SHADE TOLERANCE OF SELECTED AFFORESTATION SPECIES ON LOESS PLATEAU, CHINA

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ABSTRACT

To select tree and vegetation species for afforestation on Loess Plateau of China, we tested the shade tolerance of nine tree and one vine species. We planted 3-year-old seedlings in the greenhouse of the Seedling Nursery at Northwest Agriculture and Forest University in China. A photosynthesis curve was constructed to determine the light compensation point (LCP) and light saturation point (LSP) of each species using a LI-6400 Portable Photosynthesis System (LI-COR Inc., Lincoln, NE) at the peak of the growth season in 2006. We used LCP as an indicator of shade tolerance. Honeysuckle (*Lonicera japonica*), *Sabina vulgaris*, and shiny-leaved yellowhorn (*Xanthoceras sorbifolia*) had the highest shade tolerance with the lowest LCP (< 20 μ mol m^{-2} s^{-1}), followed by Liaodong oak (*Quercus wutaishanica*), oriental arborvitae (*Platycladus orientalis*), apricot (*Prunus armeniaca*), Chinese pine (*Pinus tabulaefornmis*), forsythia (*Forsythia suspensa*), and lilac (*Syringa oblate*). Locust (*Robinia pseudoacacia*) had the lowest shade tolerance (LCP < 180 μ mol m^{-2} s^{-1}). On the other hand, lilac, oriental arborvitae, and locust had the highest LSP (> 1500 μ mol m^{-2} s^{-1}), and the remaining seven species had similar LSP values, ranging from 1,240 to 1,400 μ mol m^{-2} s^{-1}. The results are consistent with our field observations that lilac, oriental arborvitae, and locust are shade-intolerant and grow well at sites with intense light, while shiny-leaved yellowhorn, *Sabina vulgaris*, and honeysuckle can grow under canopy with limited light. Lilac, oriental arborvitae, and locust also had the largest range between LCP and LSP, suggesting that these species can grow in habitats with large variation in light intensity.

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