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( $a_3 =$  kgN/ha  $a_2 =$  kgN/ha  $a_1 =$  kgN/ha)

( $b_3 =$  kgp2o5/ha  $b_2 =$  kg p2o5/ha  $b_1 =$  kg p2o5/ha)

( $c_3 =$  / kgk2o/ha  $c_2 =$  / kgk2o/ha  $c_1 =$  / kgk2o/ha)

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(3<sup>3</sup>)

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a<sub>1</sub> = )

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a<sub>3</sub>= a<sub>2</sub>=

b<sub>2</sub>= b<sub>1</sub> = )

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b<sub>3</sub>=

c<sub>2</sub>= / c<sub>1</sub> = / )

(

c<sub>3</sub>= /

- N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O

- N Kg/ha  
- P<sub>2</sub>O<sub>5</sub> Kg/ha  
- K<sub>2</sub>O Kg/ha

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cm

cm

cm

cm

cm

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<b>K<sub>2</sub>O (mg/100g)</b>	<b>P<sub>2</sub>O<sub>5</sub> (p.p.m)</b>	<b>K<sub>2</sub>O (mg/100g)</b>	<b>P<sub>2</sub>O<sub>5</sub> (p.p.m)</b>	<b>K<sub>2</sub>O (mg/100g)</b>	<b>P<sub>2</sub>O<sub>5</sub> (p.p.m)</b>	
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pH=  
p.p.m

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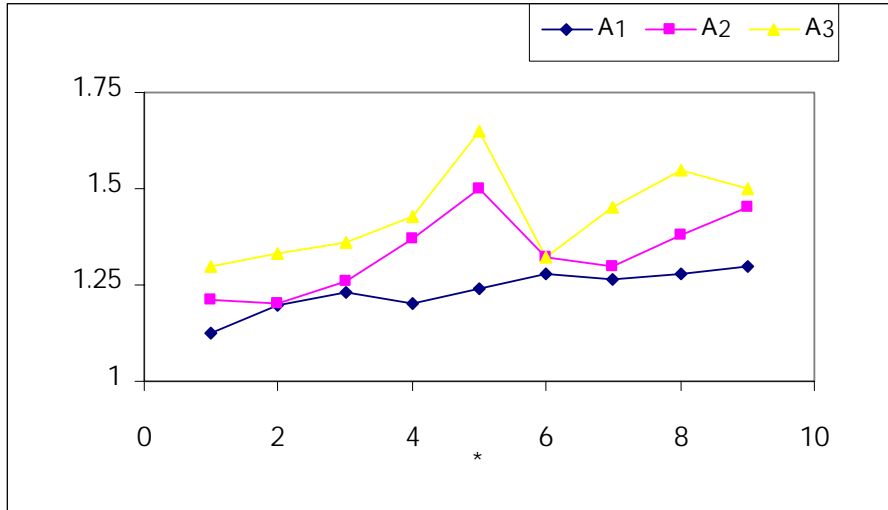
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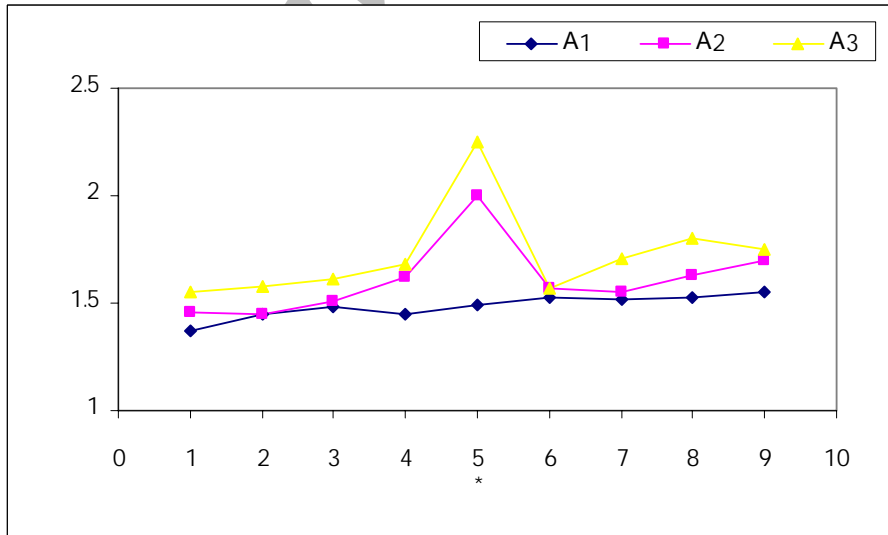




A3 :

A2 :

A1 :



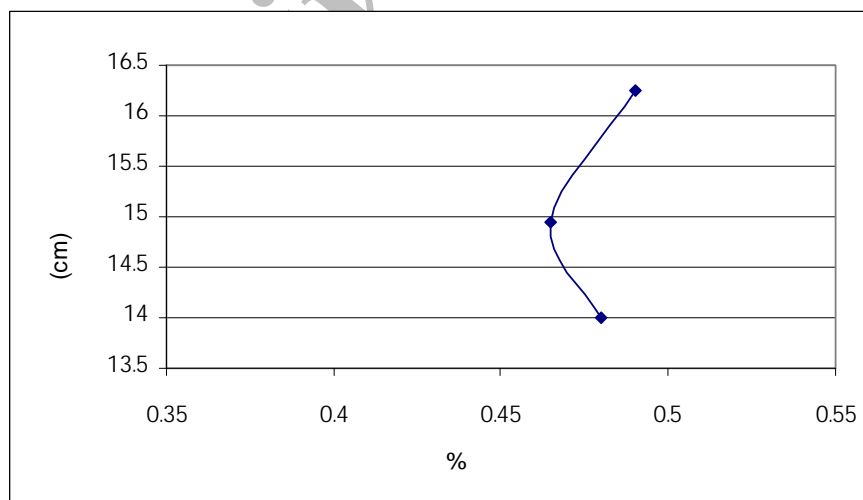
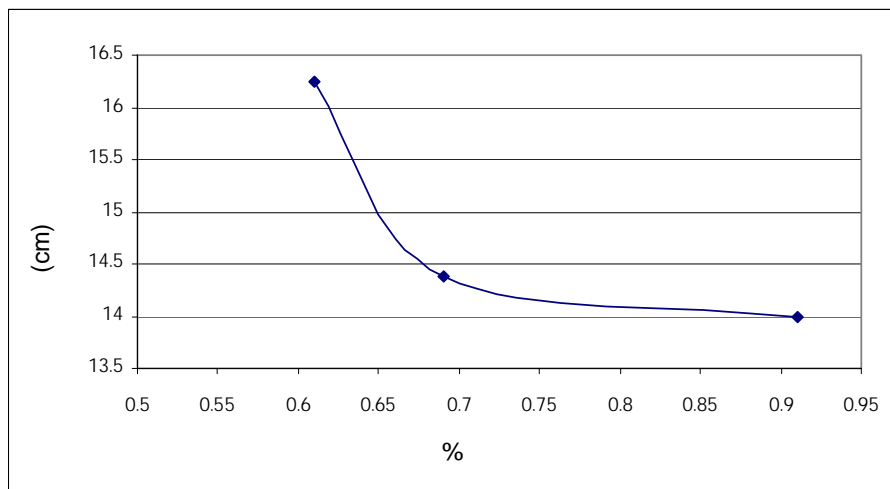
A3 :

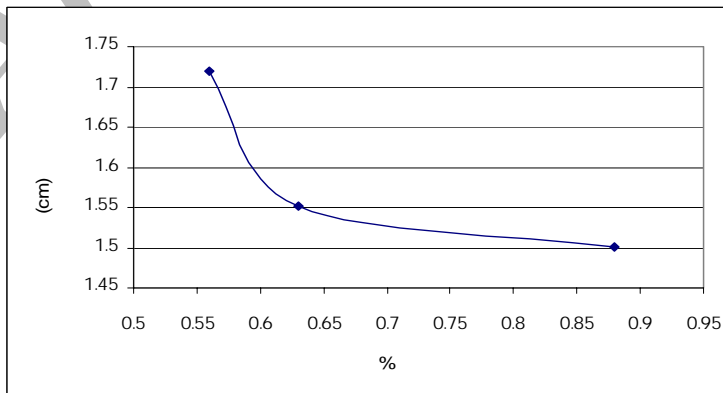
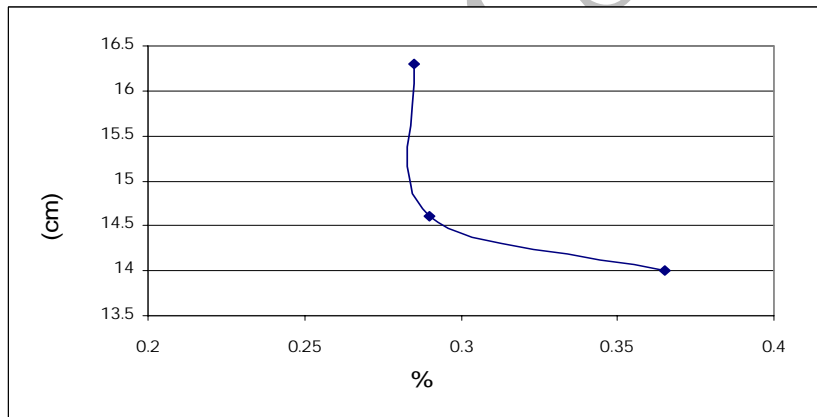
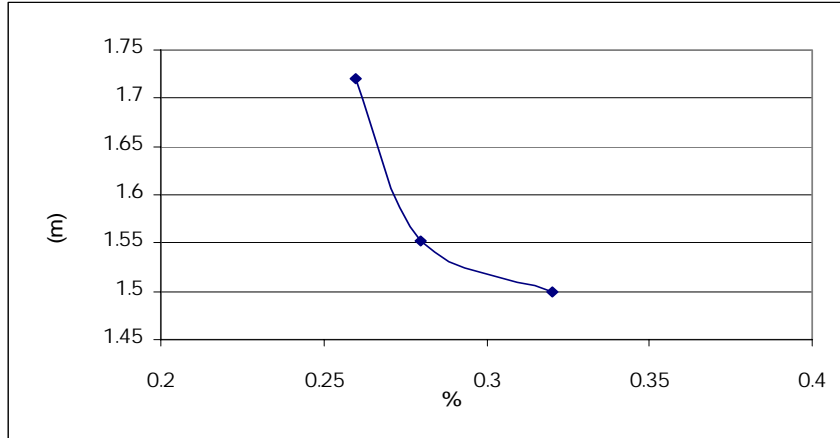
A2 :

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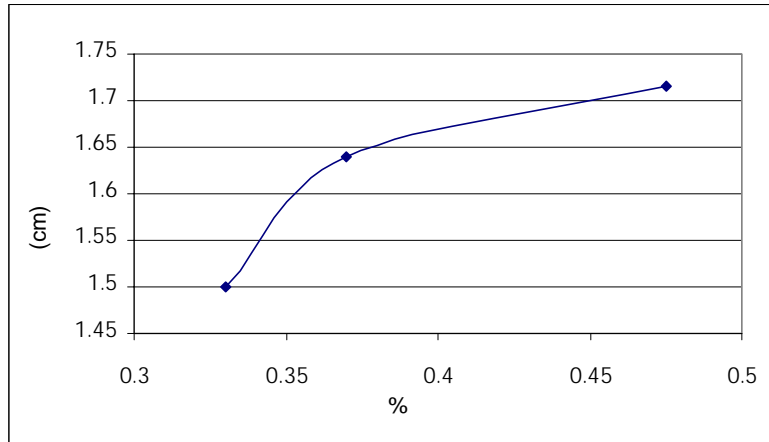
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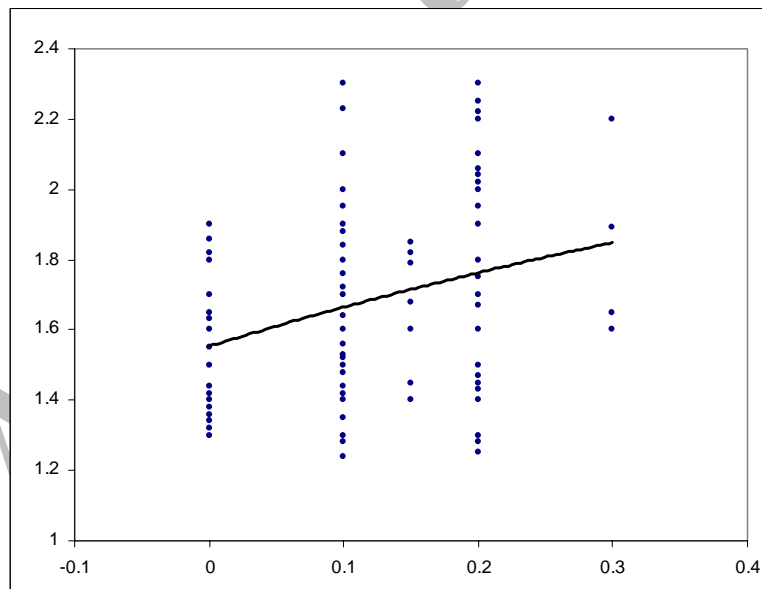


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$$Y = \frac{1}{2} X^2 - \frac{1}{2} X + \frac{1}{2}$$
$$R^2 = \frac{1}{2}$$

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- Pitchett
  - Comerford
  - Allen
  - Walles

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- Gussone

- 7- J. Jokela, E. & S. Stearns-smith, 1993. Fertilization of established southern pine stands: Effects of single and split nitrogen treatment, Southern Journal of Applied Forestry, 17(3): 135-138.
- 8- J. Jokela, E.D. & J. E. Allen, 1999. Early growth response of slash and loblolly pine following fertilization and herbaceous weed control treatment at establishment, Southern Journal of Applied Forestry, 24(1): 23-30.
- 9- Lorowell, D. 1996. Soil science: Methods and applications, Longman pub. 350p.
- 10- Nyle, C. B. & W. R. Ray, 1996. The nature and properties of soils, univ. of Maryland at coll. park pub. 740p.
- 11- Stearns- Smith, S., E. J. Jokily & N. B. Comer ford, 1989. Fertilizer rate response relationship in semi mature southern pine stands of the lower coastal plain, Coop. Res. Info. Foretops. Forestry, 98p.
- 12- er, J., 1980. Review of forestry fertilization on programs in Australia, Univ. of Cambera, Australia.



## The effect of "N" "P" "K" Fertilizers on Hand Planting *Pinus pinea* in Coastal Areas of Caspian Sea

S.M. Razavi<sup>1</sup>P. Azizi<sup>2</sup>R. Rashidi<sup>3</sup>F. Keivan Behjou<sup>4</sup>

### Abstract

In the coastal area of Jafroud, a region in the North East of Khomamcity, *Pinus pinea* trees are grown. Early experiments (spraying field studies) indicated that *Pinus pinea* was faced with a high lacking of "N", "P", and "K" elements in this region. A factorial fertilizer study in the form of randomized complete design with four replications was carried out in the region. Factor 1 consisted of 3 levels of nitrogen fertilizer ( $a_1=112$ ,  $a_2=224$ , and  $a_3=336$  kgN/ha), factor 2 of 3 levels of super phosphate fertilizer ( $b_1=56$ ,  $b_2=112$ , and  $b_3=168$  kgP<sub>2</sub>O<sub>5</sub>/ha) and factor 3 was consistent of 3 levels of potassium chloride fertilizer ( $c_1=22.8$ ,  $c_2=45.6$ , and  $c_3=68.2$  kgK<sub>2</sub>O/ha). Fertilizing had been carried out in two times, one in August 1999 and the other in March 2000. The purpose was to identify the effect of fertilizers on height, diameter, and tree needles as well as on the concentration of "N", "P" and "K" elements in the trees. The results indicated that the effect of the mixture of "N.P.K" fertilizers on the tree height and growth of tree needles was significant. The highest needle growth and tree height was observed in the  $a_3b_2c_2$  treatment. There was a high and significant correlation observed between tree needle growth and height. The results also indicated that the main growth limiting element was N.

**Keywords:** Sandy soil, *Pinus pinea*, Growth limiting, Macro element, Critical nutrient level.

1- Ph.D. Scholar of Forestry, Azad University

2- Assistant Professor, Faculty of Agriculture, University of Gilan

3- Assistant Professor, Faculty of Natural Resources, University of Gilan

4- Ph.D. Student, Faculty of Natural Resources, University of Tehran. E-mail: f-keyvan@nrf.ut.ac.ir