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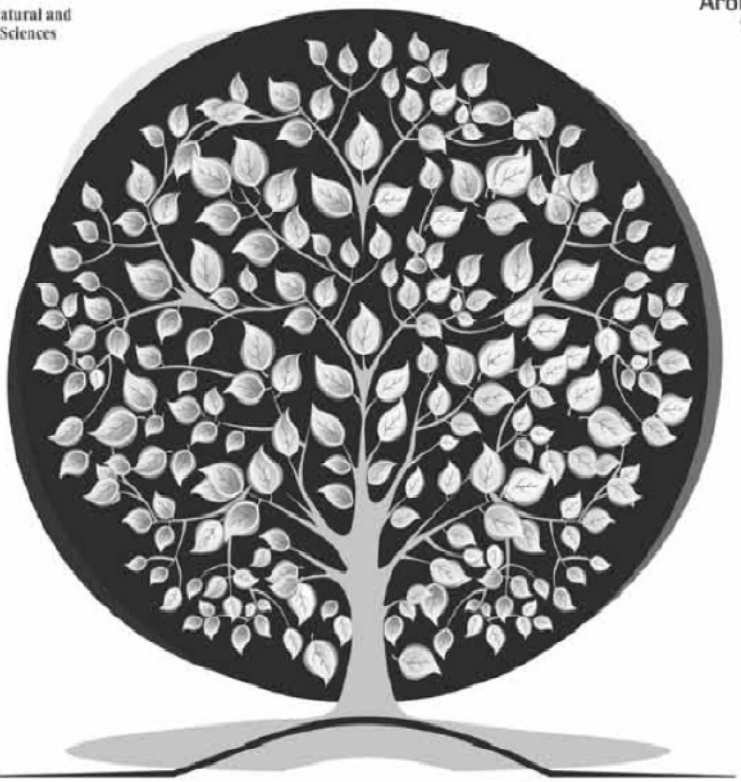

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tilled water to remove dust particles in a standardized procedure, and rest of them was untreated. Standard procedures were used and the determinations of the heavy metals and nutrient elements (B, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Zn) in all samples (washed-unwashed leaf, stem, root and soil) were done using an Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES). In addition, the usability of this plant as a heavy metal pollution monitor to define the pollutant types and to calculate the ratio of airborne and soil borne contaminations in Kocaeli region was investigated. As a result of the measurements, it was observed that heavy metal pollution is affected by the industrial activities significantly and *Calamintha nepeta* subsp. *glandulosa* could be use a biomonitor organism, especially with its leaves and roots.

***Keywords*:** Heavy metal, trace elements, pollution, industry, traffic, biomonitor

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RELATIONSHIP BETWEEN HARVESTING TIME AND FRUIT QUALITY IN SEEDLESS BARBERRY, AS A MEDICINAL SHRUB

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Barberry (*Berberis vulgaris*) is a dicotyledon, perennial species and well-known medicinal plant in Iran and has also been used as a food product. Barberry is cultivated as a domestic plant for many years in southern parts of Khorasan province of Iran. There is evidence that the barberry was domesticated about 200 years ago in this region [6]. Different parts of this plant such as fruit, root and stem have anti-bacterial, anti-fungal and antioxidant effects. The aim of this study was to determine whether early or late harvesting have any effect on quality of fruit production? In order to study the effect of different harvesting date (10 September, 2 October, 23 October and 13 November) on some qualiattives characterstics of seedless barrbery an experiment

was conducted in a Complete Randomized Block Design with three replications at Qayen, Southern Khorassan province, Iran, in 2008 and 2010. In each harvesting date the amounts of pH, brix and acidity were determined by using the Bideli method[2], also the amount of anthocyanin was measured by Timberlak and Bridle method [5]. Results of combined analysis showed that the effects of year and harvesting time were significant in all of the studied factors. All of experimental parameters except acidity had an increasing trend with delaying in harvesting date, so that the highest amounts of pH (3.36), brix (15.9%), maturity index (8.76) and anthocyanin (40 mg/100 ml extract) were obtined on 13 November and the lowest amount of these factors were observed on 10 September. Results of interaction effects showed that the highest amount of medicinal component of anthocyanin (48 mg/100 ml extract) was gained in 2008 and on 13 November. The results of correlation coefficient showed that, correlation of anthocyanin was positive with brix and maturity index ($r=0.85^{**}$ $r=0.86^{*}$, respectively). Overall, medicinal quality of fruit barberry was improved with delaying in harvesting. Our results showed that the best harvesting date was 13 November that improved qualitative indices of seedless barberry in the studied region. This results were correspondence with the other researches [1,3,4]. Soluble solids and acidity are useful chemical traits that define the optimal time for harvesting [1], and forth harvesting date had the best condition for these indices. Moreover the amount of anthocyanin was higher in final harvesting date. These secondary metabolites are produced during the plateau phase of the fruit growth curve, when growth ends and carbon is no longer needed in large quantities for primary metabolism and secondary compounds are more actively synthesized [1].

Keywords: *Berberis vulgaris*, medicinal plant, maturity index, anthocyanin

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