**Abstract**

Polyploidy induction was investigated in the Iranian peppermint (*Mentha × piperita*), mojito mint (*M. × villosa*) and *M. suaveolens*. Different concentrations of colchicine (0, 0.0125, 0.025 and 0.05 %) and soaking times of rhizomes (0, 3, 6 and 9 hours) were studied. The results of survival rate, mixoploidy and chromosome doubling of plants were checked two months and two years after induction of treatments. The highest survival rate (90.90 %) and mixoploid (11.11 %) was seen after two months in *M. × piperita* BLACK and *M. × villosa*, respectively. The only and highest rate of polyploidization (15.27 %) was observed after two months in *M. × villosa* using 0.05 % colchicine for 9 hours, which after two years increased to 18.05%. Flow cytometry analysis and chromosome counting confirmed polyploidization of mojito mint as a hexaploid plant (2*n* = 6*x* = 72). Its leaves were sturdy, thick and dark green with lower stomata density. For the first time, essential oil of chromosome doubled mojito mint showed a 64 % increase in yield from 87 % in the triploid plant up to 1.43% in the hexaploid plant. New phytochemicals α-pinene, sabinene, limonene, menthofuran and borneol were produced, while 1,8-cineole and pulegone synthesis was strongly amplified. Main essential oil substances accumulated were menthofuran (28.51%), 1,8-cineole (28.45%) and pulegone (20.14%) which have been assumed as promising phytochemicals for curing respiratory diseases.