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研究报告

美国黄松、班克松和油松的抗寒性比较

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摘要 通过人工冰冻和电导率的测定，对黄土丘陵沟壑区引种栽培的美国黄松、班克松和乡土树种油松的抗寒性进行了鉴定，并探讨其抗寒机理.结果表明，班克松的抗寒性比油松强，而美国黄松的抗寒性比油松稍弱.班克松的束缚水/自由水比值高达7.0，组织中ABA含量高达164.3 μg·g^{-1} FW；但可溶性糖和K^+含量较低，分别为12.0%和2 450 μg·g^{-1} DW.油松则是可溶性糖、K^+和ABA含量都较高，分别为18.68%、4 538 μg·g^{-1} DW和95.8 μg·g^{-1} FW；束缚水/自由水比值较低，为2.58.美国黄松的可溶性糖含量较高，18.05%；但束缚水/自由水比值、K^+和ABA含量都较低，分别为2.18、2 275 μg·g^{-1} DW和63.3 μg·g^{-1} FW，可能是其抗寒性较弱的内在原因.班克松较低的叶绿素含量和较高的类胡萝卜素/叶绿素比值对其抗寒性也有贡献.说明3种树种虽然都是抗寒树种，但其内在机理仍有差异.

关键词 美国黄松 班克松 油松 抗寒性 ABA

分类号

Cold hardiness of *Pinus ponderosa*, *P. banksian* and *P. tabulaeformis*

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Abstract

By the method of artificial freezing, this paper made a comparative study on the cold hardiness of *Pinus ponderosa*, *P. banksiana* and *P. tabulaeformis*, with their inherent mechanisms approached. The results showed that the cold hardiness of these three species was in the sequence of *P. banksiana*>*P. tabulaeformis*>*P. ponderosa*. *P. banksiana* had high bound water/free water ratio (7.0) and ABA content (164.3 μg·g^{-1} FW) but low K^+ (2 450 μg·g^{-1} DW) and soluble sugar (12.0%), *P. tabulaeformis* had higher contents of ABA (95.8 μg·g^{-1} FW), K^+ (4 538 μg·g^{-1} DW) and soluble sugar (18.68%) but low bound water/free water ratio (2.58), while *P. ponderosa* had high soluble sugar content (18.05%) but low bound water/free water ratio (2.18) and K^+ (2 275 μg·g^{-1} DW) and ABA (63.3 μg·g^{-1} FW) contents. These differences might be the reasons resulting in the different cold hardiness of these three species. Low chlorophyll content and high carotenoid/chlorophyll ratio might also contribute to the cold hardiness of *P. banksiana*. Therefore, though the test species are all of cold hardiness, their inherent mechanisms may be different.

Key words *Pinus ponderosa* *P. banksiana* *P. tabulaeformis* Cold hardiness ABA

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