

黄土丘陵沟壑区典型植物耐旱生理及抗旱性评价

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Drought-Tolerance Physiology and Drought-Tolerance of Plants Typical of Hilly-Gullied Area of Loess Plateau

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摘要 通过实地采样获取黄土高原丘陵区柠条、侧柏、油松、山杏和山毛桃5种常见植物类型的4个耐旱指标（丙二醛含量、叶绿素含量、谷胱甘肽含量、束缚水/自由水含量比值）和2个抗旱指标（脯氨酸含量、可溶性糖含量）数，采用模糊数学隶属函数法和灰色关联分析法评价不同植物的抗旱能力和不同指标的指示效果。结果表明，不同树种的上述6个生理指标对干旱条件的响应存在显著差异，但基于单个指标获得的树种抗旱能力排序结果不完全一致，说明单个指标无法全面描述树种的抗旱能力，对5个树种抗旱能力大小的综合评价结果为柠条>侧柏>油松>山杏>山毛桃。耐旱指标叶绿素含量、束缚水/自由水含量比值、谷胱甘肽含量和抗旱指标脯氨酸含量与抗旱隶属度的关联度值均>0.60，可用以指示植物的抗旱能力，其中，以脯氨酸含量的指示效果最好。

关键词：耐旱植物 生理指标 抗旱性评价 半干旱 黄土丘陵沟壑区

Abstract: As the loess hilly region is very dry and has a fragile ecosystem, it is essential to screen out suitable drought-tolerant plants for restoring the deteriorating eco-environment. Five plants, korshinsk peashrub, arborvitae, Chinese pine, siberian apricot and *Amygdalus tangutica*, common in the region were selected and 4 drought-tolerance indices and 2 drought-resistance indexes of the plants obtained. For analysis of the data, the fuzzy membership function method and the grey correlation analysis method were applied to evaluate their drought-tolerance and drought-resistance and effectiveness of the indices as indicator. Results show that the responses of the plants to drought varied sharply with species and physiological index. However, sequencing based on a single physiological index of the plants in term of drought-resistance would never get a consistent outcome, indicating that a single index is not adequate to describe any plant in drought-resistance. The comprehensive evaluation of the five species shows an order of korshinsk peashrub > arborvitae > Chinese pine > siberian apricot > *Amygdalus tangutica* in terms of drought-resistance. Drought-tolerance indicators, like chlorophyll content, ratio between bound water and free water content, free proline content and glutathione content are closely related to drought-resistance membership degree (>0.06), so they can be accepted as indicators and among them, proline is the most effective.

Keywords: drought-tolerance plant physiological index of drought-tolerance drought-tolerant evaluation semiarid area hilly-gullied area of Loess Plateau

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