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Nursery location and potassium enrichment in Aleppo pine stock 1. Effect on nursery culture, growth, allometry and seedling quality

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Summary

There is a need for a better understanding of the primary role of macronutrients in Aleppo pine stock quality and for producing larger nutrient-loaded stock, which may be challenging for inland nurseries. The influence of nursery location and fertilization on nursery culture, growth, allometry and seedling quality of Aleppo pine was studied in seedlings cultivated over the 2006 growing year. Fertilization treatments considered how a K enrichment performed over common programs currently being practiced and divided into three levels of K/N ratio: 0.63–0.89 (normal), 1.81–1.89 (high), and 2.25–2.53 (very high). Results showed that fertilization had a minor effect on seedling growth and allometry in comparison with location, which was the governing factor. However, fertilizing treatments significantly affected final seedling attributes, which has its origin on the early treatment differences that were kept up to the end of culture. Higher nutrient supply treatments produced the highest nutrient concentration in seedlings but they were associated with lower fertilization efficiencies. Fertilizer efficiency was approximately twofold in the coastal nursery for the three macronutrients, although concentration was higher in the inland nursery due to lower seedling growth. It is concluded that warmer regions are more suitable for producing large stock more efficiently.

Introduction

Seedling quality has a strong influence on field performance and is a prerequisite for reforestation success (Burdett, 1990). Stock quality is determined by specific attributes which are the consequence of the culture growing conditions, giving the nursery a key role in the production of a stress resistant stock, enhancing a better growth and survival response. Aleppo pine (*Pinus halepensis* Mill.) is among the most important species used in forest restoration in the Mediterranean basin because of its resistance to water stress in harsh, xeric and degraded environments. However, its survival is not always optimal and, under cer-

tain site conditions, resistant stock is required (del Campo *et al.*, 2007b). For example, in warm sites with shallow soils, stock quality may make an important difference in field performance, whereas in cooler sites with deep soils, this difference disappears. This is practical evidence of the definition of seedling quality as ‘fitness for purpose’ given 30 years ago by Lavender *et al.* (1980). Stock quality specifications are needed for particularly harsh environments and nurseries must be encouraged to grow these seedlings.

Official standards for Aleppo pine (Council Directive 1999/105/EC and Spanish Royal Decree 289/2003) recommend a minimum root collar diameter of 2 mm and seedling height to be between 8 and 25 cm, although