

## Growth and Tissue Nutrient Responses of *Fraxinus rhynchophylla*, *Fraxinus mandshurica*, *Pinus koraiensis*, and *Abies holophylla* Seedlings Fertilized with Nitrogen, Phosphorus, and Potassium<sup>1</sup>

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### ABSTRACT

Fertilization is the tool to increase the crop productivity and high quality seedling for forest plantation. We quantitatively measured both physical performances and nutrient responses of *Fraxinus rhynchophylla*, *Fraxinus mandshurica*, *Pinus koraiensis*, and *Abies holophylla* seedlings, which are commercially planted species in Korea, to nitrogen, phosphorus, and potassium fertilization. We compared growth performances by using Dickson's quality index (QI) and nutrient status with vector diagnosis. Nitrogen or phosphorus treatment increased height and root collar diameter growth in *F. rhynchophylla* and *F. mandshurica*, but didn't influence on *P. koraiensis* and *A. holophylla*. The order of QI was  $N > P > K > \text{control}$  for *F. rhynchophylla*,  $P \geq N > \text{Control} \geq K$  for *F. mandshurica*,  $P > \text{Control} \geq K > N$  for *P. koraiensis* and *A. holophylla*. In *F. rhynchophylla*, all fertilization diluted N concentration because growth responses were higher than fertilization uptake. *P. koraiensis* and *A. holophylla* showed N excess showing toxic accumulation. *F. rhynchophylla* and *F. mandshurica* responded P deficiency by P fertilization, but *P. koraiensis* and *A. holophylla* showed luxury accumulation. Vector diagnosis indicated that more fertilization was applicable for *F. rhynchophylla* and *F. mandshurica* and high application rates were inefficient for *P. koraiensis* and *A. holophylla*. QI and vector diagnosis seem to be the most appropriate to verify growth responses as well as nutrient status to fertilization.

Keywords : Dickson's quality index, Fertilization, Nursery culture, Vector diagnosis

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<sup>1</sup> Received on December 17, 2009

Accepted on January 15, 2010

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