Effect of Saline-Alkali Stress on Seed Germination Involving Grain Amaranth

Deying Zhang
Ministry of Agriculture, China

Yuxia Zhang
Inner Mongolia University of Nationalities, China

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Effect of saline-alkali stress on seed germination involving grain Amaranth

Zhang Deying[1] *Zhang Yuxia*[2]
[1] *Centre of Supervision and Inspection of Forage and Turf Seed Quality , Ministry of Agriculture , China , 010020 , Hohhot . E-mail : zhdy62@163 .com*
[2] *Inner Mongolia University of Nationalities , Tongliao , 028042 , China . E-mail : yuxiazhang685@163 .com*

Key words : grain amaranth ,seed germination ,saline-alkali stress

Introduction The stage of seed germination is very sensitive to salt Amaranth seeds were treated with mixing salt solutions to evaluate the influence of saline-alkali stress on the germination of amaranth seed , compare the ability of saline-alkali resistance of different varieties of 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 Red amaranth 112 , red amaranth 104 and wild amaranth were used in the experiment . Five different salt concentrations made by mixing NaCl , Na_2SO_4 , $NaHCO_3$ and Na_2CO_3 with the ratio of 1 :1 :1 :1 were designed , each with three replicates . Each of culture dish put 100 amaranth seeds and injected seven milliliter of treatment solution .The condition of germination : temperature of germination was 25℃ , light intensity was 4000lx and the time of light was12h/d . The number of germination was counted after 24h culturing and recorded every 12h . After germination , 10 plants was selected from each treatment to measure the length of radicle and hypocotyl .

Results From Table 1 we can see that different concentration of treatments significantly affected seed germination of grain amaranth . Ggermination vigour , length of radicle , vigor index and germination index of three varieties of grain amaranth decreased with the increase of salt concentration , the order of decreasing was that red amaranth K112＞wild amaranth＞red amaranth R104 . There were not significantly different in germination rate length of hypocotyl for red amaranth K112 red amaranth R104 . The results indicated that germination vigour , length radicle , germination index and vigor index were more sensitive to saline-alkali stress than germination rate and length of hypocotyl .

Table 1 *The variance analysis of seed germination related to saline-alkali stress in grain amaranth .*

variety	Treatment (%)	Germination rate (%)	Germination vigour (%)	Length of ypocotyl(cm)	Length of Radicle(cm)	Germination index	Vigor index
Red	CK	62 .33aA	47 .66aA	1 .41aA	3 .27aA	90 .10aA	294 .64aA
amaranth	0 .2	51aA	25 .33bB	1 .51aA	1 .85bB	62 .45bA	115 .53bB
K112	0 .4	11bB	2cC	0 .6bB	0 .31cC	9 .36cB	2 .90cC
	0 .6	16 .33bB	0cC	0 .52bB	0 .35cC	11 .71cB	3 .74cC
Red	CK	88aA	57 .33aA	0 .7aAB	2 .95aA	114 .79aA	338 .64aA
amaranth	0 .2	90 .66aA	53 .66aA	0 .9aA	2 .33bB	100 .74aA	234 .73bB
R104	0 .4	80aA	27 .66bB	0 .42bBC	0 .49cC	70 .42bB	34 .50cC
	0 .6	67 .33bAB	13cC	0 .4bBC	0 .21cC	54 .72bB	11 .49dC
Wild	CK	76 .66aA	45 .66aA	1 .77aA	2 .67aA	87 .36aA	233 .25aA
amaranth	0 .2	73 .33aA	37 .33aA	1 .53bB	2 .01bB	75 .83aA	152 .41bB
	0 .4	54bAB	4bB	0 .62cC	0 .3cC	27 .71bB	8 .31cC
	0 .6	34 .33bcBC	0bB	0 .4dC	0 .22cC	10 .81cC	2 .37cC

Conclusions The ability of resistance saline-alkali stress for three varieties of grain amaranth was that fed amaranth R 104＞wild amaranth＞ red amaranth K 112 . It is concluded that Red amaranth R 104 can be planted in saline-alkali areas where wild amaranth survive .

Reference

Ming Gong . Difference of Salt Tolerance on Different Growth Stage Involving Barley[J] .*Botanical Magazine of Northwest* , 1994 ,14(1) :1-7 .