Abstract

Fritillaria imperialis, known as the crown imperial, is one of the most beautiful and attractive plants all over the world. Unfortunately, this plant is on the verge of extinction from its natural habitats in Iran. Propagation of this plant through bulb and seeds takes long time and therefore tissue culture technique may be a suitable technique for large-scale propagation. In this research we examined the B5 and MS medium complemented with variable concentration of plant growth regulators to optimize the micropropagation of *Fritillaria imperialis* using different explants. Results showed that only scale and embryo respond to regeneration and only bulb scale could produce a bulblet during two or three subculture. In scale culture, high concentration of NAA (3 and 5 mg/l) in combination with 2 and 3 mg/l BAP showed the best response to regeneration of bud and shoot. Bulblet production extremely improved with increasing the concentration of BAP from one to three mg/l. No significant difference was observed between B5 and MS medium for in vitro propagation of this plant. Optimum concentration for embryo regeneration was 2mg/l and 3mg/l NAA with 3mg/l BAP that produced highest number of shoots and roots. In comparison with scales, embryos could not produce any bulblet during the culture. Shoot and root induction via scale culture was higher than embryo culture but controlling the contamination in scales culture was more difficult. The leaf and stem was not a suitable explant and did not regenerate any plantlet. Also ovary and immature ovule produced non- regenerative callus. Karyotype analysis of *Fritillaria imperialis* showed that this species was diploid and contained 24 chromosomes (2n=2x=24). The biggest chromosome was metacentric and had a length of 21.4 micrometer and relative length of 11.37 micrometer. The smallest chromosome was metacentric with a length of 12.33 micrometer and relative length of 6.44 micrometer. Karyotype formula for haploid set was 8M+ 4sm.