBA. Direct shoot induction frequency was analyzed on different concentrations of BAP and KIN individually and in combination. Maximum and minimum direct regenerated shooting frequency was noted on 1mg/l BAP+ 1mg/l KIN and 1.5mg/l KIN respectively. Regenerated shoots were elongated on 1 mg/l IAA with shoot length of 10 cm after fifteen days. Direct shoot and root induction frequency was observed on different concentrations IBA and IAA. Maximum response of shoots and roots was observed on 2 mg/l IBA while 100% response of shoots and 85% roots was observed on 1.5 mg/l IAA from cotyledonary node. After complete regeneration plantlets taken from agar medium and washed with running water to remove the content of agar and shifted to pots containing different substrata i.e. soil, sand, peat moss, and bio manure with and without the inoculum of *Rhizobium*. Maximum acclimatization was achieved when plants were shifted on sand and soil in the ratio of 3:1 with the survival rate of (75%) after 24 days. Increase in plant length was recorded from 13cm to 18cm *in vitro* to *ex vitro*. RAPD-PCR analyses were performed to check the somaclonal variations among direct and indirect regenerated plants. Total ten RAPD primers were used to investigate the variations. Maximum 46 bands were scored from which 16 bands of variable sizes were similar and 30 bands of variable sizes were differing in both samples.