

Exploring the molecular mechanisms of melatonin-induced tolerance to salt-alkali stress in *Populus cathayana* × *canadensis* 'Xinlin 1'

Yan Li Xiyang Zhao*

(1. Jilin Provincial Key Laboratory of Tree and Grass Genetics and Breeding, College of Forestry and Grassland Science, Jilin Agricultural University, Changchun 130118, China)

Abstract: Melatonin is widely recognized as involved in a wide range of plant growth and development functions. Research has primarily focused on herbaceous plants, with few findings on the function of melatonin in supporting tree growth. In this study, it was demonstrated that melatonin, as an endogenous hormone, considerably contributed towards the increased tolerance of poplar to salt-alkali stress. Transcriptome and metabolome analysis revealed that melatonin may enhance the cellular protection and antioxidant mechanisms of poplar and improve salt-alkali tolerance by regulating genes and metabolites involved in photosynthesis, antioxidant enzyme systems, plant hormone signal transduction pathways, and in the flavonoid as well as the melatonin biosynthesis pathway. The results of this study not only aid our increased understanding of the potential roles of melatonin in salt-alkali stress but also shed light on the potential mechanisms of the economically important woody model plant, poplar, involved in resisting abiotic stress.