

علوم و تکنولوژی محیط زیست ، شماره ۲۶ ، پاییز ۸۴

*(Dendrochemistry)*

*(Pinus eldarica)*

*(Pinus eldarica)* :

*(Cores)* *(Pinus eldarica)*  
( )  
*(Zn)* *(Cu)* *(Ba)* *(Mn)* *(Pb)*





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(*Pinus eldarica*)

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) (SO<sub>2</sub>) (CO)  
(NO<sub>x</sub>)

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$$R_t = A_t + C_t + \delta D1_t + \delta D2_t + e_t \quad ( )$$

(Pb, Ba, Cu, Zn, Mn)

$A_t, t$   $R_t$   
 $C_t$   
 $D1_t$   
 $D2_t$

1- Graybill  
 2- Cook

1- *Platanus orientalis*  
 2-Biotic  
 3-Abiotic  
 4- *Fraxinus excelsior*  
 5- *Pinus eldarica*



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D2 D1

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D2 C

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( )

D1 A

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(R<sup>2</sup>)

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$Y_t = ae^{-bt} + K$  ( )

k b, a

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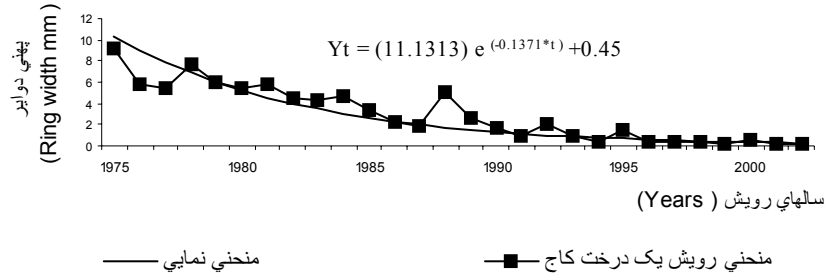
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- 1-Growth trends
  - 2- Exponential
  - 3-Fit
  - 4-Coeffecient of determination

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- 1- Dendrochronology
  - 2-Standardezation
  - 3-Indices
  - 4-Auto Correlation



$$\begin{aligned}
 &= \text{Mean}(\text{window}) && ( ) \\
 X_{i-2}, X_{i-1}, X_i, X_{i+1}, X_{i+2} &&& (Y_t) &&& (W_t) \\
 &= \text{Std}(\text{window}) && (I_t) \\
 X_{i-2}, X_{i-1}, X_i, X_{i+1}, X_{i+2} &&& ( ) \\
 \pm \text{Std}(\text{window}) &&& I_t = \frac{W_t}{Y_t} && ( ) \\
 Z_i &&& &&
 \end{aligned}$$

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

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|---|---|
| <p>( )</p> <hr/> <p>1-Positive point year<br/>2-Negative point year<br/>3- Non-destructive test<br/>4-Increment borer</p> | <p>( )</p> <p style="text-align: right;"><math>i = Z_i</math></p> <p style="text-align: right;"><math>i = X_i</math></p> <hr/> <p>1-Index<br/>2-Cropper</p> |
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(Cores)

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(Cores)

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(HNO3)

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

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(Ba) (Pb) (Cu) (Zn)

10X

ICP

(Mu)

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1-Cross dating

2- Dating

(

(Dendrochronology)

(Stuttgart)

(Achim Breuning)

1-Deionized water

2-Inductively coupled plasma spectroscopy

3-Sequential



*(Pinus eldarica)*

	(M)			pH			
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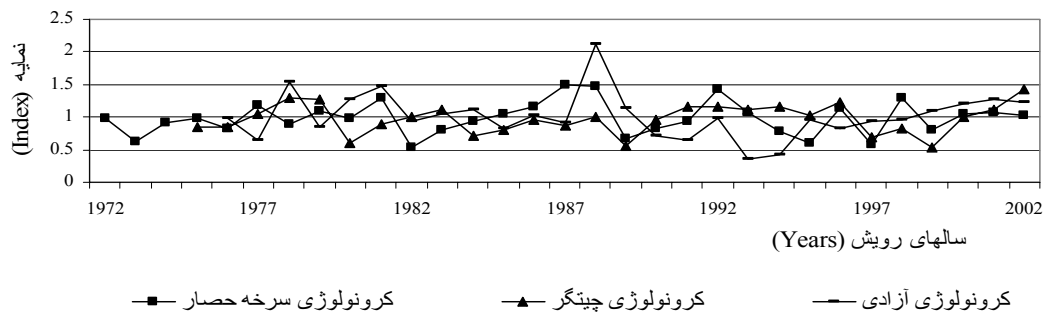
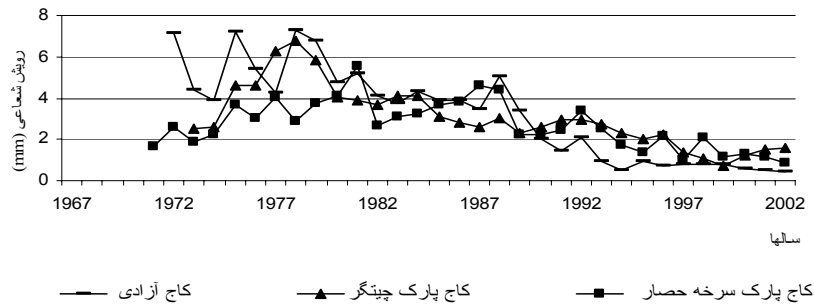
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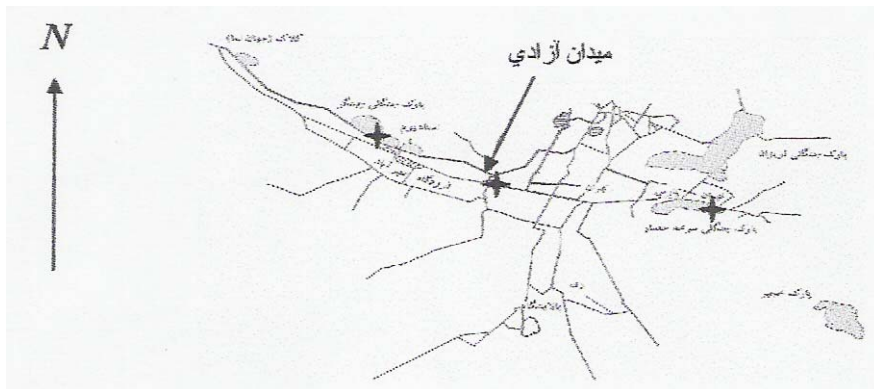
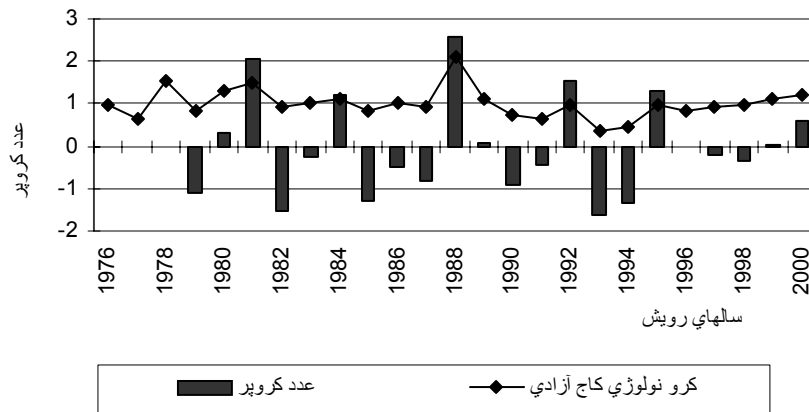
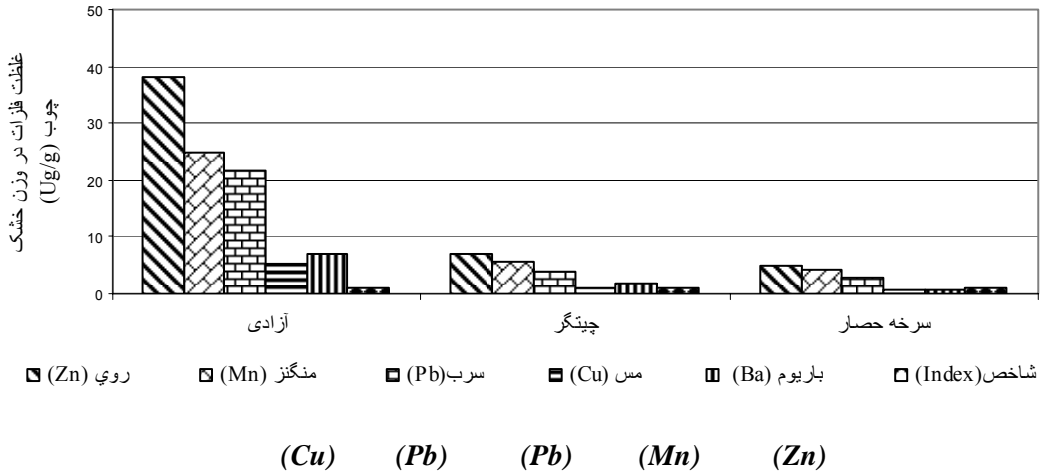
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*MSTATC*

*1-False ring*

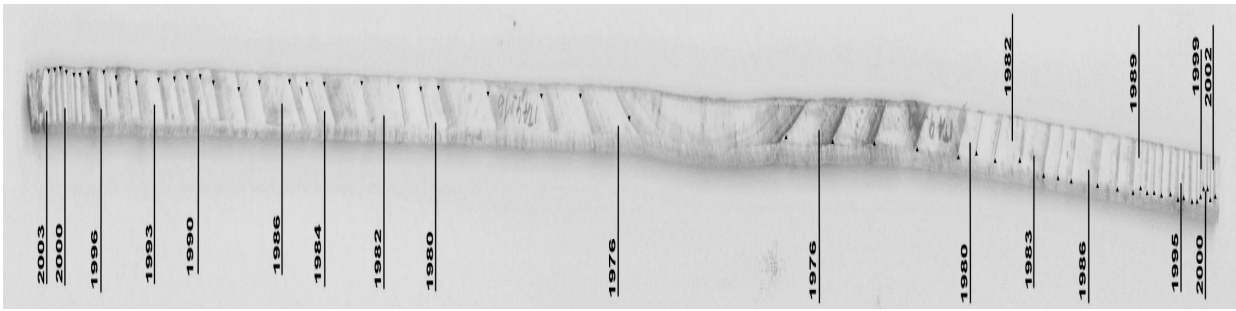






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(*Pinus eldarica*)

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(B)		/	/	< ns
(A*B)		/	/	< ns
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		/		

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				<b>F</b>
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)		/	/	/ **
(		/	/	
		/		



<u>MS</u>											
(Block)	‡	*	/	/	**	/	**	/	**	/	**
(Treat)	ε	/	ns	/	**	/	ns	/	ns	/	ns
(Error)	^	/	/	/	/	/	/	/	/	/	/
C.V( )		/	/	/	/	/	/	/	/	/	/

ns % \* % \*\*

	(Pb)	(Ba)	(Cu)	(Zn)	(Mn)
(Index)	/	/	/	/ **	/

% \*\*

( )	( )
	/ (A)
	/ (B)
	/ (B)
	/ (B)
	/ (B)

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*(Pinus eldarica)*

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*(Fraxinus*

*excelsior)*

*(pb)*

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*Agum Breuning*

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*Margaret Devall*

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(*Dendrochronology*)

(*Fraxinus excelsior*)

(*Juniperus polycarpos*)

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