The objective of this research was to examine the concentrations of Protein, P, K, Mg, Fe, Mn and Zn at different growth stages of 5 triticale genotypes and 2 barley cultivars (two-row). The experiments were carried out in the farm of Süleyman Demirel University, Faculty of Agriculture in Isparta during the growing seasons of 2012-2013. Three hexaploid triticale lines (SDÜ-21, SDÜ-27, SDÜ-43) and 2 cultivars (Karma-2000 and Tatlicak-97), and two-row barley cultivars (Hamidiye and Cumhuriyet) were used in the experiment. The experimental design was a randomized split block design with three replicates. The genotypes as main plots and growth stage as sub-plots were used. The basic pre-sowing fertilization rates for all plots were 30 kg N/ha and 50 kg P/ha, the rest of 30 kg N/ha was applied at the early spring (stem-elongation stage). Plants were harvested at four stages, stem elongation, milk development, dough development and mature stage. Samples taken from each plot were dried to constant weight at 65°C in an oven. After cooling the samples were milled for crude protein and mineral element analyses. In the analysis of variance, the software package program MSTAT-C was used. Means of treatments were evaluated and ranged according to Duncan test. According to the results of variance analysis, the nutrient concentrations of triticale and barley genotypes showed variations depending on the genotypes and different growth stages. The protein content of barley cultivars were found higher than triticale genotypes. The concentrations of K, Fe, Mn and Zn in whole plants decreased from stem elongation to maturity, while Mg and P contents increased. Protein (18.59%) at dough development stage were higher than other growth stages. The nitrogen use efficiency of numbered SDÜ-27 line which can be used for cultivar registration were found higher than control cultivar (Karma-2000; Tatlicak-1997).