

The Effect of Various Levels of Salt Stress, on Seed Germination of Blue Panicum and the Possibility of Alleviating Damage by Lyso-phosphatidylethanolamine (LPE)

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Abstract

Panicum antidotale Retz (Blue Panicum) is considered as a new forage crop recently introduced to Egypt, which emphasizes the need for an assessment of its tolerance to salinity stresses. The objectives of the study were to (1) investigate the effect of various levels of salt stress on seed germination, (2) define the threshold of damage by increasing concentration of salt stress, (3) determine the possibility of enhancing seed germination by pretreatment of seeds with lisophos and (4) examine the possibility of synergism between lisophos and low salinity level as to alleviate salt to germinate at certain a concentration of lisophos. Results showed that at a certain extent, there was a synergistic effect between salt concentrations and the percentage of seed germination. Since the soil content with NaCl of 1000 or 3000 ppm led to a significant increase in the germination (61.75% and 53.95% respectively) as compared with the control (47.70%). The influence of various used concentrations (0 ppm, 5 ppm, 10 ppm, 20 ppm and 40 ppm) of the natural compound lisophos on germination percentage of the pre-treating seeds revealed that the control seeds had the least germination percentage among all treatments. To check the possibility of alleviating salinity stress injury, lisophos used concentrations at 5 ppm and 20ppm, were used to protect the seed then seeds were exposed to salinity stress concentrations. Data showed that there was a significant increase in the germination percentage of Blue Panicum by the application of lisophos at 5 ppm to salt exposed seeds at 5000 ppm. On other hand data indicated that there was an adverse effect on the germination percentage by applying lisophos at 20 ppm in the presence of salinity at 3000 ppm or 5000 ppm since the highest percentage was obtained with the control. This study may add valuable information about *Panicum antidotale* tolerance to salinity as well as capability and potentialty of lithophosphatidyl ethanol amine (lisophosph or LPE) as growth regulators in stimulating germination of *Panicum antidotale* seeds and alleviating the damage of salinity to the ability of seeds to germinate.

Keywords: Lyso-phosphatidylethanolamine (LPE), *Panicum antidotale*, salinity, germination.

Introduction

Panicum antidotale Retz plant has two common names Blue Panicum or Blue Panic. The name Blue came from, the green leaves tend to

be blue in color (Freckmann, 2011; Quattrocchi, 2006). This plant is a perennial grassit has been recently introduced to Egypt as forage grass crop. This grass has many fea-

tures attracted several farmers as it is known of its several branches and deep root originated from shallow bulbous rhizomes roots (FAO, 2011; Humphreys and Partridge, 1995; Heuzé *et al.*, 2016), has stems of up to 2.5 meters. *Panicum antidotale* is now cultivated in many countries (FAO, 2011) but is considered a weed in California (USDA, 2011). Blue Panicum based on the seasons, soil fertility, water availability can produce from 10-50 tons of fresh material/ha (Eco crop, 2011; Heuzé *et al.*, 2016). In addition, Blue Panicum contains high protein content that reach 10 to 11%, while it recover rapidly after grazing (Muhammad, 1989). *Panicum antidotale* can be cultivated solitary or combined with some grasses like *Cenchrusciliaris* in pastures. Farmers can drill seed in rows (45-100 cm apart) or broadcast (Heuzé *et al.*, 2016). *Panicum antidotale* started its vegetative growth with slow speed and then speed up after the first 6 and 8 weeks of germination. To keep the nutritive value and sustain grass vigor as long as possible for this plant it is important to frequently and heavily graze Blue Panicum to avoid plant to mature and enter the woody stage (FAO, 2011; Heuzé *et al.*, 2016).

At this moment many studies concerning species are extremely needed to provide farmers and producers across Egypt with sufficient and detailed information about its cultivation, seed germination, production, impact on the environment, and its feeding value for the farm animals. Species in general have the capability to grow in different conditions, soil and environments, and the best

growth is in well-drained soil with reasonable fertility like sandy clay soil or light clay and the plant prefers to grow under high temperature and sunny climate [Huxley 1992].

Salt tolerance is another important and attractive characteristic of *Panicum antidotale* and added another economic value to its use in cultivation (Al-Solaimani *et al.*, 2009; Khan *et al.*, 2009; Ahmad *et al.*, 2010). Some genotypes from Blue Panicum have been cultivated on soil of high salinity levels (Heuzé *et al.*, 2016). Based on seed and forage yields, *Panicum antidotale* seemed to be more tolerant to high levels of salinity than other pastures, like *Dichantium annulatum* and *Cenchrus ciliaris* (Qadir *et al.*, 2008).

Egypt has an arid climate and suffers from salinization problems in Nile Delta valley due to the intensive irrigation and scarcity of rainfall (Tarek *et al.*, 2000). In Egypt about 35% of the cultivated lands undergo salinity, and the E.C of the extract from saturated soil was found to be above 4 dS/m (GARE, 1992; Tarek *et al.*, 2000).

Percentage of germinated seed can be significantly dropped when high salinity occurred in soil (Jalali *et al.*, 2010). To enhance the capability of seed to germinate under adverse condition many seed treatments have been adopted to stimulate seed germination such as gibberellic acid, ABA, KNO₃, NaNO₃, nitric oxides, ethanol as well as smoke and ionizing radiation especially in warm season-grasses (Ogawa *et al.*, 2003; Olszewski *et al.*, 2002, Nambara and Marion-Poll, 2005). On the other hand, lithophosphatidyl ethanol

amine is a lysophospholipid that has been reported to stimulate seed germination and to enhance the vigor of the resulting seedling whether through seed priming or direct seeding following the treatment (Farag *et al.*, 2003). It was found also that this natural compound alleviates the injury resulting from rapid seed imbibition which protects the seed cell membrane against damage. This compound (produced under trade or commercial name called Liso) increases the plant tolerance to the environmental stresses and mitigates the adverse effect of some biotic and abiotic stresses (Farag *et al.*, 2003; Cowan *et al.*, 2006) at low concentrations.

Seedling is the most vulnerable stage in the life cycle of a plant and germination is determined when seedling growth begins (Harper, 1977). In order to add some information about Blue Panicum germination a simple protocol was used by Wuest (2007) for germination procedures was used to obtain accurate and reproducible incubation conditions.

Characterizing Blue Panicum as a new forage crop and detecting its tolerance to salinity stress and other biotic and abiotic stresses is essential for providing information about its production and also for plant breeding programs. However, no research has been testified the salinity tolerance of Blue Panicum. Thus, the objectives of the study were to: (1) investigate the effect of various levels of salt stress, on seed germination. (2) define the threshold of damage by increasing concentration of salt stress (3) determine the possibility of enhancing seed germination by pre-treatment of seeds with lysophos (4)

examine the possibility of synergism between lysophos and low salinity level as to alleviate salt damage to germination at certain concentration of lysophos.

Materials and Methods

Plant Materials

This study was carried out at the agronomy seed laboratory, crop science department, faculty of Agriculture, Damanhur University, Egypt during the year 2017 at September, October, November and December for the first, second, third and fourth experiment respectively. The aims were to study the germination of the new introduced forage plant *Panicum antidotale* Retunder normal, salinity stress and growth regulators condition by using a controlled and reproducible system or protocol. Fresh seeds were obtained from Agricultural Research Center (ARC), Egypt.

Seed Planting System

The protocol of germination used in this study is adopted from (Wuest, 2007; Wuest and Lutcher, 2012) for wheat and modified to suit seeds. The soil solution was based on the water or NaCl concentrations. The soil mixture used in this study was made from equal proportions of peatmoss, vermiculite and sand. Each of the soil solution treatment and 70 g of soil were mixed for one to two minutes before being placed into the petri dishes (Figure 1). The amount of soil solution added was adjusted to reach full soil saturation without excess water. Pretreated seeds were soaked in the lysophos treatments for two hours then allowed to air dry at ambient temperature in the laboratory $22 \pm 2^\circ\text{C}$. All the four experiments were each done in factorial form

(treatments x days of germination) treatment number varies from one experiment to another and time factor are two (7 and 14 days), using a completely randomized design with ten replications. One piece of filter paper was set on top of the wet soil and seeds were placed on top of the filter paper in order to see the development and to avoid interference with germination. Sixty seeds were then placed on the filter paper, covered with the lid, and incubated at $22 \pm 2^\circ\text{C}$. Light was turned on in the incubator for eight hours per day. The petri dishes were placed lid side down in the incubator in order for the plumules to grow towards the lid and easier to see. Seeds were grown and observed for up to 14 days. However, as normally germinates in three to four days, many of the treatments were fully germinated and scored at 14 days. Germination was scored on the seventh day and fourteenth day after the incubation of the experiment. When a 5-millimeter root or shoot sprouted from the seed, it was considered as germinated. The total number of seeds germinated per petri dish by the end of the experiment was used to measure the germination percentage. This indicated if the rate of germination was affected by the treatments and time. Germination percentage out of 60 seeds was calculated for each petri dish experimental unit. Analysis of variance for germination test was conducted by the PROC GLM procedure of SAS (SAS Inst., Cary, NC, USA). Treatments means were considered significantly different at $P < 0.05$.

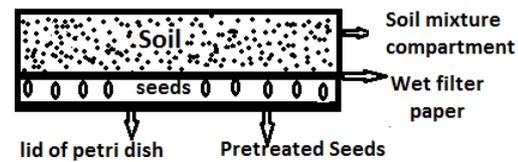


Figure 1: Illustration of the system used to test the germination of seeds treated with either water or various concentrations of lisophos then exposed to saline solutions

Protocols

The first study

Germination test on NaCl concentrations: The experiment was carried out to study the effect of NaCl concentrations on the germination of Blue Panicum. Seven concentration from NaCl were used 0, 1000, 3000, 5000, 7000, 9000 and 11,000 ppm to treat the soil part while seeds were pretreated in water by soaking for 2 hours.

The second study

Germination tests of seeds pretreated with different Lisophos concentrations: The Experiment was done to study the effect of the pretreated seeds with lisophos concentrations before planting on the enhancement of the germination of Blue Panicum. Five concentrations (0 ppm, 5 ppm, 10 ppm, 20 ppm and 40 ppm) were used from lisophos to pretreat seeds before planting in the petri dish system while the soil compartment was reared with just water.

The third Study

Germination tests of seed pretreated with 5 ppm lisophos across different concentrations of NaCl: The experiment three: was conducted to study the effect pretreated seeds with economically concentration of lisophos (5 ppm) on the enhancement of Blue Panicum germination under

different NaCl concentrations (0, 1000, 3000, 5000, 7000, 9000 and 11,000 ppm) in the soil compartment.

The fourth study

Germination tests of seed pretreated with 20 ppm lisophos across different concentrations of NaCl:

The experiment was conducted to study the effect pretreated seeds with high concentration of lisophos 20 ppm on the enhancement of Blue Panicum germination under different NaCl concentrations (0, 1000, 3000, 5000, 7000, 9000 and 11,000 ppm) to the soil compartment.

Statistical analysis

All experiments were done in two way factorial arrangement in CRD with 10 replications. The first factor was the treatments concentrations and the second factor was the number of days after planting in petri dishes. Analysis of variance for germination test was conducted by the PROC GLM procedure of SAS (SAS Inst, Cary, NC, USA). Germination percentages were subjected to arcsin transformation before analysis of variance. The differences between the means were compared by the least significant difference (LSD) test ($p \leq 0.05$). Treatments means were considered significantly different at $P < 0.05$.

Results and Discussion

1- Germination test on NaCl concentrations

To further define the threshold of damage by salt stress for the germination of Blue Panicum seeds, an experimental study was carried out using wide scale of salts concentrations (0, 1000, 3000, 5000, 7000, 9000 and 11,000 ppm) in the soil solution. The data presented in Table

(1) showed that at a certain extent, there was a synergistic effect between salt concentrations and the percentage of seed germination. Since the soil content with NaCl of 1000 or 3000 ppm (led to a significant increase in the germination (61.75% and 53.95% respectively) as compared with the control (47.70%). When salinity was further increased to 5000, 7000, 9000ppm or 11000 ppm, there were a parallel reduction in Blue Panicum seed germination (43.85, 32.20, 19.30 and 11.45% respectively). In other word, the least germination percentage was obtained with NaCl in the soil solution at 110000 ppm followed by NaCl at 9000 ppm that also resulted in a significant reduction in germination percentage relative to the control or even relative to salinity at 1000 ppm or 3000 ppm. Moreover, the time factor revealed that there was a significant increase in the germination of Blue Panicum seeds over the incubation period from 7 to 14 days (19.42 and 58.33 respectively) at the ambient temperature regardless the used treatment. The interaction between the used treatment and the time factor (Table 2) revealed that the greatest increase after 14 days of treatment occurred with seeds on soil solution with 1000 or 3000 ppm from NaCl which both gave (82.0 %). However, there was a significant increase in seed germination between 7 and 14 days of treatment with varying magnitude of increase. The greatest adverse effect on the germination percentage of Blue Panicum seeds was found with NaCl at 11000 ppm followed by salinity at 9000 ppm then at 70000 ppm. Thus the magnitude of reduction in the germination of Blue

Panicum seed germination was proportion to the increase of NaCl concentration with the threshold of damage to germination starting at 5000 ppm.

Field and greenhouse studies on Blue *Panicum* tolerance to salinity are limited at this moment. In general spp. are expected to be a very good source for feeding animal for their high nutrition value (Khan *et al.*, 2009) and recognized to be the most promising species under saline conditions in sandy loam soil (Tomar *et al.*, 2003). One study conducted by (Al-Dakheel *et al.*, 2015b) showed that *Panicummaximiun* is stand well in

soil affected with salinity and considered as moderate species for salt tolerance. Salinity stress for any crop can interfere its physiological process by different manner (Negrão *et al.*, 2017) this disruption started with reduction in plant germination percentage or delay it or even completely stop germination, these can led to incomplete density of pant in the field, some stunted and abnormal growth may appear and finally poor yield obtained (Ahmad *et al.*, 2010; Ihsan *et al.*, 2018). Liu *et al.*, (2014) found that salinityhad synergetic effects on the germination percentage of *Pnicumvirgatum*.

Table 1. Analysis of variance for germination at 7 days and germination at 14 days of the Blue *Panicum* with different experimental treatments.

Source of variations	First study		Second study	
	d.f. ^a	Mean square	d.f. ^a	Mean square
Treatments	6	3019.13**	4	5166.20**
Days	1	21850.93**	1	6067.16**
Treatments *Days	6	400.68**	4	332.66 **
Error	126	28.01	90	82.55
	Third Study		Fourth Study	
Source of variations	d.f. ^a	Mean square	d.f. ^a	Mean square
Treatments	6	320.53**	3	2181.34**
Days	1	11490.28**	1	951.23*
Treatments *Days	6	123.62**	3	65.19ns
Error	126	24.03	72	94.61

^a: degree of freedom, ns: non-significant, * Significant at p-value = 0.05 and ** Significant at p-value = 0.01

Table 2. First Study: Mean percent age of germination test on NaCl treatments, and days after planting.

NaCl conc. In ppm	7 Days after planting	14 Days after planting	Mean
0	19.60 fg	75.80 a	47.70 C
1000	41.50 d	82.00 a	61.75 A
3000	25.90 ef	82.00 a	53.95 B
5000	22.50 efg	65.20 b	43.85 C
7000	10.80 ij	53.60 c	32.20 D
9000	12.09 hi	28.11 e	19.30 E
11000	4.30 j	18.60 gh	11.45 F
Mean	19.42 B	58.33 A	

Data in the same column with different letters indicate a significant difference at P < 0.05

2-Germination tests of seed pretreated with different lisophos concentrations

The influence of various used concentration (0 ppm, 5 ppm, 10 ppm, 20 ppm and 40 ppm) of the natural compound lisophos on germination percentage of the pretreating seeds before planting in the petri dish was reported in (Table 3, Figure 2). The data revealed that the control seeds had the least germination percentage among all treatments. Meanwhile, seeds soaked in lisophos at 5 ppm had a significant increase in their germination as compared with the control. Moreover the response of the seeds to the used concentration gradient showed no further significant alteration in the percentage of germination between pretreatment with lisophos at 5.0 ppm or at 40 ppm. Thus, it is more economic to use 5.0 ppm especially on the production at a large scale. The data also indicated that the concentration of lisophos was increased from 10 to 20 ppm, there was an increase in the germination percentage while the increase from 20 ppm to 40 ppm, there was a significant reduction in such percentage. The time factor indicated to significant change in the germination between the seventh day after treatment compared with assessment after 14 days. Furthermore, the interaction between applied treatment and the time factor showed that all treated seed had a significant increase in the germination percentage in the second assessment after 14 days except with lisophos treated seeds at 20 ppm. The greatest increase over two weeks was obtained with those seed tested with lisophos concentration were equally effective on increasing the germina-

tion after 14 days of the treatment. Insight of the significant increase in the germination percentage in the control seed, but still its percentage after 14 days was lower than other treatments.

Phosphatidylethanolamine is reported as the second most plentiful glycerophospholipid in eukaryotic cells (Calzada *et al.*, 2016) and has a number of miscellaneous applications. Phospholipid such as lisophos is considered as plant growth regulator and maintain cell membrane in its healthier state (Attia and Farag, 2017). Researchers have found that lysophosphatidylethanolamine (LPE) stops one of the key enzymes that breakdown membrane phospholipids so helping to maintain the membranes of living cell healthy, some of diverse application of LPE is prolonging the shelf life of cutting flowers, enhance fruit and plant quality and hastens ripening. Significant researches in field of seed germination is a provide information of high impact to the economic production of the crop and reduce of many agricultural practices to compensate the problem in seed germination in the field. (Asomaning *et al.*, 2011; Suleman *et al.*, 2011). Germination Seed treatment whether by priming techniques or soaking followed by direct seeding can allow seed to germinate and emerge even under adverse agro-climatic conditions Seed treatments is not only promoted germination percentage but they stimulated earlier and stronger plant establishment, also, overcome thermo and photo abiotic stresses and uniform emergence when planted (lee and Kim, 1999; Basra, 2003).

Table 3. Second study: Mean percent age of germination on lisophos concentrations, and days after planting.

Lisophos Conc. (ppm)	7 Days after planting	14 Days after planting	Mean
0	22.70 d	34.500 c	28.6 d
5	68.30 b	87.80 a	78.05 b
10	44.20 c	86.00 a	65.1 c
20	83.40 a	89.66 a	86.53 a
40	65.30 b	92.80 a	79.05 b
Mean	56.78 B	78.30 A	

Data in the same column with different letters indicate a significant difference at $P < 0.05$

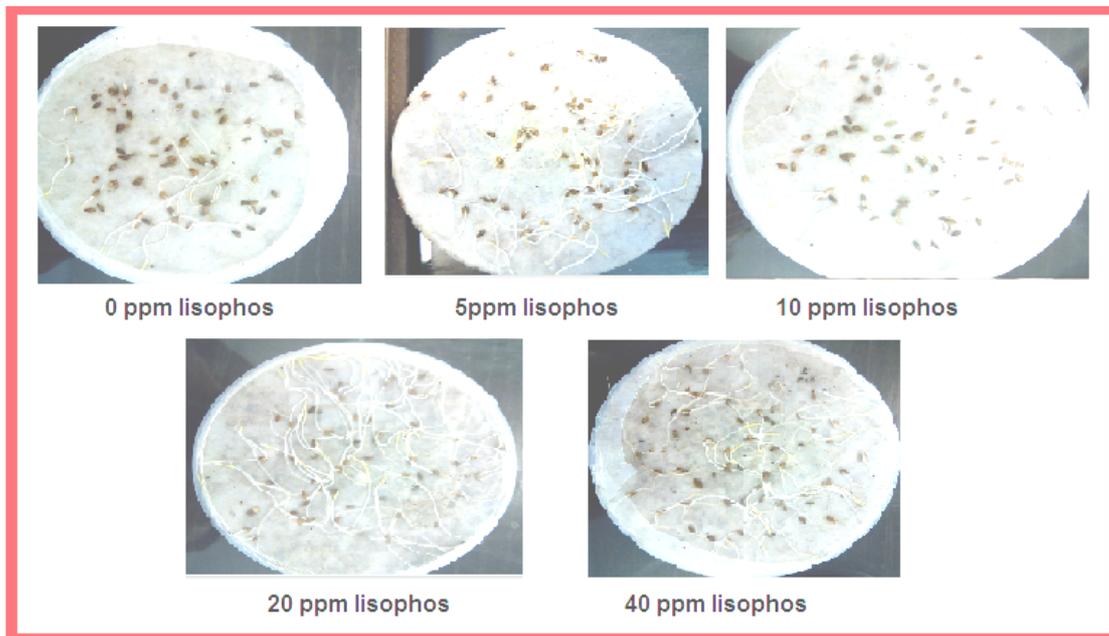


Figure 2. The effect of various concentrations of lisophos on the germination percent-age of the pretreated seed of Blue Panicum after 7 days of planting in petri dish system.

3- Germination tests of seed pre-treated with 5 ppm lisophos across different concentrations of NaCl

To determine any possibility of synergism between low concentration of lisophos at 5 ppm and salinity levels in the soil solution, this study was conducted by using various concentration of NaCl that were 1000 ppm, 3000 ppm, 5000 ppm, 7000 ppm, 9000 ppm, and 11000 ppm. The reported data in (Table 4). Showed that there was a significant increase in the

germination percentage of Blue Panicum by the application of lisophos at 5 ppm to salt exposed seeds at 5000 ppm. However, lisophos - treated seeds by the same concentration that were exposed to salinity of 11000 ppm had a significant reduction in their germination as compared with the control or with lisophos at 5 ppm in the presence of 2000 ppm of NaCl. The time factor showed again a significant increase in the germination between the seventh day of incuba-

tion at ambient temperature at 22°C compared with after 14 days assessment at the same conditions.

Meanwhile, the interaction effect between treatments and the time factor revealed that the greatest increase in the percentage of germination over time was obtained with lisophos treated seeds at 5 ppm after 14 days of incubation while exposed to 1000 ppm of salinity. Moreover, seeds exposed to 7000 ppm, 9000 ppm or 11000 ppm of salinity had similar percentage of germination when compared with control after 14 days of the incubation when pretreated with lisophos at 5 ppm. Meanwhile the incubation of lisophos at 5 ppm - treated seeds in the presence of 3000 or 5000 ppm of NaCl was still able to stimulate the germination of Blue Panicum after 14 days at ambient temperature. Thus

lisophos at 5 ppm was able to alleviate the injury of salts to a certain extent which had a synergistic influence on germination when seeds were incubated along with salinity of 1000 ppm. For maximizing the natural potential of crop seed in the field need to test different compound presented naturally like lisophos or any other synthetic compound. This study is aimed to explore the potential of lysophos phospholipids in stimulating germination of seed under salinity stress condition. It has been reported that phospholipids important in all plant stages and growth. Moreover, they have vital role in many physiological processes to plants such as embryo maturation, seed germination, stimulated cell division and growth, osmotic adjustment and stress tolerance, and organ senescence (Laxaland Munnik, 2002; Cowan 2006).

Table 4. Third study: Mean percent age of germination tests of seed pretreated with 5 ppm lisophos across different concentrations of NaCl.

NaCl Conc. (ppm)	7 Days after planting	14 Days after planting	Mean
0	76.30 e	87.50 cd	81.900 B
1000	68.40 f	95.90 a	82.150 B
3000	60.00 gh	85.10 d	72.550 CD
5000	78.10 e	93.80 ab	85.950 A
7000	61.60 g	88.60 bcd	75.100 CD
9000	63.09 g	92.2 abc	76.200 C
11000	56.10 h	88.20 cd	72.150 D
Mean	66.18 B	90.15 A	

Data in the same column with different letters indicate a significant difference at $P < 0.05$

4- Germination tests of seed pretreated with 20 ppm lisophos across different concentrations of NaCl

To check the possibility of alleviating salinity stress injury, lisophos used concentration at 20 ppm, as concluded from the second experiment the study was used to protect the seed

then they were exposed to salinity stress at either 1000, 3000, or 500 ppm (Table 5). The data indicated that there was an adverse effect on the germination percentage by applying lisophos at 20 ppm in the presence of salinity at 3000 ppm or 5000 ppm since the highest percentage was ob-

tained with the control (water treatment to both the seeds and was obtained with the control (water treatment to both the seeds and the soil system). However the time factor indicated to a significant increase in the germinated seeds after 14 days of incubation as compared with that after 7 days. Regarding the interaction between the treatments and the time factor (Table 4). The data showed a trend of increase in the germination percentage between 7 and 14 days of incubation periods in the control and lisophos treated seed then exposed to adjacent salinity at 5000 ppm. However, no difference was found over that period between seeds exposed to either 3000 ppm or 5000 ppm that were pretreated with either 3000 or 5000 ppm that were pretreated with lisophos at 20 ppm. Thus the use of lisophos at relatively higher concentration was able to alleviate the damaging effect of 5000 ppm of NaCl (Table 4). It is now well establish the role of phospholipids in promoting plant development and maintain it healthy also across the agrochemical markets there are many phospholipid-

based growth regulators for commercial agriculture application which is open an attractive and challenging field of research(Cowman, 2006). Lisophos may act to repair the damage to seed cells membranes, which avoid its damage (Farag and Palta, 2003). The ability of germination under different concentrations of lisophos could be attributed to the effect of lisophos on enhancing the activity of the natural GA formation and its effect on the increase in α -Amytase enzyme that causes the bioassay of starch to sugar (Arfeca, 1996).

The exposure to certain lisophos concentration was also able to mitigate the damage by some abiotic or biotic stresses and maintaining the integrity if the seeds cell plasma membrane (Farag and Palta, 2003). It was also reported that the lysophosphatidylethanlalamine might be delaying tissue senescence and reducing electrolyte leakage through the plasma membrane by repairing the damage of that membrane, thus reducing cell leakage and reducing the injury of rapid imbibition (Farag and Palta, 1993).

Table 5. Fourth Study: Mean percent age of germination tests of seed pretreated with 20 ppm lisophos across different concentrations of NaCl

NaCl Conc. (ppm)	7 Days after planting	14 Days after planting	Mean
0	68.10 a b	78.20 a	73.15 A
1000	41.30 b	51.30 b	46.30 B
3000	46.40 b	50.30 b	48.35 B
5000	27.30 c	43.10 b	35.20 C
Mean	45.77 B	55.72 A	

Data in the same column with different letters indicate a significant difference at $P < 0.05$

Conclusion

This investigation is considered as preliminary study to explore the potential of the new crop Blue pan-

cuim as salt tolerant crop using suitable protocol for germination able to observe germination clearly in petri dish using real soil than using small

pots. Results of this study revealed that Blue Panicum. Showed a significant increase in the germination on the soil content with NaCl of 1000 or 3000 ppm. Seed pretreated with 5 ppm lisophos protected the seed from salinity injury on concentration up to 5000 ppm. On other hand data indicated that there was an adverse effect on the germination percentage by applying high concentration of lisophos (20 ppm) under salinity condition 3000 ppm or 5000 ppm since the highest percentage was obtained with the control. The study concluded that Blue Panicum is a salt tolerant crop, seed pretreated with plant growth regulators like lisophos may increase its tolerance when apply at certain concentrations or dose.

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تأثير مستويات مختلفة من الإجهاد الملحي، على إنبات بذور البلونيكام وإمكانية تخفيف الأضرار بواسطة ليزوفوسفاتيديل إيثانول امين

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المخلص:

يعتبر البلونيكام محصول علف جديد تم إدخاله مؤخراً إلى مصر ، مما يتطلب تقييم مدى تحمله لإجهاد الملوحة يعتبر امر ضروري لتوفير معلومات جديدة حول هذا المحصول الجديد. أهداف الدراسة هي (١) دراسة تأثير مستويات مختلفة من الإجهاد الملحي، على إنبات البذور (٢) تحديد حدود الضرر على إنبات البذور عن طريق زيادة تركيز الإجهاد الملحي ، (٣) تحديد إمكانية تعزيز إنبات البذور عن طريق المعالجة المسبقة للبذور بالليزوفوس ليزوفوس (٤) دراسة الأثر التشجيعي بين ليزوفوس ومستوى الملوحة المنخفض لتخفيف تأثير الملح على الإنبات عند تركيز معين من ليزوفوس. أظهرت النتائج أن هناك ، إلى حد ما ، تأثير تشجيعي بين تركيزات الملح ونسبة إنبات البذور. تركيز محتوى التربة من كلوريد الصوديوم ١٠٠٠ أو ٣٠٠٠ جزء في المليون أدى إلى زيادة كبيرة في الإنبات (٦١,٧٥ % و ٥٣,٩٥ % على التوالي) بالمقارنة مع الكنترول (٤٧,٧٠ %). أما عن دراسة تأثير عدة تركيزات (٠ جزء في المليون ، ٥ جزء في المليون ، ١٠ جزء في المليون ، ٢٠ جزء في المليون و ٤٠ جزء في المليون) من المركب الطبيعي ليزوفوس على نسبة إنبات للبذور سابقة المعاملة بالتركيزات المختلفة منه. قد كشفت النتائج أن بذور الكنترول كانت أقل نسبة إنبات بين كل التركيزات المختلفة من ليزوفوس. للتحقق من إمكانية التخفيف من اثر الضرر لإجهاد الملوحة ، استخدمت تركيزات الليزوفوس عند ٥ جزء في المليون و ٢٠ جزء في المليون ، لحماية البذور قبل التعرض لتركيزات الملوحة. أظهرت البيانات أن هناك زيادة معنوية في نسبة الإنبات للبلونيكام عن طريق استخدام الليزوفوس عند ٥ جزء في المليون تحت إجهاد الملوحة عند ٥٠٠٠ جزء في المليون. من ناحية أخرى ، أشارت البيانات إلى وجود تأثير ضار على نسبة الإنبات عن طريق تطبيق الليزوفوس بتركيز ٢٠ جزء في المليون في وجود الملوحة عند ٣٠٠٠ جزء في المليون أو ٥٠٠٠ جزء في المليون ، حيث كانت اعلى نسبة إنبات تم الحصول عليها مع الكنترول . هذه الدراسة قد تضيف معلومات قيمة عن تحمل البلونيكام للملوحة وقدرات الليزوفوس كمنظم للنمو في تحفيز إنبات بذور البلونيكام وتخفيف ضرر الملوحة وزيادة قدرة البذور على الإنبات.