Relation between drought stress, genotypic differences and nutrients are important in plant growth. The aim of the study was to determine the effects of different sweet cherry rootstocks grown in 50-liter pots and drought stress on nutrient (N, P, K, Ca, Mg, Zn, Mn, and Cu) concentrations of leaves. In this study 0900 Ziraat sweet cherry variety grafted on five different rootstocks (P. mahaleb, Mazzard, Gisela-6, MaxMa 14, CAB 6) were used. Four irrigation treatments (control or 100%, 75%, 50%, and 25% and of the field capacity) were used and irrigation intervals were four days in the study. As a result, mineral concentrations of leaves were changed with both rootstocks and drought stress treatments. In general, “Mazzard and Gisela 6” sweet cherry rootstocks had higher nutrient concentrations than “MaxMa 14” under drought stress conditions. The results showed that drought stress reduced the concentration of N, P, K, Ca, Mg, Zn, Mn, and Cu concentrations. CAB 6 rootstock was not affected by water deficiencies and had higher performance on nutrition than the other rootstocks under drought stress conditions. In conclusion, drought stress and rootstocks have substantial effects on nutrient concentrations of sweet cherry leaves.