Effect of Saline-Alkali Stress on Physiological Characteristics of Grain Amaranth Seedling

Yuxia Zhang
Inner Mongolia University for Nationalities, China

Yuqin Zhang
Inner Mongolia University for Nationalities, China

Weiwei Tan
Inner Mongolia University for Nationalities, China

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Zhang Yuxia ,Zhang Yuqin Tan Weiwei
Inner Mongolia University for Nationalities , Tongliao , 028042 , China . E-mail : yuxiaZhang@163 .com

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Introduction The stage of seed germination is a sensitive period to salt . According to the actual situation of drought and saline-alkali areas in north , the research treated amaranth seed with mixing salt solutions to discuss that injury and mechanism of adaptation in relation to saline-alkali stress for grain amaranth , and provide theoretical basises to cultivation and selection of seed resisting saline-alkali stress in drought and saline-alkali areas of north .

Material and methods Seedling of red amaranth K112 ,red amaranth R104 and wild amaranth was cultured in outside on June of 2007 ; seedlings were watered with Hoagland solution every three days , other time was used water to spread . When seedlings had five-leaves year old , they was respectively treated with four different concentrations by combining NaCl , Na_2SO_4 , $NaHCO_3$ and Na_2CO_3 with 1 :9 :9 :1 of substance ratio , Per treatment concentration repeated 3 times ; They was randomly arranged . After 15 days treating ,we started to determine physiological indexes .

Results With increase of treatment concentration , the relative conductivity in red amaranth K112 and R104 a little increased , but that of wild amaranth significantly increased under moderate and high concentration of treatment ; From the table1 we also can see clearly that chlorophyll content delined with increasing concentration of treatment , and that in red amaranth R104 and wild amaranth which had high content of chlorophyll itself extremely decreased , it illustrated that saline-alkali stress destroyed chlorophyll in wild amaranth and red amaranth R104 .

Table 1 *Effect of saline-alkali stress on physiological characteristics of amaranth seedling .*

variety	Treatment (mol/L)	Relative Conductivity(%)	Chlorophyll (mg/g)	Proline (ug/ g)	Soluble Sugar(mg/g)
	CK	18 .81bA	1 .40aA	342 .50bB	215 .07bcAB
Red amaranth	0 .1	22 .05abA	1 .35abA	372 .91bB	187 .84cB
K112	0 .2	23 .94aA	1 .34abA	562 .50aA	284 .06abAB
	0 .3	22 .55abA	1 .25bA	322 .91bB	319 .15aA
	CK	22 .04aA	2 .08aA	363 .33bB	120 .71dC
Red amaranth	0 .1	24 .35aA	1 .62bB	383 .33bB	170 .38cBC
R104	0 .2	21 .17aA	1 .39cB	541 .66aA	213 .31bB
	0 .3	21 .65aA	1 .12dC	352 .08bB	304 .94aA
	CK	20 .09bB	2 .59aA	337 .50bA	85 .38bB
	0 .1	19 .39bB	1 .92bB	350 .00abA	136 .03bAB
Wild amaranth	0 .2	29 .64aA	1 .84bB	410 .41aA	139 .25bAB
	0 .3	25 .23aAB	1 .36cC	295 .83abA	268 .45aA

According to the figures in Table 1 ,we can see clearly that proline content of three varieties of grain amaranth first increased and then decreased with increasing treatment concentration and significantly increased on condition of moderate concentration ; Meanwhile this table also shown that soluble sugar content of three grain amaranth increased with increase of treatment concentration ,and significantly increased under high content of treatment . Moreover their content in red amaranth K112 and R104 were more than in wild amaranth .

Conclusions The ability of red amaranth R104 and K112 in relation to resist saline-alkali stress were stronger than that of wild amaranth , so seedling of red amaranth R104 and K112 could normally grow in saline-alkali areas where wild amaranth was distributed . Overall , proline and soluble sugar were osmotic substance of grain amaranth to adjust saline-alkali stress .

Reference

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