The study was conducted to determine the effects of cultivar, harvest period, and their interaction on the hydrophilic phenolic components extra virgin olive oils of the cultivars ‘Ayvalık,’ ‘Memecik,’ and ‘Topakaşi.’ Olives were collected at three different harvesting periods: (1) early harvest period-1 (Beginning of spotting), (2) early harvest period-2 (End of spotting), and (3) optimum harvest period. Oils were extracted using the Abencor system. HPLC (High-performance liquid chromatograph) technique was used to quantify the phenolic compounds including tyrosol (p-HPEA), hydroxytyrosol (3,4-DHPEA), luteolin, rutin, quercetin, catechin, sinapinic acid, p-coumaric acid, cinnamic acid, vanillin, vanillic acid, ferulic acid, and gallic acid. The results indicated that the effects of harvest period on the phenolic components were variety dependent. At the early harvest period-1, ‘Memecik’ and ‘Topakaşi’ had the highest efficiency in luteolin, cinnamic acid, vanillic acid, and ferulic acid contents, while ‘Ayvalık’ had the highest efficiency in hydroxytyrosol, sinapinic acid, p-coumaric, vanillin, and ferulic acid contents. At the optimum harvest period, ‘Ayvalık’ had the highest efficiency in luteolin, tyrosol, and gallic acid contents, while ‘Topakaşi’ had the highest efficiency in tyrosol, hydroxytyrosol, and rutin content. The highest phenolic content was detected in the early harvest period-1. The content of tyrosol linearly increased with the progress of maturity harvest period, whereas the contents of the sinapinic acid, vanillin, vanillic acid, and ferulic acid decreased. The oils of ‘Memecik’ variety had significantly higher phenolic content than those of ‘Ayvalık’ and ‘Topakaşi’ varieties.