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Effects of spermidine on photosynthesis, antioxidant enzyme activity and gene expression in melon under chilling stress

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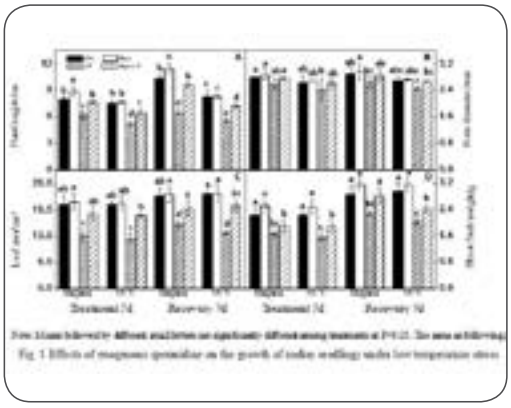
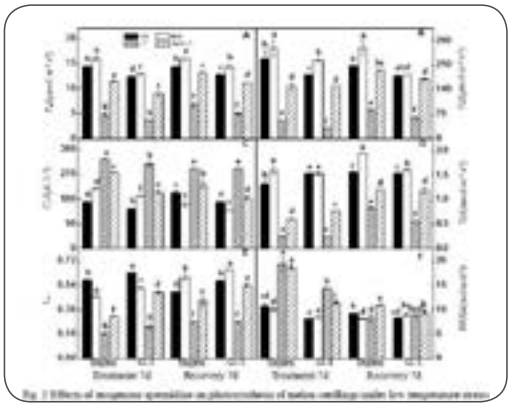
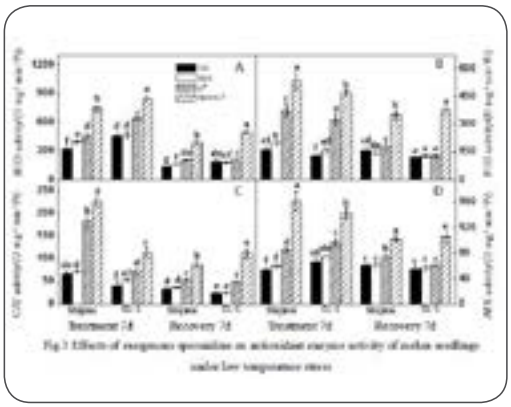
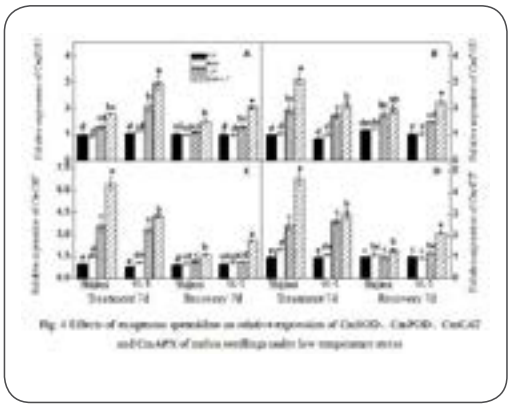
To explore exogenous SPD relief of melon seedlings physiological mechanism under chilling stress, the experiment was carried 'Shijimi' (chilling-tolerant) and 'GL-1' (chilling-sensitive) in climate chambers and substrates to investigate the alleviating effects of exogenous Spermidine (SPD) on melon seedlings for growth, photosynthesis and reactive oxygen metabolism, the expression patterns of four different antioxidant enzyme genes were analyzed using quantitative PCR under chilling stress and recovery. The results showed that under chilling stress, melon-seedling growth and photosynthesis were decreased, the antioxidant enzyme activities and the expression patterns of four different antioxidant enzyme genes were increased. SPD could increase melon-seedling growth, net photosynthetic rate (Pn), Stomatal Conductance (Gs), Transpiration rate (Tr), Stomatal Limitation (Ls) and Water Use Efficiency (WUE), while reduce intercellular carbon dioxide concentration (Ci) under chilling stress. Exogenous SPD changed antioxidant activities and gene expression pattern under chilling stress and increased expression of Superoxide Dismutase (SOD), Catalase (CAT), Peroxidase (POD) and Ascorbate Peroxidase (APX) genes to improve antioxidant enzyme activities, reducing chilling stress injury. Obviously, SPD was favorable for the seedlings to maintain photosynthesis, improve photochemical electron transport efficiency, capture and converse solar energy, the antioxidant enzyme activities and the expression patterns of antioxidant enzyme genes, and thus improving melon growth and abating the inhibitory effects of chilling stress on melon. These findings suggested that ameliorative effect of SPD on melon seedlings with chilling stress was effective, especially for chilling -sensitive genotypes.









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Biography

Zhang Yongping has working on Shanghai Academy of Agricultural Sciences since 2008. She has mainly engaged in the collection, arrangement and evaluation of melon germplasm resources, the selection of new varieties, the breeding of good species, the study of cultivation techniques, and the demonstration and promotion of the germplasm.

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