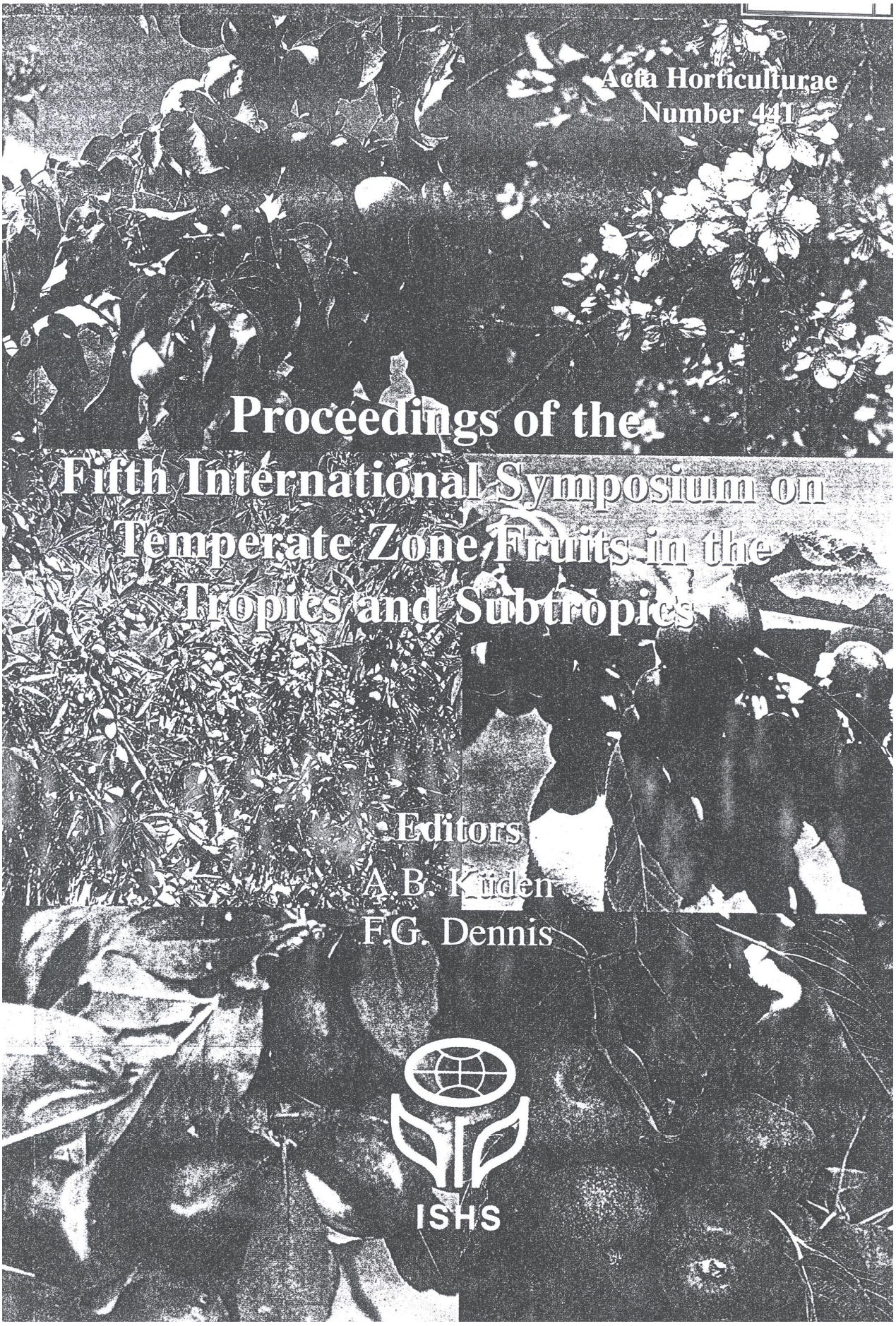

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LEAF NUTRIENT CONTENT OF SOME PERSIMMON VARIETIES UNDER SUBTROPICAL CONDITIONS IN TURKEY

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Abstract

In 1993, levels of N, P, K, Na, Ca, Mg, Zn, Mn and Cu were measured in the leaves of four persimmon varieties (Persimmon Seedless, Fuyu, Tipo Kaki, and Yesil Hurma) on persimmon seedling rootstock, which were planted in 1989 on clay-loamy soil in Adana at a spacing of 8x8 m. in 1993.

Nutrient content did not vary significantly among varieties. The level of N was 2.41% and Ca 1.58% for Yesil Hurma and Ca was 1.42 % for Persimmon Seedless. The level of Mg was also found the highest in Persimmon Seedless as 0.58 % respectively.

1. Introduction

Persimmon is a popular fruit, known as paradise fruit, paradise apple, Frenk apple, Japanese apple and date in different parts of Turkey. Consumers because of its colour, flavour and aroma, as well as its vitamin and mineral contents enjoy the fruit. It is used to make jam, marmalade, pastry and ice cream, and is also dried for use (Onur and Önce, 1985; Onur and Onur, 1995).

The persimmon originated in the Far East, and China and Japan are the leading producers, followed by Korea, New Zealand, Australia, Brazil, Italy and Israel (Onur and Onur, 1995). Although persimmon is a subtropical fruit, it can be grown in the warmer areas of temperate zones and the highlands of tropical zones (Onur, 1990).

Persimmon production in Turkey is small relative to that of other persimmon producing countries, but Turkey has suitable climatic and soil conditions for persimmon and production is gradually increasing. Production increased from 1,400 tons in 1973 but it reached to 10,000 tons in 1993. The Mediterranean region of Turkey produces 8,302 tons, or 83 % of Turkey's annual production. It is followed by the Black Sea region with 996 tons and the Marmara region with 393 tons (Anonymous, 1995).

The province of Hatay produces 6,069 tons of persimmons per year, followed by the provinces of Adana with 1,115 tons and Içel with 796 tons. Within Hatay, the Harbiye district produces many persimmons mainly the Harbiye variety. Although Adana and other provinces such as Içel and Antalya in the Mediterranean region have climatic conditions similar to those of Hatay. production remains low, perhaps because of insufficient technical and cultural treatment and inadequate fertilization.

In Japan, Sato et al. (1954) has demonstrated that a balanced nutrition is required proper growth and development of persimmon. They found that the leaves contained 2.22-3.15 % N, 0.11-0.16 % P, 1.47-3.86 % K, 0.92-2.78 % Ca and 0.22-0.77 % Mg on a dry weight basis.

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Using the Fuyu variety in sand culture, Kitagawa (1970), used from 0 to 160 ppm of N, P, and K in mineral solutions in his study coverage three years, and found that N was critical. A Large number of flowers were obtained with 40 ppm N, and high concentrations of K increased both shoot growth and fruit size.

Aoki et al. (1979) reported that N application increased tree canopy size and the number of flowers, but had no effect on yield. Maniyazov (1980) concluded that the best results could be obtained from persimmons when phosphorus and potassium were applied in the autumn, and N in the spring before budding.

Gasanov (1985) found that N increased fruit set and decreased fruit and flower drop. Fruit weight was not significantly affected.

Liu and Wang (1990) found that Ca and Mg contents increased with leaf age, but that N, P and K contents decreased. Uptake, translocation and use of plant nutrients play significant roles in fruit yield and quality. Great changes can occur among and even within varieties in regard to plant nutrient elements.

This study was carried out to compare the levels of plant nutrients in leaves of various persimmon cultivars planted on clay-loamy textured soil and grown under the similar condition in Adana.

2. Materials and Methods

In this study, leaves of four persimmon varieties were collected from trees grafted on persimmon seedlings. The varieties Fuyu, Persimmon Seedless and Tipo Kaki originated from Pakistan, and Yesil Hurma originated from the province of Hatay in Turkey.

Characteristics of the mixed soil, sampled at depths of 0-30 cm, 30-60 and 60-90 cm are shown in the Table 1. The soil was of average texture and slightly alkaline. According to the 50-year climatic data,annual precipitation averages 646.8 mm, with most rain falling between November and April, and the summer season is rather hot (Anonymous, 1974).

Three replicates of mature leaves were picked from the middle non-fruiting branches in the beginning of August and taken immediately to the laboratory (Suzuki et al., 1991). The leaves were first washed in water with 1 % detergent, then rinsed with tap water and finally washed 3 times with distilled water. After washing the leaves were dried at 65-70°C to constant weight, than ground. One gram of the ground sample was oxidized (Kacar, 1972). The levels of Na, K, Ca, Mg, Zn, Mn and Cu were determined in an atomic absorption spectrophotometer (Chapman and Pratt, 1961). The level of P was determined by using a spectrophotometer (Barton, 1948) and the level of N by using " Kjeldahl" method (Lees, 1971).

The data were analysed by Anova and Tukey's test using a complete randomized design (Düzgünes, 1963).

3. Results

The N level differed significantly among the varieties. The highest level of N (2.41%) was obtained from the local variety Yesil Hurma while the lowest level of N (1.50%) was obtained from the variety Persimmon Seedless. Thus one may assume that Yesil persimmon gets the most benefit from N. Yesil Hurma had greener leaves and showed good growth and development compared with other cultivars, possibly due to the proper

usage of N and getting more benefit from it. These results might also be due to the good adaptation capacity of Yesil Hurma, which is a local variety was grown in Hatay and Adana for many years and therefore well adapted to the ecological conditions of Adana.

The leaves of the other cultivars had lower levels of N than the optimal ones reported by Sato et al. (1954). This may be the result of differences in the ability of cultivars to transport and use N. The interaction of ecology x genotype could also affect nutrient levels. P, K and Na levels of the leaves of the cultivars did not differ significantly, but the levels of these elements were generally lower than the optimal levels reported by Sato et al. (1954). These low levels might be explained as evidence of improper application of P and K, which are not applied annually in this region. Thus annual leaf analyses are of great importance. Yesil Hurma had the highest level of Ca (1.58%), followed by Persimmon Seedless (1.42 %). Fuyu had the lowest level (1.03 %). While the leaves of Persimmon Seedless contained the highest level of Mg (0.58%), those of Fuyu had the lowest (0.44%). Ca and Mg levels were within the optimal levels stated by Sato et al. (1954). The optimum Ca levels may reflect the fact that the soils were rich in lime. In addition the high level in Yesil Hurma might be due to its good adaptation to the area.

Levels of Zn, Cu and Mn did not differ significantly among cultivars. The optimal levels of these elements for persimmon have not yet been reported but it is possible that the persimmon's need for Mn is greater than its need for Zn.

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Table 1. Characteristics of the soil in the persimmon orchard at Adana

Texture	pH	Soluble salts (%)	Lime (%)	Available K (kg/hectar)	Available P (kg/hectar)	Organic matter (%)
Clay-loamy	7.71	0.078	45.2	0.46	0.37	1.5

Table 2. Levels of some plant nutrient elements in the leaves of persimmon varieties

Cultivar	N (%)	P (%)	K (%)	Na (%)	Ca (%)	Mg (%)	Zn (ppm)	Mn (ppm)	Cu (ppm)
Fuyu	1.73 b*	0.07	0.87	0.08	1.03b	0.44b	23.6	203.6	54.0
Persimmon Seedless	1.50b	0.08	0.86	0.09	1.42a	0.58a	24.6	245.3	46.6
Tipo Kaki	1.80ab	0.08	0.93	0.09	1.34ab	0.50ab	23.0	245.6	40.0
Yesil Hurma	2.41a	0.08	1.00	0.12	1.58a	0.51ab	26.0	205.3	43.0
D %	0.60	N.S.**	N.S.	N.S.	0.37	0.07	N.S.	N.S.	N.S.

*: Values followed by the same letter are not significantly different by Tukey's multiple range test at the D=0.05 level.
**: N.S.: Not significant