عنوان مقاله:

Photosynthetic Responses in Reed (Phragmites australis (CAV.) TRIN. ex Steud.) Seedlings Induced by Different Salinity-Alkalinity and Nitrogen levels

محل انتشار:

مجله علوم و فناوری کشاورزی, دوره 13, شماره 5 (سال: 1390)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

Many Phragmites-dominated wetlands have been markedly salinized and alkalinized in the Songnen Plain, northeastern China. Agricultural wastewater with high nitrogen content has been discharged into these alkalinized-salinized wetlands. To understand the effect of salinity-alkalinity on reed (Phragmites australis) seedlings at various nitrogen levels, we examined photosynthesis rate, chlorophyll fluorescence characteristics, and chlorophyll content of reed seedlings using gas exchange and chlorophyll a fluorescence tests. The greatest decreases (by ۸۲%, ۱۵%, ۸۲% and ۹۸%) of net photosynthesis rate (Pn), maximal efficiency of photosystem II (PSII) photochemistry (FV/FM), comprehensive photosynthesis performance index (PIABS) and plant height growth rate were observed at high salinity-alkalinity (mixed with ۱۵۰ mM NaCl and ۱۰۰ mM NaHCO۳). Stomatal limitation was the main reason for decreased photosynthesis rate at low salinity-alkalinity (mixed with ۵۰ mM NaCl and ۲۵ mM NaHCO۳). The activity of PSII was significantly inhibited at high salinity-alkalinity. Both donor and acceptor sides of PSII are the target sites of high salinity-alkalinity. High N (۳۰ mM) at low salinity-alkalinity and moderate N (۱۵ mM) at high salinity-alkalinity mitigated the toxicity of salinity-alkalinity on reeds and promoted plant height growth, chlorophyll synthesis, and PSII activity. Proper levels of N partly reduced the toxicity of salinity-alkalinity on the donor and acceptor sides of PSII. This suggests that agricultural wastewater containing high level of nitrogen may be helpful in restoration of Phragmites-dominated salinized wetland, though the N level needed for salinity-alkalinity stressed reed varies with the salinity-alkalinity level.

کلمات کلیدی:

Chlorophyll fluorescence, Nitrogen, Gas exchange, Alkalinized-salinized wetlands, Phragmites australis