

Archive of SID

*
(11 : 11 :)

Pinus)

(*Cupressus arizonica*)

(*eldarica*)

1 1

1

1 1
(1)

(R²)

(1)

(1)

(Ebuy et al., 2011)

(Navar., 2009)

Randomized branch)

Importance) (sampling

(Sub sampling) (sampling

(Bilgili and Kucuk, 2009)

(Two Phase Sampling)

Zobeiri,)

(2002 Thomas et)

(al., 2010

Grote (2002) .

(*Fagus sylvatica*) (*Picea abies*)

Peper and Pherson (1998) . (Thomas et al., 2010) (

(1979) .

Harrington

(Snowdon et al., 2002)

Adl (2007)

(Good et al., 2001)

()

(Complete Harvest Method)

(Partial Harvest Method)

(*Pinus eldarica*)

(*Cupressus arizonica*)

()
Snowdan *et al.*

(*al.*, 2002)

()

)

(Anonymous 1992)

(

(*Morus alba*)

(*Robinia pseudacacia*)

(Snowdon *et al.*, 2002)

(*Pinus eldarica*)

(*Cupressus arizonica*)

(/)

Snowdan *et al.*,)

(Bias)

:(2002

(Bias_r)

(Jayaraman, 1999)

$$WDc = \frac{WFc \times WDs}{WFs}$$

(

$$Bias = \frac{\sum_{i=1}^n \theta_i - \hat{\theta}_i}{n}$$

WFc
WFs

WDs
WDc

$$Bias_r = \frac{Bias}{\bar{\theta}} \times 100$$

Bias_r

Bias

$\bar{\theta}$

$\hat{\theta}_i$

θ_i

θ_i

$$\hat{Y}_i = ax_i^b$$

x_i

\hat{Y}_i

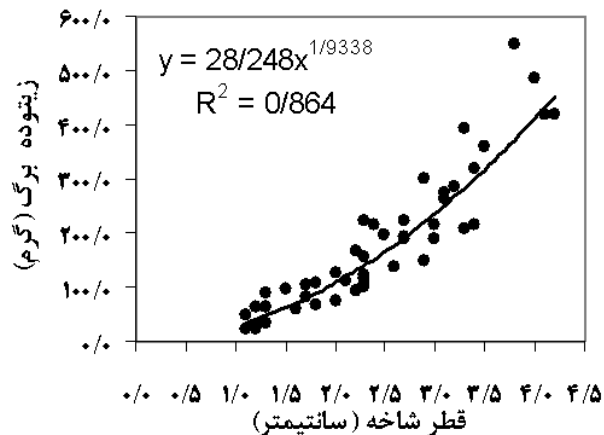
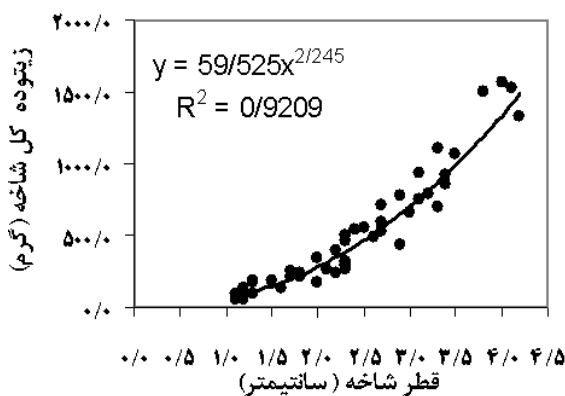
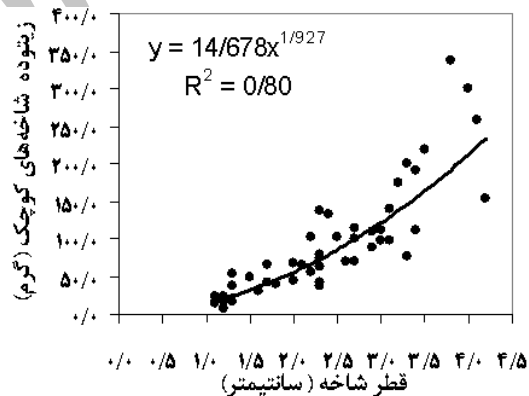
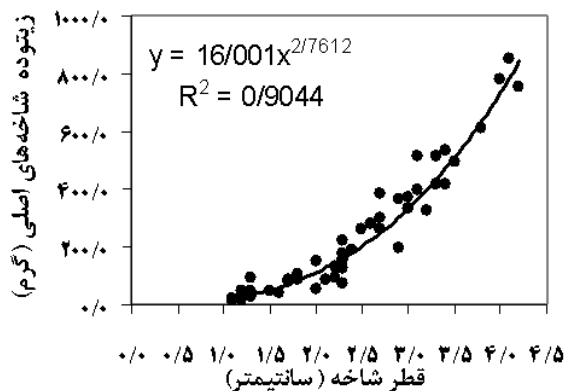
i

Snowdan)

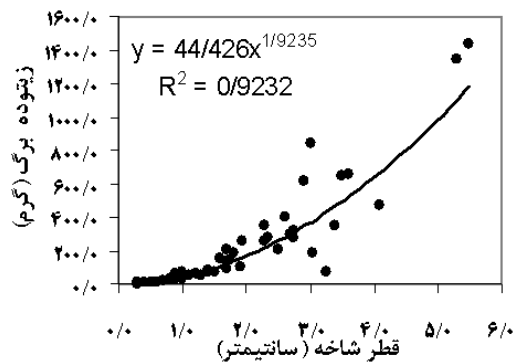
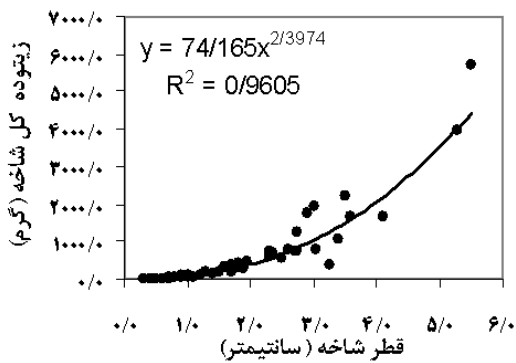
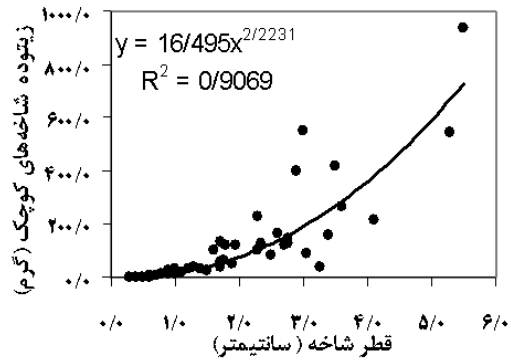
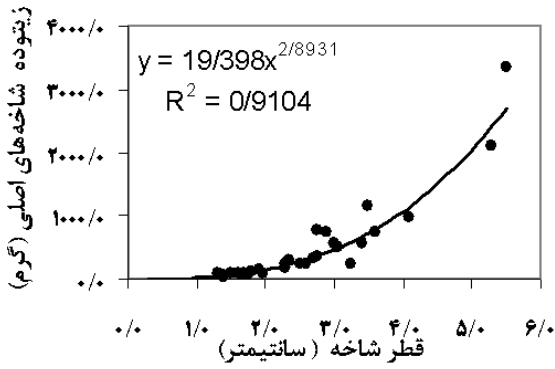
$b a$ (

(*et al.*, 2002; Acka and Laar, 2007; West, 2009

	F	R	
$Y = \dots / x \dots$	(***)	/	
$Y = \dots / x \dots$	(***)	/	
$Y = \dots / x \dots$	(***)	/	
$Y = \dots / x \dots$	(***)	/	
	F	R	X Y
	/	/	ns * ** ***



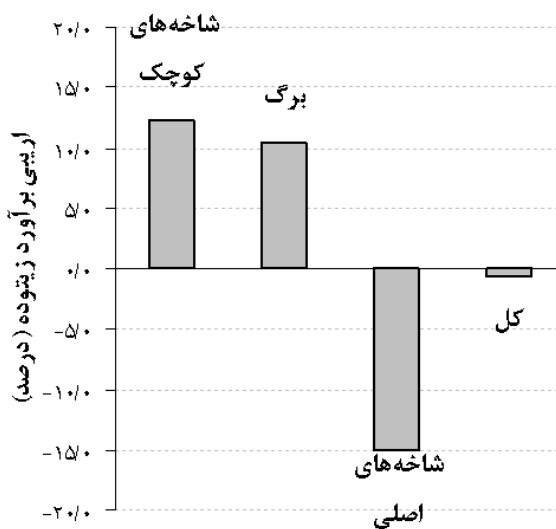
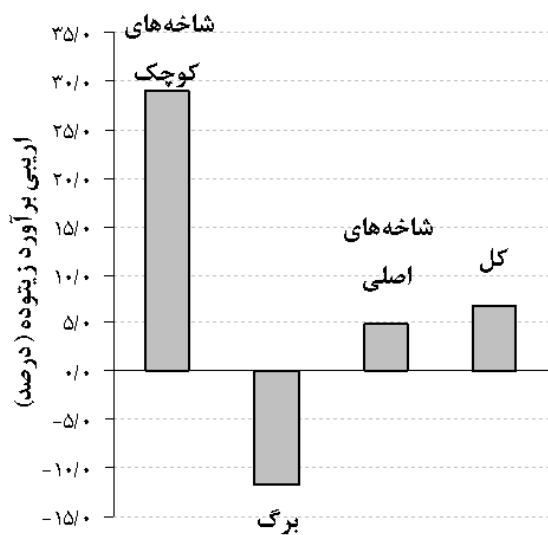
		F	R		
$Y =$	x	(***)	/		
$Y =$	x	(***)	/		
$Y =$	x	(***)	/		
$Y =$	x	(***)	/		
***		F	R	X	Y
			/	/	ns * **



(/)

(/)

(/)



Verwijst and Telenius,)

(1999).

Verwijst (1999)

Telenius and

... (sub sampling)

(*Spruce*)
(R²) / /
(R²) (α= /)
/ /
(R²)
() ()
Czapowskyi et al (1985)
(Black Spruce)
(R²)
(%) ()
/ / (R²) "
() (Stratification)
Harrington (1979)
(R²)
(Dry matter) " (α= / / /)
Grote (2002)
()

Peper and pherson (1998)

()

1- Harris equations for predicting biomass 2-)
Sampling method 3- Sub sampling method for foliar
and woody biomass 4- Surrogated method for
(estimating foliar biomass

(architecture)

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Sub Sampling for Estimating Biomass of tree Crown and its Components

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Abstract

Considering the global warming and climate change topics, biomass estimation of trees has great importance in theory and application. Measurement of biomass is a costly and time consuming operation. And to reduce these difficulties, a large numbers of sampling methods were innovated. One of these methods is the "subsampling". In this research, accuracy of this sampling method for estimating biomass of total and different tree components of two planted coniferous species; Eldar pine (*Pinus eldarica*) and Arizona cypress (*Cupressus arizonica*) were examined in Mobarake Steel factory. Five sample trees from each species were felled down and each component of trees were separated and weighted. Therefore, actual biomass of different tree components was obtained. To test subsampling method, tree crown was divided to three parts, upper, lower and medial part and from each part, a number of branches were selected randomly and base diameter of every branch was recorded. Using nonlinear regression analysis, models of estimating biomass were obtained. The results showed that, all models were significant at 99.9% confidence level. The minimum and maximum coefficients of determination (r^2) of these models were 0.8 and 0.92 for pine and 0.91 and 0.96 for arizona cypress respectively. The least and the most relative bias for pine belongs to estimation of total biomass (0.7%) and main branches (15.1%) and for arizona cypress belongs to estimation of main branches (4.9%) and small branches (29.4%). Based on the results, subsampling method is an appropriate method for estimating trees crown biomass.

Keywords: Subsampling, Crown biomass, Eldar Pine, Arizona Cypress, Regression analysis, Mobarake Steel Complex