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Effects of aspect and slope position on growth and nutritional status of planted Aleppo pine (*Pinus halepensis* Mill.) in a degraded land semi-arid areas of Jordan

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Abstract Plantation of open grazing lands with *Pinus halepensis* are the most widely used practices in afforestation and reforestation in Jordan and other semi-arid areas around the Mediterranean Basin. The effect of aspect North (N), South (S), East (E) and West (W) and slope position (upper, middle, lower and valley bottom) on growth of planted Aleppo pine, nutritional status, plantation on restoring, needle, forest floor, nutrients concentration and soil properties were studied in Jubilee forest in Rakeen area, south of Jordan. Tree height was significantly higher in W than N, S and E aspects which mainly due to better moisture and nutritional conditions. All growth parameters were obtained on valley bottom were significantly higher than all aspect slope position combinations due to accumulation of run off and depositions from upper towards middle, and finally in lower slopes. In general, pH and EC were significantly reduced and soil organic matter was significantly improved by Allepo pine plantations compared to unplanted areas. West and N aspects as well as valley bottoms showed better soil physical and chemical properties.

Keywords Aleppo pine · Aspects · Growth · Semiarid · Slope position

Introduction

Aleppo pine (*Pinus halepensis* Mill.) is a pioneer drought resistant species that can survive in a wide range of conditions (Olarieta et al. 2000; Quézel 2000). It is the most widely used species in afforestation in Jordan and in other arid and semi-arid areas around the Mediterranean Basin. In Jordan, more than 50,000 ha were planted since 1948. In addition, there are about 4,000 ha naturally existed in north and middle of Jordan. The coverage area of forests in Jordan is extremely low in comparison with other Mediterranean countries; for

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