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PRE- SOWING SEED TREATMENTS RELATED TO SEEDLING VIGOR, GROWTH AND GRAIN YIELD OF EGYPTIAN HYBRID RICE UNDER SALINE SOIL

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ABSTRACT

To explore hybrid rice cultivation under Egyptian saline soils using its hybrid vigor in salinity tolerance, two field experiments were conducted under saline soil during 2005 and 2006 seasons at Research Farm of El Sirw Agriculture Research Station. Enhancing seedling vigor and salinity tolerance of hybrid rice as well as its grain yield were the main approaches during the set up of this experiment. The type of experimental soil was clayey with salinity levels of 7.5 and 7.35 dS/m in 2005 and 2006 seasons, respectively.

For above mentioned purposes, the seeds of Egyptian SK2034H rice hybrid (Egyptian Hybrid 1) were soaked in 1-water (as a control treatment), 2- $ZnSo_4$(2%) , 3-diammounum phosphate (DAP)(2%), 4- NaCl(1%) ,5-GA_3 (120 mg/l), 6- cytokinine (75 mg/l) and 7- Salicylic Acid (80mg /L). The seedling vigor of SK2034H hybrid rice was measured at 30 days after sowing whereas, root and shoot traits as well as leaves and root chemical contents were estimated. Furthermore, growth and grain yield and its components were estimated.

The obtained results showed that pre-sowing seed treatments were found to be significantly effective in enhancing seedling vigor of SK2034H and improved its growth and its favorable nutrient content such as N, P and K. Therefore, the salinity withstanding of hybrid rice was raised which resulted in proper growth and reasonable grain yield and its components under salt stress. The most effective treatments were GA_3, NaCl and Salicylic Acid. These treatments clearly demonstrated their desirable effect on seedling vigor, growth parameters and grain yield of hybrid rice under salt stress. Moreover, the all studied traits were significantly affected by the current treatments involving seedling vigor traits, rice growth traits at heading and grain yield and its components.

Keywords: Hybrid, Seedling vigor, Salinity, Seed soaking.

INTRODUCTION

Salinity problem in Egypt affected wide spectrum area in which rice is grown. Rice yield and growth are restricted and increasing grain yield of rice under such area has to rise to meet overpopulation. Releasing new salt tolerant rice varieties and developing proper rice management under salt stress was found to be effective way to increase rice grain yield and its salt tolerance under mentioned target area. Improving rice seedling quality and raising rice seedling vigor consider as one of the proper rice management methods under salt stress using the concept that high seedling vigor and early fast rice growth and emergences enable rice to be more tolerant to salt stress leading to higher grain yield under the current circumstances (Zayed *et*

al., 2005). Rajan (1989), Patil (1989), Singh et al. (1994), Singh (1996) Lee et al. (1999), Bodapati et al. (2002), Ros et al. (2003), Xu et al. (2003), Basra et al. (2004), Perumal and Sundari (2004), Chen et al.(2005), Farooq et al. (2007) and Bassiouni. (2008) claimed that seed priming or seed soaking in the terms of pre-sowing chemicals seed treatments such as sodium chloride NaCl, Gibberillic acid (GA3), diammonium phosphate(DAP), Zinc sulphate (ZnSo4) and Salicylic acid (SA) could invigorate the rice seedling and improved its quality and increased rice salt tolerance leading to healthy rice growth, standardizing the source –sink relation resulted in significant higher grain yield and yield components. Hanan Deef (2007) stated that pre treatment of wheat and barley with salicylic acid significantly enhanced their salt tolerance and improved their growth and yield that attributed to activation to antioxidant activities. On the other hand, for obtaining entire high yield potentiality of hybrid rice, improving seedling quality and vigor, accelerating early vegetative growth, and idealizing source – sink relation has to be achieved (Peng et al., 2003 and Zayed et al., 2006).

The present study was, therefore, carried out with the objectives to develop an appropriate pre-sowing chemical treatment for nursery preparation under saline soil in hybrid rice using its higher vigor and herterosis resulted in improving its salt tolerance leading to higher grain yield under salt affected soil.

MATERIALS AND METHODS

The present study was conducted in the two seasons of 2005 and 2006 at the Experimental Farm of El Sirw Agriculture Research Station, Dammietta Governorate, Northern part of Delta, Egypt. The soil was clayey with salinity level of 7.50 and7.53dSm^{-1} (Soil were chemically analyzed according to Piper, (1950) in the first and second seasons, respectively. The experiments were designated in to randomized complete blocks with four replications.

Seed treatments

Forty eight grams of seed of SK2034H hybrid rice variety were subjected to the following treatments; Control (soaking seed in water), Seed soaking in $ZnSO_4$ (2%) for 24 h, Seed soaking in Diammonium phosphate (2%) for 24 h, Seed soaking in NaCl (1%)) for 24 h, Seed soaking in Cytokinine (75mg/l) for 24 h, Seed soaking in Gibberellic acid GA3(120 mg/l)) for 24 h and Seed soaking in salicylic acid SA (80mg /l)) for 24 h.

The soaked seed were incubated for 24 h, divided into equal four parts and then sown into four random replications with plot size of one meter square in the field.

Traditional soaking

Seeds were soaked in 100 ml water for 24h at 30+ 2 °c .These seeds were then placed between two layers of saturated gunny bags up to chitting (just appearance of radical)at 30+ 2 °c.

The nursery seedbed preparation was well performed. The land was divided into 40 small plots (1×1m). The nursery was fertilized with calcium

super phosphate (15.5% P_2O_5) at the rate of 4 kg/ Kerat (Kerat = 175 m^2) on the dry soil before plough. Nitrogen in the form of urea (46.0% N) was added at the rate of 3 kg/ Kerat, after the last plough before leveling and immediately before sowing. Rice grains at the rate of 20 kg/fed for hybrid rice were divided, calculated for each plot and then treated as indicated previously treatments. Therefore it was broadcasted with 2-3 cm standing water in the nursery in April, 25th in both seasons. Weeds were chemically controlled by using Saturn (50%) at the rate of 2 liter /fed.

The permanent field was well prepared as it indicated in the nursery. Calcium super phosphate (15.5% P_2O_5) was added in the rate of 100 kg/fed on the dry soil before plough. Thirty days old seedlings were transplanted at the rate of 2-3 seedlings/hill with spacing of 20×20 cm, which were sown with 2-3 cm of standing water in the land. Potassium sulphate (48% K_2O) was applied at the rate of 24 kg K_2O/fed into two equal doses as basal application and at maximum tillering stage. The nitrogen at the rate of 69 kg/fed in the form of urea was applied into four splits, 1/4 at tillering stage + 1/4 at maximum tillering stage + 1/4 at panicle initiation (PI) +1/4 at the end of booting stage (BS). The rest of cultural practices of rice under saline soil were followed according to the recommendation of Rice Research and Training Center.

2) Data recorded:

The data were collected at three stages as following:

A- Seedling vigor traits.
B- Growth characteristics at heading stage.
C- Yield and yield components characters.

A- Seedling vigor traits:

At seedling stage (30 days after sowing), plant samples of the area 20×20cm were randomly collected twice from each plot corresponding each treatments. The plant samples were carefully pulled for keeping their full root and shoot system, transferred to the laboratory, gently washed and then the root and shoot were carefully characters, separated to determine the following characters; shoot length (cm), root length (cm), shoot dry weight (mg/seedling), root dry weight (mg/seedling), root volume (cm^3/ seedling), number of white roots / seedling, leaf area (cm^2/ seedling), total chlorophyll content (SPAD value), number of tillers/seedling, number of leaves $tiller^{-1}$ and nitrogen content in shoot and root according to (Hafez and Mikkelsen 1981).

B-Growth characteristics at heading stage:

At heading stage, five hills were randomly taken and transferred to Lab to determine the following traits: dry matter production (g m^{-2}), flag leaf area (cm^2) and leaf area index.

Grain yield and its Components:

At time of harvest, ten hills were randomly taken from the fourth inner row to estimate the following characters; number of panicles m^{-2}, panicle weight (g), number of filled grains panicle, number of unfilled grains $panicle^{-1}$, 1000-grain weight (g), grain yield (t ha^{-1}), straw yield (/ha^{-1}) and harvest index (HI):

Statistical Analysis:

All data collected were subjected to standard statistical analysis following the proceeding described by Gomez and Gomez. (1984) using the computer program (IRRISTAT). The treatment means were compared using Duncan's multiple range test (Duncan, 1955). * and ** symbol used in all Tables indicate the significant at 5% and 1% levels probability, respectively, while NS means not significant.

RESULTS

Seed soaking in various chemical substances for 24 h significantly and positively affected all seedling vigor traits of Sk2034H hybrid rice variety in both seasons as compared to control treatment (Tables1,2,3and 4).

Obviously, seed soaking in the studied chemical markedly improved seedling vigor and quality over control under salt stress. Interestingly, the treatment of NaCl soaking distinctly superseded other treatments in improving seedling vigor traits, number of tillers seedling^{-1}, number of leaves seedling^{-1} , number of white roots seedling^{-1} , chlorophyll content, leaf area cm^2 seedling^{-1}, root volume, shoot dry weight, root dry weight ,root /shoot ratio, root length and shoot length. Both treatments of GA3 and salicylic acid (SA) gave the same results of NaCl treatment, whereas, the three of them were at a par regarding their favorable effect on seedling vigor and subsequently on rice growth and grain yield of Sk2034H under salt stress. The treatments of NaCl gave the highest values of abovementioned seedling vigor characteristics, except shoot dry weight in both seasons and shoot and root lengths in 2005 season. The longest shoot and root, and heaviest shoot dry weight were obtained by GA3 treatment (Table2). The lowest values of aforementioned traits were produced when the seeds were traditionally soaked (Control). Also, the treatments of NaCl, GA3, and SA had the same level of significance while the rest of treatments came in the second rank regarding their effective action of the current treatments on rice seedling vigor under salt stress.

Regarding to N % in shoot and root at 30 days after sowing (DAS), data listed in Table 4 showed that pre-sowing seed treatments significantly increased N% in shoot and root over control treatment in both seasons. The highest values of N% in shoot at 30 DAS were given by GA3 and the maximum values of N% in root were produced by NaCl treatment in the two years of study. The lowest values of N % in shoot and root at 30DAS were recorded when seeds of SK2034H hybrid rice were traditionally soaked (control) in both seasons. In continuation, the best three treatments of this study of NaCl, GA3 and SA didn't significantly vary in their effects on N% in shoot and root in both seasons (Table 4).On the other hand, the treatment of $ZnSO_4$ didn't show any significant improvement in N% in shoot and root over control treatment.

Table 1: Shoot and root lengths, and root volume of Sk2034H hybrid rice as affected by pre sowing seed treatments at 30DAS under saline soil during 2005 and 2006 seasons.

Characters			Root length cm		Root volume cm^3	
Treatments	2005	2006	2005	2006	2005	2006
Control	21.61d	22.96c	13.14d	14.90c	0.53e	0.80c
Soaking in $ZnSO_4$ (2%)	24.15c	24.79b	14.45c	15.80bc	0.80bc	1.18ab
Soaking in DAP (2%)	25.71b	26.22a	14.80bc	15.80bc	0.77cd	0.91bc
Soaking in NaCl (1%)	26.83a	26.83a	15.84a	17.40a	0.92a	1.36a
Soaking in cytokinine (75 mg/l)	26.69a	25.20b	14.73bc	16.70ab	0.74d	0.91bc
Soaking in GA_3 (120 mg/l)	26.93a	26.90a	15.95a	16.90a	0.92a	1.21ab
Soaking in salicylic acid (80 mg/l)	26.58a	25.76ab	14.54ab	16.70ab	0.89a	1.20ab
F. Test	**	**	**	**	*	*

DAP, Diammonium phosphate. GA_3, Gibberellic, acid, * and ** indicated P< 0.05and P<0.1 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

Table 2: Shoot and Root dry weights and shoot/root ratio of SK2034H hybrid rice as affected by pre-sowing seed treatments at 30 DAS under saline soil during 2005 and 2006 seasons.

Characters	Shoot dry weight (mg $seedling^{-1}$)		Root dry weight (mg $seedling^{-1}$)		Root: Shoot ratio	
Treatments	2005	2006	2005	2006	2005	2006
Control	140.41c	125.00c	48.9b	49.0b	0.35b	0.39ab
Soaking in $ZnSO_4$ (2%)	162.08b	159.32b	59.7ab	64.0ab	0.37ab	0.40ab
Soaking in DAP (2%)	165.00ab	163.40ab	61.8ab	61.2ab	0.38ab	0.37ab
Soaking in NaCl (1%)	166.35ab	163.00ab	66.4a	70.5a	0.40a	0.43a
Soaking in cytokinin (75 mg/l)	162.31b	159.00b	55.6ab	58.2ab	0.35b	0.37ab
Soaking in GA_3 (120 mg/l)	171.88a	167.50a	64.0a	65.8ab	0.37ab	0.39ab
Soaking in salicylic acid (80 mg/l)	165.58ab	166.50a	60.7ab	65.9ab	0.37ab	0.40ab
F. Test	**	*	*	*	*	*

DAP, Diammonium phosphate. GA_3, Gibberellic acid, * and ** indicated P< 0.05and P<0.01 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

Table 3: Number of white root $seedling^{-1}$, number of tillers $seedling^{-1}$, number of leaves $seedling^{-1}$, and leaf area, $seedling^{-1}$ of SK2034H hybrid rice as affected by pre-sowing seed treatments at 30DAS under saline soil during 2005 and 2006 seasons.

Characters			No. of tillers $seedling^{-1}$		No. of leaves $seedling^{-1}$		Leaf area $cm^2 seedling^{-1}$	
Treatments	2005	2006	2005	2006	2005	2006	2005	2006
Control	13.25c	12.99c	3.13d	2.94b	2.89d	2.42c	18.72d	17.82b
Soaking in $ZnSO_4$ (2%)	14.27abc	16.0ab	3.38cd	3.57a	3.38cd	3.12b	25.00c	23.07a
Soaking in DAP (2%)	14.90ab	16.1ab	3.53bc	3.59a	3.51bc	3.26ab	26.48a	22.01ab
Soaking in NaCl (1%)	15.18a	17.0a	4.13a	3.89a	3.84a	3.51a	26.46a	25.73a
Soaking in cytokinin (75 mg/l)	13.77bc	15.0b	3.63bc	3.36ab	3.31c	3.19ab	25.41bc	22.44a
Soaking in GA_3 (120 mg/l)	15.12a	17.4a	3.98ab	3.90a	3.69ab	3.85a	26.09ab	25.58a
Soaking in salicylic acid (80 mg/l)	14.91ab	16.0ab	3.93ab	3.68a	3.48bc	3.57a	25.83ab	23.32a
F. Test	*	**	**	**	**	**	**	**

DAP, Diammonium phosphate. GA_3, Gibberellic acid, * and ** indicated P< 0.05and P<0.01 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

Table 4: Total Chlorophyll content, N% in shoot and N% in root of SK2034H hybrid rice as affected by pre-sowing seed treatments at 30DAS under saline soil during 2005 and 2006 seasons.

Characters / Treatments	Total chlorophyll content		N % in shoot		N % in root	
	2005	2006	2005	2006	2005	2006
Control	26.59e	25.3b	2.000b	2.008b	0.540c	0.500c
Soaking in $ZnSO_4$ (2%)	29.72bc	32.1a	2.390ab	2.254ab	0.593bc	0.580bc
Soaking in DAP (2%)	28.10d	31.2a	2.320b	2.296a	0.615ab	0.640ab
Soaking in NaCl (1%)	30.75a	32.6a	2.407ab	2.297a	0.658a	0.687a
Soaking in cytokinin (75 mg/l)	27.96d	30.4a	2.330b	2.273a	0.603bc	0.600ab
Soaking in GA_3 (120 mg/l)	30.30ab	32.9a	2.467a	2.353a	0.647ab	0.651ab
Soaking in salicylic acid (80 mg/l)	29.25c	31.7a	2.398ab	2.299a	0.603ab	0.642ab
F. Test	**	**	*	*	*	*

DAP, Diammonium phosphate. GA_3, Gibberellic acid, * and ** indicated P< 0.05and P<0.01 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

Data in Table 5 indicated that the pre-sowing seed treatments had the same favorable effect obtained with seedling vigor traits measured at 30 days after sowing(DAS) on growth parameters at heading stage. All pre-sowing seed treatments significantly increased hybrid rice growth , dry matter production, flag leaf area and leaf area index in both seasons against control treatment and mitigated the hazard effect of salinity over control treatment.

Table 5: Dry matter (g m^{-2}), flag leaf area Cm^2 and Leaf area index of SK2034H hybrid rice as affected by pre-sowing treatments at 30 DAS under saline soil during 2005 and 2006 seasons.

Characters / Treatments			Flag leaf area		Leaf area index	
	2005	2006	2005	2006	2005	2006
Control	594.9c	639.1d	19.62b	20.38c	3.46d	4.62d
Soaking in $ZnSO_4$ (2%)	797.6b	860.6b	22.65a	22.69a	5.35abc	5.57bc
Soaking in DAP (2%)	864.36b	833.7b	19.90b	20.72bc	4.75c	5.15cd
Soaking in NaCl (1%)	875.14ab	909.4ab	22.50a	23.12a	5.88a	5.92ab
Soaking in cytokinin (75 mg/l)	681.19c	730.5c	20.0b	22.13ab	4.86bc	5.02cd
Soaking in GA_3 (120 mg/l)	950.6a	956.2a	22.83a	23.23a	5.95a	6.41a
Soaking in salicylic acid (80 mg/l)	870.53ab	882.0ab	22.41a	22.84a	5.44ab	5.57b
F. Test	**	**	*	*	**	**

DAP, Diammonium phosphate. GA_3, Gibberellic acid, * and ** indicated P< 0.05and P<0.01 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

As seen in Table5 the salinity significantly restricted the rice growth at heading as detected in the results obtained with control treatments but, pre-sowing seed treatments particularly GA3, NaCl and salicylic acid (SA) could alleviate this harmful effect and improved rice growth; flag leaf area, leaf area index and dry matter production at heading stage. The highest values of

the previous mentioned growth traits were recorded when seed were soaked in GA3 followed by seed soaking in NaCl and then SA .Meanwhile, the control treatment gave the lowest values of them(Table5). The rest of pre sowing treatments intermediated the control treatment and the best three treatments of DAP spray, NaCl and GA3 soaking.

Regarding the yield and yield components, the pre-sowing treatments significantly increased the all yield components and grain yield of SK2034H over control treatment under saline soil (Tables 6and7).

Table 6: Number of panicles m^{-2}, panicle weight, filled grains, and unfilled grains of Sk2043H hybrid rice as affected by pre-sowing seed treatments under saline soil during 2005 and 2006 seasons.

Characters	No. of panicles m^{-2}		Panicle weight (g)		Filled grains panicle^{-1}		Unfilled grain panicle^{-1}	
Treatments	2005	2006	2005	2006	2005	2006	2005	2006
Control	312.0d	317.7d	2.974d	3.054c	125.64d	127.95c	19.85a	18.72a
Soaking in $ZnSO_4$ (2%)	369.2b	394.4abc	3.515ab	3.687a	134.79abc	140.72ab	17.90b	16.51c
Soaking in DAP (2%)	358.8bc	357.2bcd	3.230c	3.429b	129.28cd	134.9b	18.13b	16.50bc
Soaking in NaCl (1%)	386.7a	402.3ab	3.553a	3.496ab	137.75ab	139.98ab	18.60b	17.50ab
Soaking in cytokinin (75 mg/l)	338.5cd	344.7cd	3.270c	3.466b	129.32cd	138.51ab	17.72b	c
Soaking in GA_3 (120 mg/l)	390.0a	424.2a	3.571a	3.601ab	140.60a	143.67a	17.74b	16.90bc
Soaking in salicylic acid (80 mg/l)	376.5a	397.4ab	3.309bc	3.448b	137.68ab	138.97ab	18.17b	16.41c
F. Test	**	**	**	**	**	**	**	16.55c

DAP, Diammonium phosphate. GA_3, Gibberellic acid, * and** indicated P<0.01. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

Table 7: 1000-grain weight, straw yield, grain yield and harvest index of Sk2043H hybrid rice as affected by pre-sowing seed treatments under saline soil during 2005 and 2006 seasons.

Characters	1000-grain weight g		Straw yield t ha^{-1}		Grain yield t ha^{-1}		Harvest index	
Treatments	2005	2006	2005	2006	2005	2006	2005	2006
Control	20.20e	23.01d	7.08b	7.25b	4.51d	4.77d	0.39b	0.40b
Soaking in $ZnSO_4$ (2%)	21.43de	23.57abc	7.27ab	8.03ab	5.71bc	5.56c	0.44a	0.41ab
Soaking in DAP (2%)	21.75cde	23.44c	7.82ab	8.09ab	5.29c	5.34c	0.40ab	0.40b
Soaking in NaCl (1%)	22.38ab	23.63ab	7.97a	8.22a	6.17ab	5.90ab	0.44a	0.42a
Soaking in cytokinin (75 mg/l)	21.83bcd	23.51bc	7.79ab	8.24a	5.32c	5.56bc	0.42ab	0.40b
Soaking in GA_3 (120 mg/l)	22.50a	23.72a	7.99a	8.61a	6.49a	6.25a	0.45a	0.42a
Soaking in salicylic acid (80 mg/l)	22.15abc	23.65ab	7.57ab	8.10ab	6.00ab	5.93ab	0.44a	0.42a
F. Test	**	**	*	*	**	**	*	**

DAP, Diammonium phosphate. GA_3, Gibberellic acid, *and ** indicated P< 0.05and P<0.01 respectively. Means designated by the same letter are not significantly different at 5% level, according to DMRT.

The lowest values of panicle number m^{-2}, panicle weight, number of filled grains panicle^{-1}, ,1000-grain weight ,grain yield and harvest index while the highest value of unfilled grains panicle^{-1} were produced when seeds were soaked in water. On the other hand, GA3 treatment gave the highest values of the previous mentioned yield and yield components, while it gave the

lowest value of unfilled grains pancle^{-1} in both seasons followed by the treatment of NaCl soaking and then SA treatment without any significant differences. Generally all pre-sowing seed treatments achieved pronounced improvement in grain yield under salt stress as compared to traditional treatment (control) result of improving rice salt tolerance and hybrid rice growth via enhancing rice seedling vigor. The NaCl, SA, ZnSo4, DAP, cytokine, and control treatments didn't significantly vary in their effect for straw yield while, ZnSo4, cytokine and control treatments were at a par regarding their effect on harvest index.

DESCUSSION

The current investigation clarified that employing varying pre-sowing seed treatments could significantly invigorate the rice seed of SK2034H more than those obtained by traditional treatment (control) under salt stress. The superiority of NaCl treatment in inducing high seedling vigor under salt stress than others might be mainly due to its hardening effect, accelerating germination, increasing metabolic activities, raising some growth regulators and hormones such as IAA, NAA, ATPase and inducing gene of salt tolerance (Bose and Mishra,1992;-Lee et al., 1999 and Barsa et al,2004 and 2005). All previous improved growth of rice seedlings and their salt tolerance as result of using seed soaked in NaCl resulted in early vegetative rice growth, faster recovery after transplanting, more adoption to salt stress, healthy growth, increased dry matter production, leaf are index (LAI), flag leaf area, more assimilates translocation to grains leading to considerable yield components, less sterility(high sterility percentage) of rice under salt stress and subsequently higher grain yield as well as harvest index than those obtained by traditional soaking (Ros et al., 2003 and Bassiouni 2008).

Regarding the mode of action of GA3, the obtained favorable effect of GA3 in improving seedling vigor traits and rice growth as well as yield and yield components of hybrid rice under such conditions might be mainly due to its activation to ά-amylase for breakdown of starch stored in the seeds that will be used by the growing embryo during germination, enhancing IAA exertion, promoting cell elongation and division particularly mesocotyle length and internodes of rice seedlings, reducing Na and Cl uptake, increased K, P and N uptake and chlorophyll content of rice seedling resulted from seeds soaked in GA3 leading to high seedling vigor, reasonable rice growth at early and late stages, improving source-sink relation resulted in high yield components and grain yield under salt stress as compared to traditional treatment(Prakash and Prathapasenan,1990; Singh, 1996; Lee et al., 1999, Chen et al., 2005 and Bassiouni, 2008)

As previously mentioned in the results SA occupied the third rank regarding the desirable effect of pre-sowing chemical seed treatments on seedling vigor, rice growth, grain yield and yield components of SK2034H hybrid rice that ,their effective role might be mainly attributed to activation of antioxidant defense system that formed by hydrophilic and lipophilic compounds to alleviate and protect the plant cell against salt stress oxidative damage and enhancing accumulation of ionic and non ionic osomolytes such

as proline leading to higher seedling vigor, high rice salt tolerance pushing early rice growth of SK2034H, resulted more dry matter production at pre- and post heading leading to higher grain yield and yield components of hybrid under saline soil against conventional seed soaking (Hare et al., 1998; Silevana et al., 2003; Farooq et al., 2007 and Hanan Deef, 2007).

It could be concluded that the desirable effect of GA3 and SA through seed soaking, it also promoted seedling vigor and quality, enhanced salt tolerance by inhibited sodium uptake, exhibited both Ca^{+2} and K^{+} uptake, promoted cell division and elongation, pushed hybrid rice to grow fast under stress as possible and improved photosynthesis and enzyme activities, translocation processes as well as standardized yield components resulted in considerable grain yield. Sodium chloride seed soaking was found to be effective in salt stress mitigation and amelioration resulted in proper seedling vigor, optimum growth and yield components producing contentment grain yield. The rest of treatments might be have similar method in improving grain yield of hybrid rice under salt stress

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معاملات البذور قبل الزراعة وعلاقتها بقوة البادرة و النمو و المحصول في الأرز الهجين المصري تحت ظروف الأراضي الملحية

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مركز البحوث والتدريب فى الأرز سخا - كفر الشيخ

أقيمت هذة الدارسة في محطة بحوث السرو الزراعية بدمياط خلال موسمي ٢٠٠٥ و٢٠٠٦ وذلك لدارسة تأثير معاملات نقع للبذور بمواد كيماوية مختلفة علي قوة البادرة و النمو و المحصول و مكوناته للأرز الهجين المصري تحت ظروف الأراضي الملحية .

واستخدم صنف الأرز الهجين سخا ٢٠٣٤ هجين في هذه الدارسة وكانت قيم معامل التوصيل الكهربي للتربةالمقام فيها التجربة هي. ٠ ٧,٥ ,٧,٣٥ملليموز/سم في موسمي ٢٠٠٥ و٢٠٠٦م علي التوالي.

وكانت المعاملات التي تم دراستها هي: ١- النقع في الماء (المعاملة المقارنة) . ٢- النقع في كبريتات الزنك ٢%. ٣- النقع في فوسفات الامونيوم الثنائية ٢%. ٤- النقع في كلوريد الصوديوم (١%). ٥- النقع في حمض الجبريللين (١٢٠ ملليجرام/اللتر). ٦- النقع في السيتوكنين (٧٥ ملليجرام/اللتر) . ٧- النقع في حمض السالسيليك(٨٠ ملليجرام /اللتر).

وجد ان معاملات النقع المختلفة كانت ذو تأثير معنوي و فعال في تحسين جودة و قوة البادرة في الأرز الهجين و كذا ذاد من تحمل الأرز للملوحة و حسن من النمو و كان هناك تأثير ايجابي و معنوي علي مكونات المحصول والتي كانت فعالة في زيادة المحصول بصورة معنوية.

وتوصي الدراسة بأن أفضل المعاملات فاعلية ومعنوية و اقتصادية تحت هذة الدراسة هي المعاملات بحمض الجبيريلك ثم كلوريد الصوديوم ثم حمض السالسليك علي التوالي.