



T.R.  
MINISTRY OF AGRICULTURE AND RURAL AFFAIRS  
OLIVE RESEARCH INSTITUTE



# THE DETERMINATION OF POTASSIUM STATUS OF OLIVE GROVES IN EGE REGION OF TURKEY

Tülin PEKCAN (M.Sc.)

Dr.H.Sevim TURAN

Erol AYDOĞDU

Prof. Dr. Habil ÇOLAKOĞLU

Dr. Seyfi ÖZİŞİK

Prof. Dr. Burçin ÇOKUYSAL



# INTRODUCTION

- ★ Olive, is a cultivated perennial plant, having economical importance in the Mediterranean Countries, the widespread olive growing area, besides Asia, America and North Africa Countries which are significant in table and crude oil.
- ★ Olive trees numbered 153.7 million units covering thousand hectare of 778.2 with an annual production of 1.3 million tons of olive. The olive producing sector provides a means of living for nearly 400 000 peasant families and the ratio of olive fields within the overall cultivated fields is nearly 3 % (Tüik 2009).

# INTRODUCTION

- ★ Although olive trees are resistant unfavorable conditions in comparison to other fruit kinds, the problems like yield and quality losses have appeared because of nutrition deficiency. Potassium element has an important effect in solving of these problems.
- ★ Potassium element effects growth and also increases cold, drought, illness and pests resistances, yield and crop quality in olive trees.



# AIM

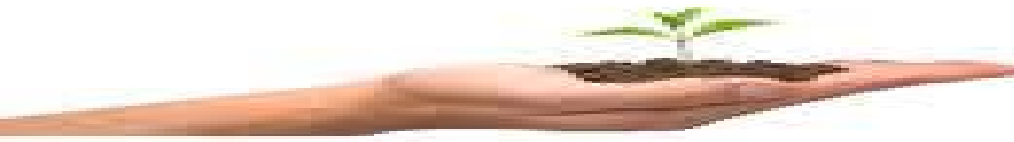
♦ The amounts of potassium in the soils of olive groves and the nutritional status of potassium of olive trees were determined in the Provinces of İzmir, Manisa, Aydın, Muğla, Balıkesir, Çanakkale and Bursa in Ege and Marmara Regions in last 12 years.

# MATERIAL AND METHOD

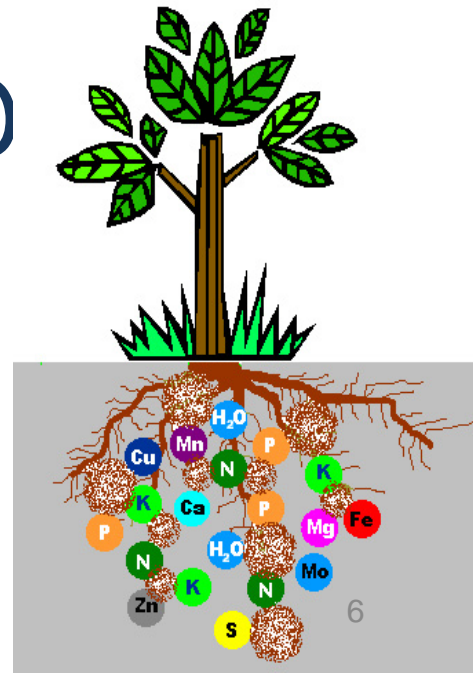
✕ The contents of potassium of 201 numbers soil samples in total and the nutritional status of potassium of the trees were taken from; 79 numbers olive groves in İzmir Province and its surroundings, 43 numbers olive groves in Manisa Province and its surroundings, 10 numbers olive groves in Aydın Province and its surroundings, 11 numbers olive groves in Muğla Province and its surroundings, 43 numbers olive groves in Balıkesir Province and its surroundings, 9 numbers olive groves in Çanakkale Province and its surroundings, 6 numbers olive groves in Bursa Province and its surroundings were determined between the years 1997-2009.



# SOIL ANALYSES



- \* pH (1:2.5 Soil:Water)
- \* Electrical conductivity ( $\text{mS cm}^{-1}$ )
- \* Texture (Hydrometer)
- \* Lime (%) (Scheibler Calcimeter)
- \* Organic matter (%) (Walkley-Black)
- \* K ( $\text{me } 100 \text{ g}^{-1} \text{ soil}$ ) (1 N  $\text{NH}_4\text{OAc}$ )





# LEAF ANALYSES



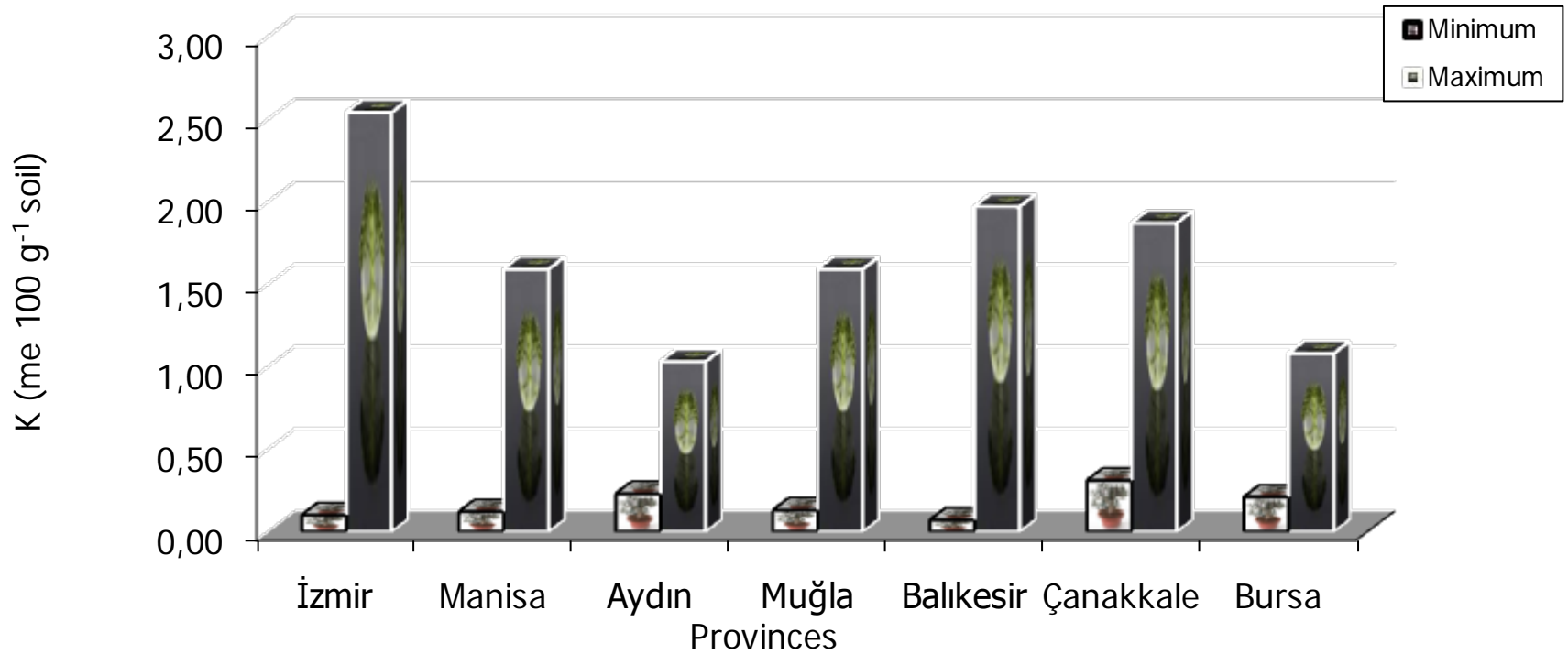
**K (%) (Microwave Digestion)**

Table 1. Results of Some Physical and Chemical Properties of Soils in Ege and Marmara Regions between The Years 1997-2009\*

Soil Analyses	Provinces							
	İzmir	Manisa	Aydın	Muğla	Balıkesir	Çanakkale	Bursa	Min-Max
PH (1:2.5 Soil:Water)	5.37-8.70	6.30-9.01	6.32-8.35	6.08-8.87	5.46-8.42	7.03-7.80	7.36-8.21	5.37-9.01
EC (mS cm <sup>-1</sup> )	0.10-2.00	0.15-1.20	0.10-0.70	0.10-1.04	0.10-2.00	0.40-1.00	0.40-1.50	0.10-2.00
CaCO <sub>3</sub> (%)	0.77-26.96	1.24-37.72	2.50-21.40	1.04-22.08	0.78-27.72	1.66-12.23	2.05-29.76	0.77-37.72
Organic Matter (%)	0.16-3.93	0.34-2.74	0.92-2.06	0.77-3.61	0.55-2.67	1.06-1.72	0.94-2.77	0.16-3.93
Texture	Loamy	Loamy	Loamy	Loamy	Loamy	Loamy	Loamy	
Exchangable Potassium (me 100 g <sup>-1</sup> soil)	0.10-2.54	0.12-1.59	0.33-1.03	0.13-1.59	0.07-1.97	0.31-1.87	0.21-1.08	0.07-2.54

\* Values are mean of replications.



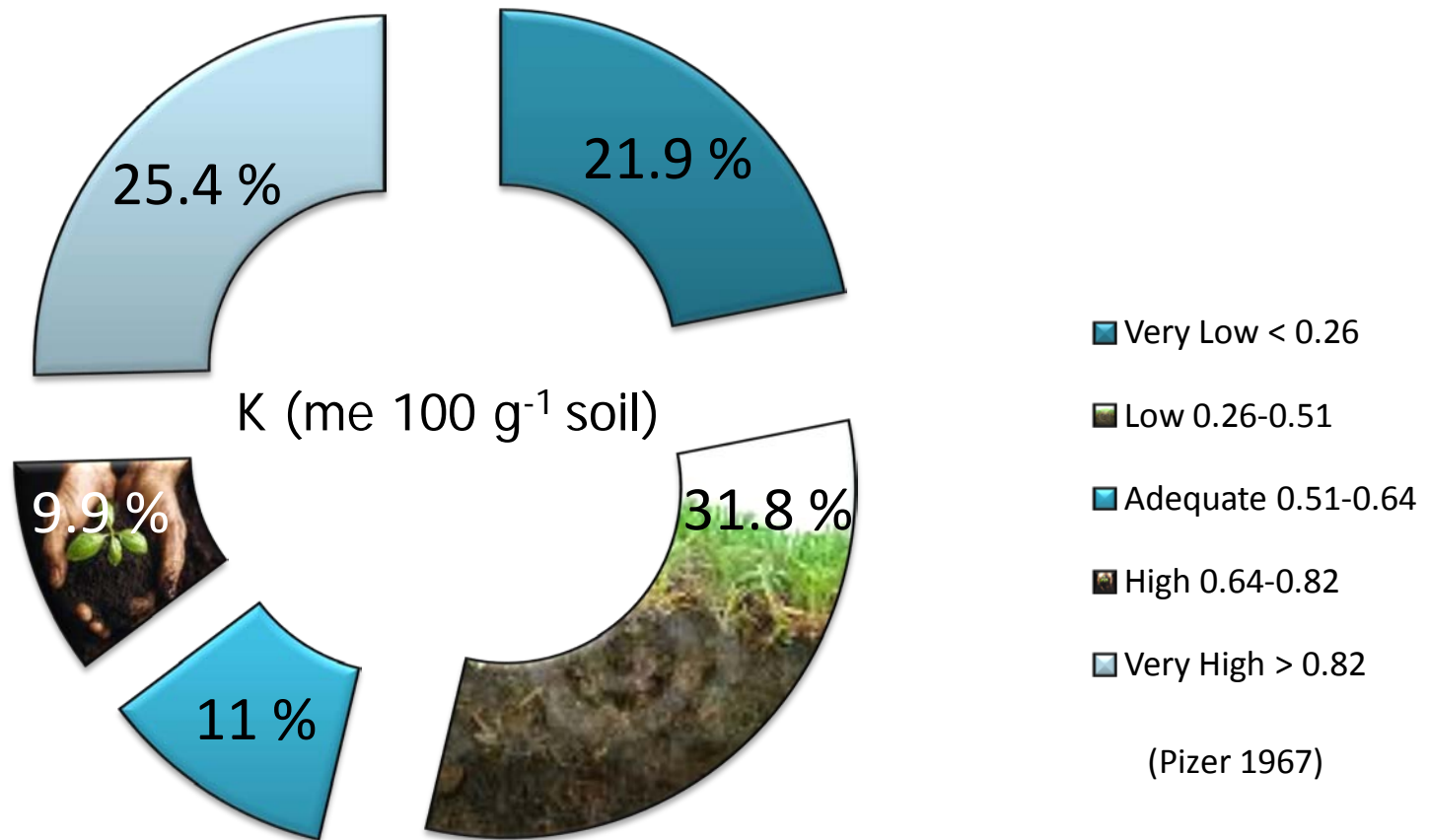


**Figure 1. The Contents of Potassium of Soil Samples in The Provinces of İzmir, Manisa, Aydın, Muğla, Balıkesir, Çanakkale and Bursa in Ege and Marmara Regions between The Years 1997-2009.**

Table 2. The Classification of Olive Groves with The Contents of Potassium of Soil Samples in Ege and Marmara Regions between The Years 1997-2009 according to Pizer 1967.

	K (me 100 g <sup>-1</sup> soil)				
	Very Low (<0.26)	Low (0.26-0.51)	Adequate (0.51-0.64)	High (0.64-0.82)	Very High (>0.82)
<b>Grove Number</b>	44	64	22	20	51
<b>Grove %</b>	21.9 %	31.8 %	11.0 %	9.9 %	25.4 %

64.7 %

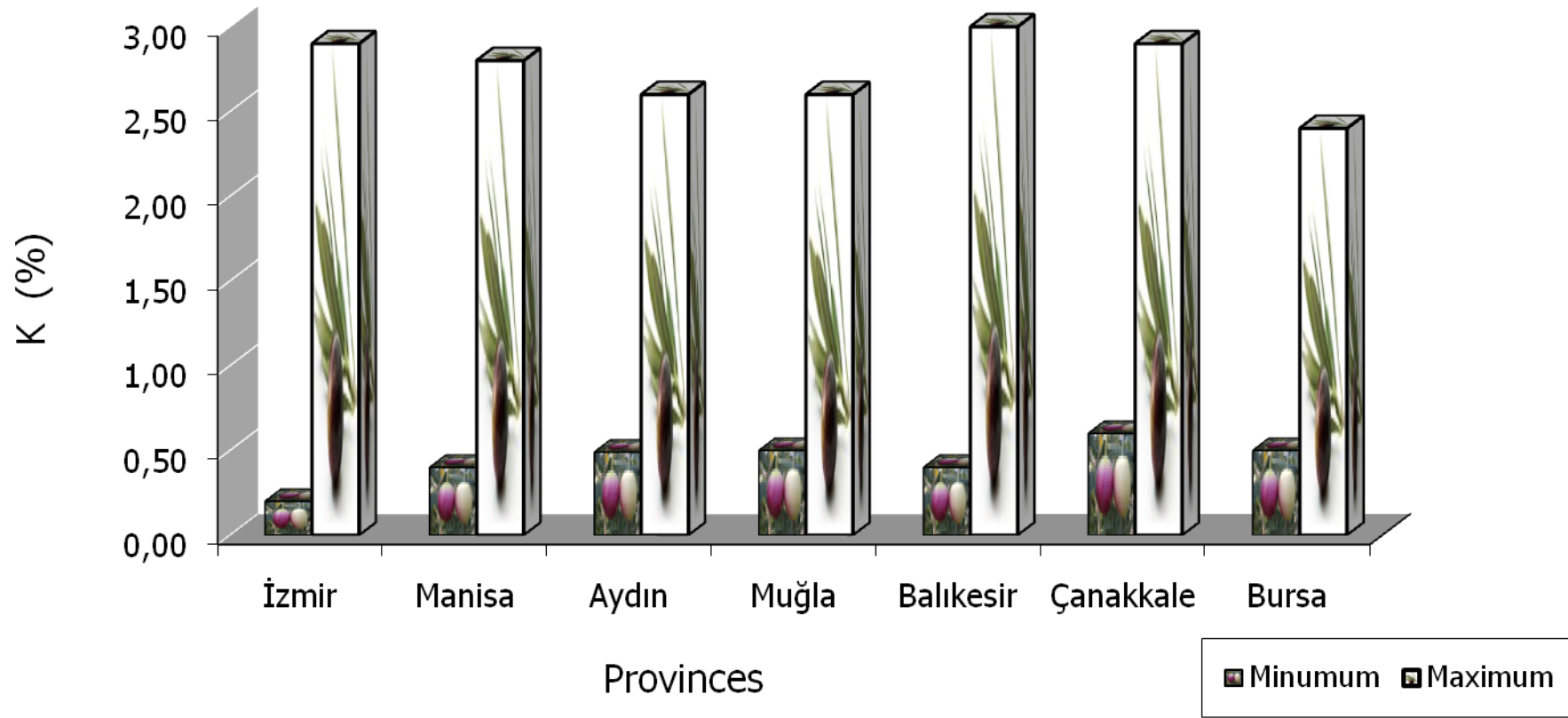


**Figure 2. The Percentage of Olive Groves with The Contents of Potassium of Soil Samples in Ege and Marmara Regions between The Years 1997-2009 according to Pizer 1967**

**Table 3. The Contents of Potassium of Leaf Samples in Ege and Marmara Regions between The Years 1997-2009**



Provinces	K (%)
İzmir	0.20-2.90
Manisa	0.40-2.80
Aydın	0.49-2.60
Muğla	0.50-2.60
Balıkesir	0.40-3.00
Çanakkale	0.60-2.90
Bursa	0.50-2.40
Min-Max	0.20-3.00

\* Values are mean of replications.



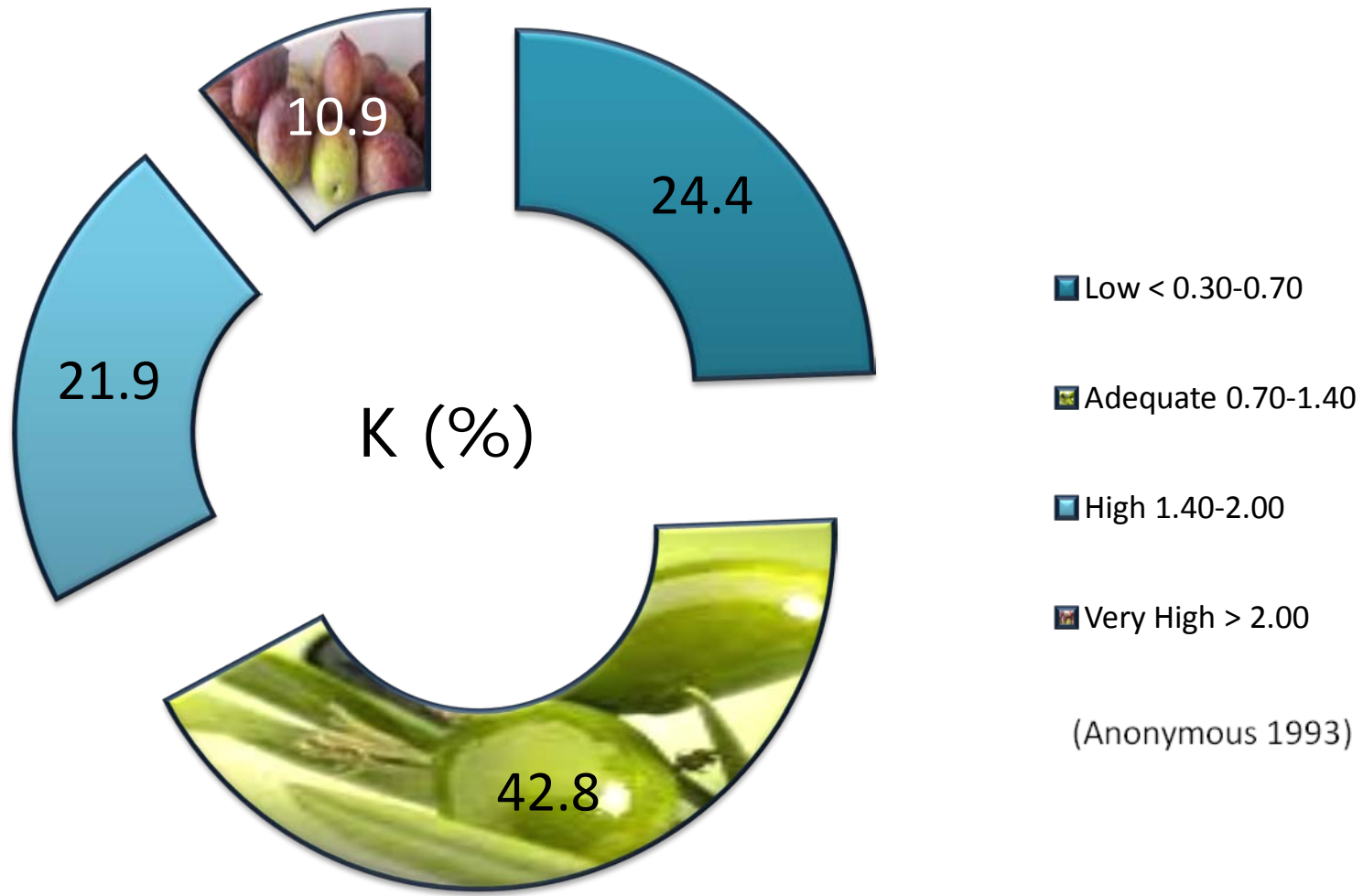
**Figure 3. The Contents of Potassium of Leaf Samples in The Provinces of İzmir, Manisa, Aydın, Muğla, Balıkesir, Çanakkale and Bursa in Ege and Marmara Regions between The Years 1997-2009.**

Table 4. The Classification of Olive Groves with The Contents of Potassium of Leaf Samples in Ege and Marmara Regions between The Years 1997-2009 according to Anonymous 1993

	K (%)				
	Very Low ( $<0.30$ )	Low ( $0.30-0.70$ )	Adequate ( $0.70-1.40$ )	High ( $1.40-2.00$ )	Very High ( $>2.00$ )
<b>Grove Number</b>	-	49	86	44	22
<b>Grove %</b>	-	24.4 %	 42.8 %	21.9 %	 10.9 %

67.2 %





**Figure 4. The Percentage of Olive Groves with The Contents of Potassium of Leaf Samples in Ege and Marmara Regions between The Years 1997-2009 according to Pizer 1967**

Table 5. K Values in Different Depths in The Soil Samples

RESEARCHERS	K (ppm)
Canözer (1978)	
0-30 cm	28-313
30-60 cm	24-306
Eryüce (1979)	48-447
Püskülcü (1981) (Different Depths)	22-378
Genç et al. (1991)	
0-25 cm	62-800
25-50 cm	30-540
Akıllıoğlu et al. (1993)	
0-30 cm	12-500
30-60 cm	15-990
Soyergin (1993)	132-638
Soyergin et al. (1994)	38-588
Tekin et al. (1994)	80-640
Dikmelik (1995)	107-332
Soyergin and Moltay (2000)	38-788
In This Study	27-990

# Table 6. K Values in The Leaf Samples

RESEARCHERS	K (%)
Bouat (1958)	0.22-1.65
Fox et al. (1964)	0.72-1.46
Canözer (1978)	0.13-1.11
Eryüce (1979)	0.30-1.63
Püskülcü (1981)	0.33-0.96
Zabunoğlu et al. (1981)	0.30-1.26
Jordao et al. (1990)	0.25-0.97
Akıllıoğlu et al (1993)	0.29-1.40
Soyergin and Moltay (2000)	0.38-1.09
Rouina et al. (2002)	0.17-0.90
In This Study	0.20-3.00

# RESULTS




53.7 % of olive groves were very low-low and 11.0 % of them were adequate in the amount of potassium according to soil analysis results, so this brings up 64.7 % of olive groves (approximately 2 of 3 olive groves) should be applied with K fertilizer.




The amount of K percentage was low in the leaf in the 24.4 % of olive groves according to leaf analysis results, this refers to the groves should be applied with K fertilizer.



# RESULTS



53.7 % of olive groves were low and very low according to soil analyses and also this ratio was the level of 24.4 % according to leaf analyses. This is relation with the dispersion area of root system of olive trees. The root dispersion area of olive trees is not only under the canopy of the tree but also in the outportion of the tree as it can be seen from the figure. If the amount of K percentage was low in the soil, the olive trees may be benefit from the area because of the roots that are outside of under the canopy of the tree are nourished from the soils in this area and take fertilizer with K. For this reason, deficient nutrition with K in the leaf was low.



To become widespread of flat and drip irrigation systems recently bring up in great need of fertilizer with K as the root structure may form intense under the canopy of the trees and due to the roots will contact with less soil layer.



