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Full Length Research Paper

Determination of some trace element nutritional status of cherry laurel (*Prunus laurocerasus* L.) with leaf analysis which grown natural conditions in Eastern Black Sea region of Turkey

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This investigation was carried out to determine the trace element nutritional status of cherry laurel (*Prunus laurocerasus* L.) in Eastern Black Sea region of Turkey. For this purpose, leaf samples were collected from different 20 cherry laurel (*P. laurocerasus* L.) gardens in June. Iron (Fe), copper (Cu), zinc (Zn), manganese (Mn), boron (B) and molybdenum (Mo) contents were determined in leaf samples. According to the results, Fe, Cu, Zn, Mn, B and Mo contents of leaf samples were determined between 50 to 130, 2 to 8, 27 to 56, 950 to 1032, 36 to 52 and 0.05 to 0.32 mgkg^{-1}, respectively.

Key words: Cherry laurel (*Prunus laurocerasus* L.), plant nutrients, nutritional status, trace elements.

INTRODUCTION

Cherry laurel (*Prunus laurocerasus* L.) belongs to the Rosaceae family and is a popular fruit (dark purple or black when mature) mainly distributed in the coasts of the Black Sea region of Turkey and is locally called Taflan or Karayemiş (Halilova and Ercişli, 2010).

It is mostly consumed as fresh fruit in local markets, but may also be dried, pickled and processed into pekmez, jam, marmelade and fruit juice products. Besides its use for food, both fruit and seed of cherry laurel are well known as traditional medicine in Turkey and have been used for many years for the treatment of stomach ulcer, digestive system complaints, bronchits, eczemas, hemorrhoids and a diuretic agent, among others (Baytop, 1984; Halilova and Ercişli, 2010).

Cherry laurel originated in Central and West Asia, South-Eastern Europe and Anatolia cherry laurel is grown as a native fruit crop in the eastern Black Sea region of Turkey (İslam, 2002).

Cherry laurel is used for food additivies such as flovouring. The leaves and seed of this plant is used in pharmaceutical. The tree is also valuable for ornamentation as an evergreen broadlife plant (İslam and Bostan 1996; İslam, 2002).

The nutrient problems of cherry laurel were determined for different regions in some investigation. According to the results of the investigations, the kind, amount and application times of the necessary fertilizers are different from region to region (Alasalvar et al., 2005; Vizzotto et al., 2007; Halilova and Ercişli, 2010).

Cherry laurel genarally give the highest yield in acid soils. Optimum pH value is between 5.5 and 6.5 in the soils for cherry laurel. But, this plant can be grown in neutral pH conditions. On the other hand, the pH values of the soil in eastern Black Sea region are below 6.5 value, generally. Consequently, cherry laurel production decreased because of excess and missing fertilizing program in this region (Anonymous, 2000).

The fertilizer program should carefully be chosen to increase plant production. The choice of fertilizer program should not only be based on soil analysis but also leaf samples analysis. Therefore, soil and leaf samples analysis results were evaluated together to solve nutrition problems for many plants in the world (Kowalenko, 1984; Güneş et al., 2003; Tarakçıoğlu et al., 2003; Zengin et al.,

Figure 1. Study area in Turkey.

Table 1. Some trace elements critical values of cherry laurel, mg kg^{-1} (Jones et al., 1991).

Trace elements	Deficient	Sufficient	Excess
Fe	47	48 - 126	127
Cu	3	4 - 6	7
Zn	26	27 - 32	33
Mn	959	960 - 1056	1057
B	31	32 - 44	45
Mo	0.11	0.12 - 0.30	0.31

2003; Adiloglu and Adiloglu, 2006; Eryılmaz Açıkgöz, 2011).

In this research nutritional status of cherry laurel which was grown in eastern Black Sea region inTurkey was aimed to determine with plant analysis.

MATERIALS AND METHODS

Cherry laurel leaf samples were taken from 20 different cherry laurel gardens. Five (5) mature leaf samples were taken from each tree. Leaf samples were taken in June, 2010 and brought to laboratory (Mills et al., 1996), washed with distilled water, dried at 65°C tempereture and ground. Study area in Turkey is shown in Figure 1. On the other hand, study area has humid climate conditions and acid soil property. Annual mean temperature is 14°C, annual rainfall 831 mm and relative humidity is 75%.

Some trace elements [Iron (Fe), copper (Cu), zinc (Zn), manganese (Mn), boron (B), molybdenum (Mo)] were analyzed for each cherry laurel leaf sample with ICP-OES (Kacar and Inal, 2008). Then, nutrient element contents of cherry laurel plants were evaluated according to critical values (Table 1).

RESULTS

Some trace element contents of cherry laurel leaf samples are shown in Table 2. According to Table 2; Fe contents of leaf samples were between 50 and 148 mg kg^{-1}, Cu contents of leaf samples ranged from 2 to 8 mg kg^{-1}, Zn contents of leaf samples were between 27 and 56 mg kg^{-1}, Mn contents of leaf samples ranged from 950 to 1032 mg kg^{-1}, B contents of leaf samples were between 36 and 52 mg kg^{-1} and Mo contents of leaf samples ranged from 0.05 to 0.32 mg kg^{-1}.

DISCUSSION

Trace element status of cherry laurel leaf samples were

Table 2. Trace element contents of leaf samples, mgkg^{-1}.

Soil number	Locations	Fe	Cu	Zn	Mn	B	Mo
1	Beşikdüzü- Adacık	52	5	48	980	36	0.08
2	Beşikdüzü- Adacık	65	6	45	1010	48	0.10
3	Beşikdüzü- Denizli	72	4	35	956	38	0.05
4	Beşikdüzü- Denizli	67	8	32	1025	52	0.25
5	Beşikdüzü- Sayvancık	110	3	27	950	43	0.18
6	Beşikdüzü- Çeşmeönü	130	3	35	957	36	0.30
7	Beşikdüzü- Çeşmeönü	128	6	28	1005	45	0.32
8	Beşikdüzü- Kalegüney	105	7	46	1022	38	0.20
9	Beşikdüzü- Anbarlı	97	2	56	1018	47	0.09
10	Beşikdüzü- Anbarlı	78	2	52	960	42	0.12
11	Beşikdüzü- Kaleköy	65	4	32	980	50	0.10
12	Beşikdüzü- Çamlık	120	5	34	1012	49	0.05
13	Beşikdüzü- Akkese	148	4	32	980	42	0.08
14	Beşikdüzü- Çorapçılar	135	8	33	978	48	0.09
15	Beşikdüzü- Resullü	110	6	35	965	38	0.18
16	Beşikdüzü- Resullü	76	6	38	955	42	0.22
17	Beşikdüzü- Hünerli	85	5	27	960	36	0.26
18	Beşikdüzü- Kutluca	50	4	32	1020	39	0.18
19	Beşikdüzü- Aksaklı	52	3	52	1032	36	0.07
20	Beşikdüzü- Türkelli	66	7	38	1030	43	0.09
Minimum		50	2	27	950	36	0.05
Maximum		148	8	56	1032	52	0.32

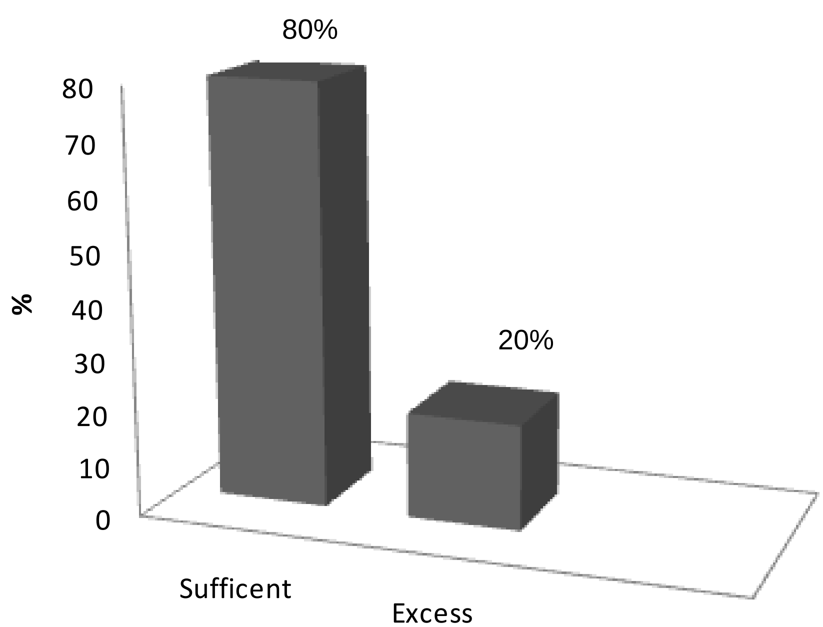

Figure 2. Fe content status of cherry laurel.

compared with the critical values as shown in Table 1. According to these results, Fe contents of cherry laurel leaf samples were determined 80% of sufficient and 20% excess (Figure 2). Cu contents of leaf samples 25% was deficient, 55% was sufficient and 20% was excess (Figure 3). According to Table 1, Zn contents of leaf

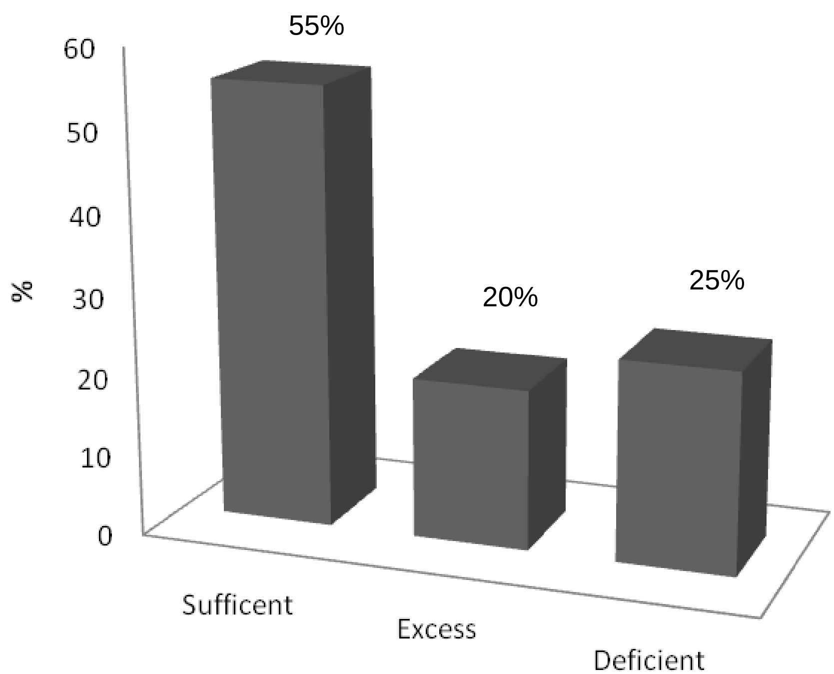

Figure 3. Cu content status of cherry laurel.

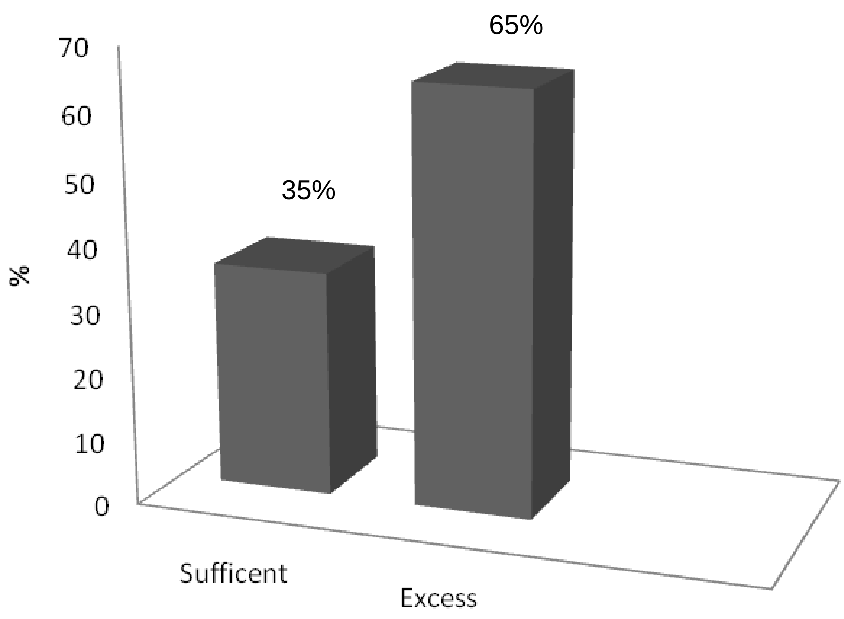

Figure 4. Zn content status of cherry laurel.

samples 35% was sufficient and 65% was excess (Figure 4). Mn contents of leaf samples 15% was sufficient and 85% was excess (Figure 5). B contents of leaf samples 65% was sufficient and 35% was excess (Figure 6). Mo contents of leaf samples 50% was deficient, 45% was sufficient and 5% was excess (Figure 7). Cherry laurel is growing in acid soils and natural conditions in eastern Black Sea region. Thus, these results were harmonied with chemical properties of this region soils.

According to many researhers, Fe, Zn, Mn and sometimes Cu deficient for different plants are not seen commonly in acid soils. Because, Fe, Zn, Cu and Mn

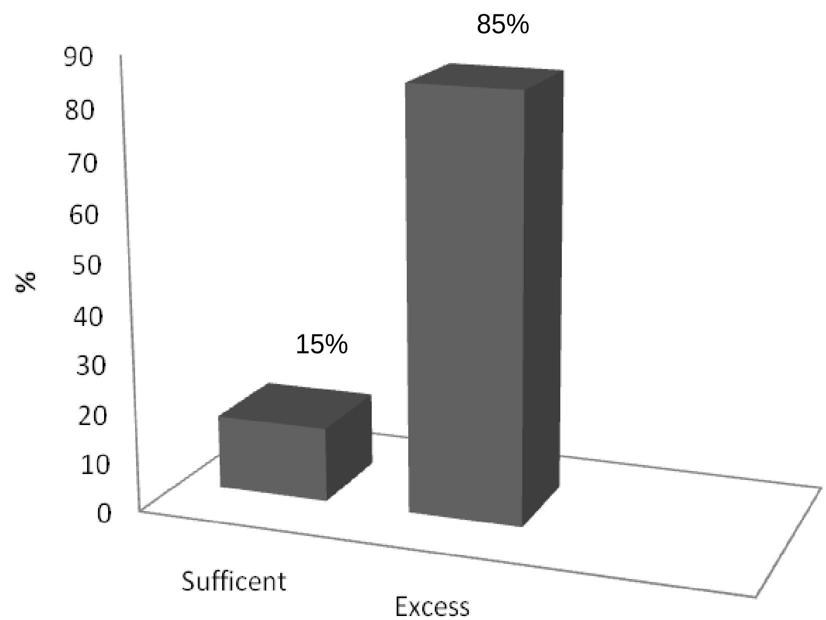

Figure 5. Mn content status of cherry laurel.

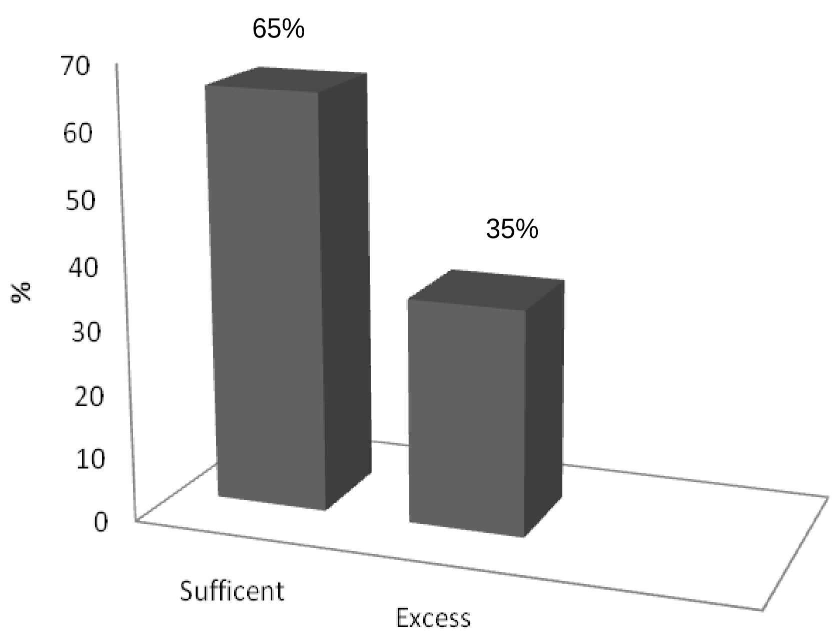

Figure 6. B content status of cherry laurel.

solubility are high in acid soil conditions. Therefore, Fe, Zn and Mn deficient is not seen in plants, generally. But Mo deficiency is seen commonly in acid soil conditions, because Mo solubility and availability decrease with increase in acidity in soils (Lin, 1966; Southern and Dick, 1969; Kacar et al., 1979; Kabata-Pendias and Pendias, 2001).

The reason for this results, may be that a fertilizer program was not carefully chosen for cherry laurel plant. On the other hand, fertilizer program should not only be based on soil analysis but also leaf samples analysis. Consequently, soil and leaf samples analysis results has been evaluated together to solve the nutrition problems of cherry laurel plant in acid soils.

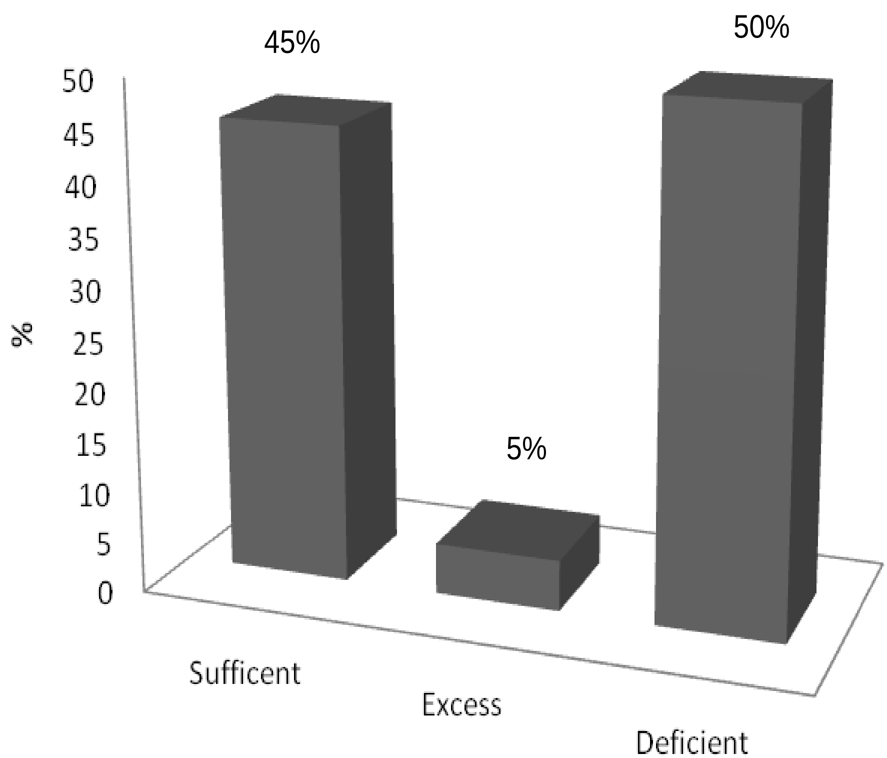

Figure 7. Mo content status of cherry laurel.

Conclusion

According to the results of the investigation, Fe, Zn, Mn and B contents of cherry laurel leaf samlpes were determined sufficient and excess. But Cu and Mo content of cherry laurel leaf samlpes were determined deficient in some samples. Therefore, Cu and Mo fertilizeres should be applied to cherry laurel trees for the Cu and Mo deficient hindering.

Mo deficient was determined with acid soils in this region (Eyüpoğlu, 2002), because great amount of soil samples were strong acid reaction in eastern Black Sea region of Turkey. For this purpose, lime should be applied to these soils for prevention of the Mo deficiency, but the pH value of soils should not be excessively high.

Fe, Zn, Mn and B contents of leaf samples were sufficient and excess, generally. Soil acidity was increasing in this region (Eyüpoğlu, 2002). Therefore, the levels of these nutrient elements may be toxic in the near future. This situation should be remembered for application of fertilizer program to cherry laurel in this region.

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