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**(Dendrochronology)**

(*Fraxinus excelsior*)

(ICP)

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E-mail: [yahidsaf@hotmail.com](mailto:yahidsaf@hotmail.com)

Cross dating  
Standardization



( )

( )  
( )

( )

(CO<sub>2</sub>)

(CO)

(NO<sub>x</sub>)

(SO<sub>2</sub>)

( )

( )

(Dendrochronology)

( )

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( )

(

(

)

( )

/

)

( )

(

(Cores)

10X

Indices

Auto Correlation

Chronology

Non- destructive test

Increment borer

...

/

(Cores)

(HNO<sub>3</sub>)

(H<sub>2</sub>O<sub>2</sub>)

( )

(Zn)

(Mn)

(Ba)

(Pb)

(Cu)

ICP

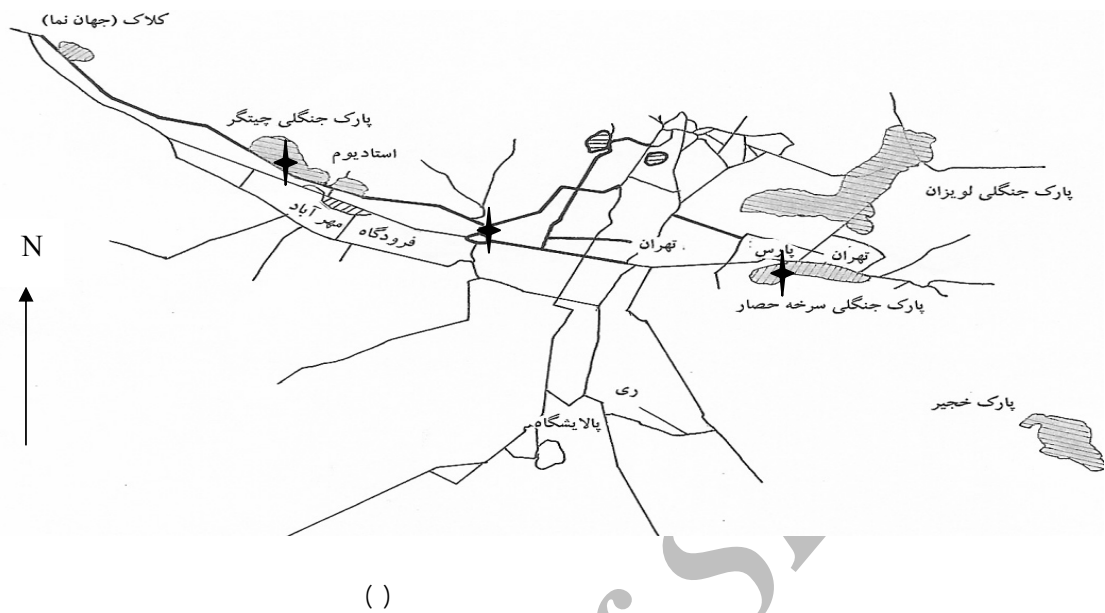
( )

	(M)			pH			
( )				>			
( )				>			
( )				>			

Deionized Water

Inductive coupled plasma spectroscopy

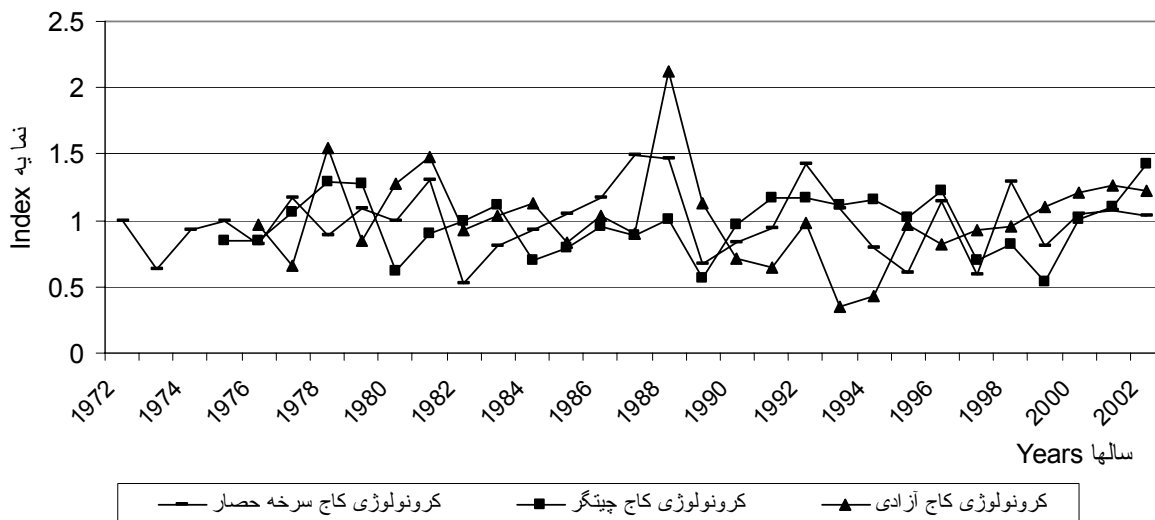
Sequential



$X_i$  = Mean (window)  
 $X_{i-2}, X_{i-1}, X_i, X_{i+1}, X_{i+2}$  = Std (window)  
 (Indices)

$Z_i = \frac{X_i - \text{Mean}(\text{window})}{\text{Std}(\text{window})}$   
 $\pm .5$ , Std (window)  
 SAS  
 ( )  
 (.)

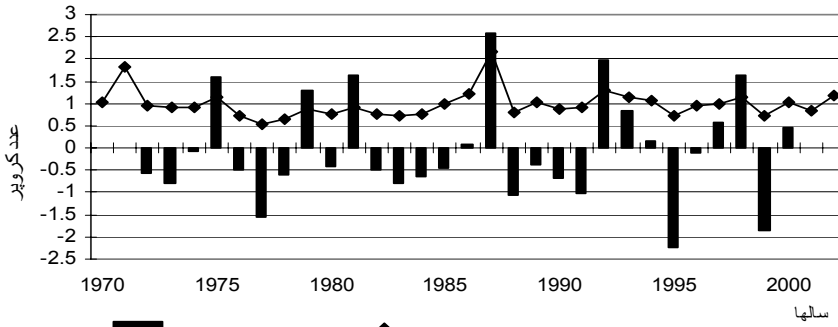
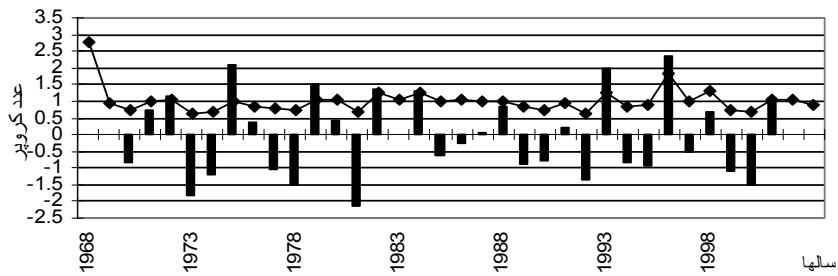
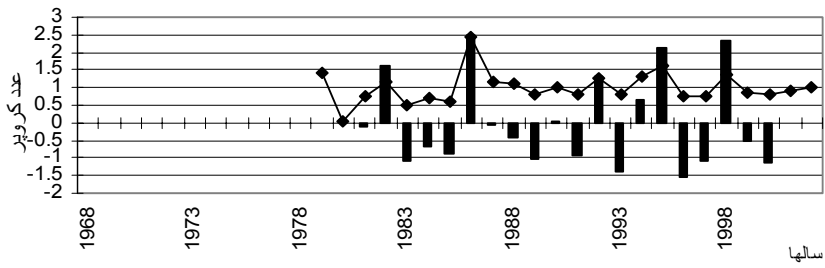
$$Z_i = \frac{X_i - \text{mean}[\text{Window}]}{\text{std}[\text{Window}]} = Z_i$$



MS							
(S.O.V)	(df)	(Index)	(Pb)	(Ba)	(Cu)	(Zn)	(Mn)
(Treat)		/ ns	/ ns	/ ns	/ ns	/ ns	/ ns
(Block)		/ ns	/ ns	/ ns	/ xx	/ ns	/ ns
(Error)		/ ns	/	/	/	/	/
C.V		/	/	/	/	/	/

\*\* ns

(Cropper)







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## A Dendrochronological Evaluation of the Effects of Air Pollution on Radial Growth of Ash Tree (*Fraxinus excelsior*) in Tehran

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### Abstract

Tehran as one of the most polluted cities in the world is a good candidate for an evaluation of pollution (from vehicles) effect on radial growth of ash (*Fraxinus excelsior*) trees. Since ash trees in Azadi square (most polluted site) and Sorkhehesar as well as Chitgar Parks (control or unpolluted sites) were not of the same age, a comparison of ring widths was made only after cross dating and standardization. Concentrations of Pb, Mn, Ba, Cu, and Zn in tree rings determined through ICP (Inductive Couple Plasma Spectroscopy) indicated no significant difference among tree rings (grouped in 5- year intervals) and no significant differences among sites (blocks). There was no significant difference observed among indices in ash trees at the three sites, indicating that pollution did not have any noticeable effect on the radial growth in ash trees.

**Keywords:** Air pollution – Ash (*Fraxinus excelsior*) – Ring width – Cross dating – Radial growth

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