In this study, the effects of cadmium sulphate (CdSO₄), fleuresans irradiation, methyl jasmonate (MeJA) and sucrose treatments on the production of phenolic compounds in grapevine cell suspension cultures were investigated. Cell suspensions initiated from callus from petiole tissues of *Vitis vinifera* L. cvs. Gamay, Kalecik karası and Öküzgözü. Different concentrations of CdSO₄ (0, 1 and 1.5 mM), MeJA (0 and 10 µM) and sucrose (0, 0.20 and 0.25 M) were applied to cell suspension cultures. For fleuresans irradiation, cell suspensions were exposed to visible light (10,000 lux) or cultured in dark constantly. Amount of total phenolic, total flavanols, total flavanols and anthocyanin were determined spectrophotometrically while *trans*-resveratrol was carried out in the harvested cells by HPLC. The results showed that CdSO₄ at 1.5 mM concentration and MeJA at 10 µM concentration compared to controls yielded highest phenolic productions in all cultivars. Especially, Kalecik karası applied CdSO₄ at 1.5 mM concentration had the highest total phenolic (3.144 mg g⁻¹), anthocyanin (1.672 CV g⁻¹) and *trans*-resveratrol (3.650 µg g⁻¹) contents. 10 µM of MeJA application provided the *trans*-resveratrol accumulation as high as 11.681 µg g⁻¹ in Öküzgözü. In cell suspension cultures applied sucrose, the highest total phenolics and *trans*-resveratrol contents were obtained from Kalecik karası cultures at 0.20 M sucrose concentration as 4.215 mg g⁻¹ and 7.550 µg g⁻¹, respectively while the most anthocyanin accumulation (2.024 CV g⁻¹) was achieved from Gamay at the same sucrose concentration. Additionally, it was determined that darkness had strongly increased *trans*-resveratrol content in all cultivars tested, whereas total phenolics and anthocyanin syntheses were induced by light. These results demonstrate that some elicitor applications including CdSO₄, MeJA, sucrose and fleuresans irradiation, and can be an efficient approach for the production of phenolics in grapevines.