Interactive effects of nitrogen supply and container size on root architecture, growth and nutrient storage in two contrasting tree species of Quercus variabilis and Pinus tabulaeformis. Zhongqian Cheng, Beijing Forestry University, China.

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Nitrogen (N) supply and container size are viewed as two kinds of methods for producing seedlings at nursery to adapt to outplanting sites especially harsh conditions. Their interactive effects on growth, root structure and nutrient status remain unknown. Quercus variabilis seedlings planted in containers with depths of 25 and 36 cm were received a total of 25 and 100 mg N respectively. Pinus tabulaeformis seedlings reared in containers with depths 14 and 21 cm were fertilized by accumulated nitrogen of 20 and 80mg 15N, respectively. (1) Interaction significantly influenced Q. variabilis in terms of root N concentration, root volume and surface area with root diameter between 2 and 3 mm. As to P. tabulaeformis, significant interaction occurred in root volume, surface and length with root diameter more than 2 mm, as well as root N content, P and K concentration in needle, and K concentration in needle and root. (2) For Q. variabilis, combination treatment of 25mg N and 36 cm yielded maximum root volume and surface area with root diameter between 2 and 3 mm. Except for the root diameter between 2 and 3 mm. 25 cm container consistently promoted root volume and surface area. And the container benefited dry mass, P concentration and content in roots, and shoot P concentration. In contrast, 36 cm container enhanced shoot growth and N storage. 25 mg N supply had higher shoot dry mass, and P concentration and content in root. 100 mg N supply improved root total length, root length and surface with root diameter less than 0.5 mm, and root volume and surface area with root diameter more than 4 mm, root-collar diameter, shoot N and P status, and root K status. (3) For P. tabulaeformis, maximum root volume, surface area, and length in any root diameter consistently occurred in the 14 cm container. The similar trend was shared by 20 mg 15N supply. Root N content, P content, and K status in needles peaked in the combination treatment of 80 mg 15N and 21 cm. 80 mg 15N supply increased shoot growth, N status in any tissue, and stem K content. (4) Increased container depth could improve N utilization efficiency in P. tabulaeformis. (5) Overall, high N supply facilitated shoot growth and N storage, while both low N supply and deep containers benefited root architecture in P. tabulaeformis. Conversely, either high N availability or shallow containers facilitated root architecture in Q. variabilis. Deep containers increased shoot growth and shallow ones enhanced root dry mass as well as P status of shoot and roots. These finding could be used to produce specific seedlings to meet particular site requirements.