Journal of Animal Environment

(E-ISSN 2717-1396, ISSN 2717-1388)

Original Research Paper

Effect of different dilution of Fresh Cow Milk and Hydro-priming Of Sea Water On Seed Germination Of *Glycine max* L.

Aiad Abdelkareim Akhreim Alzway[1] Ghazala Ahmad Hamaden Mansour[2] Idress Hamad Attitalla[3]*

[1]Department of Botany, Faculty of Sciences, University of Omer Al-Mukhtar, Albida – Libya.
Email Id: aiad.abdelkareim@omu.edu.ly
[2]Department of Botany, Faculty of Sciences, University of Benghazi, Benghazi – Libya
Email Id: ghazala.mansour@uob.edu.ly M.Sc. at Department of Botany, Faculty of Sciences, University of Benghazi, Benghazi – Libya.
[3]*Faculty of Science, Department of Microbiology. Faculty of Health Sciences formally Medical Technology (Dean), Omar Al Mukhtar University, Box 919, Al-Bayda, Libya.
Email Id: idress.hamad@omu.edu.ly

Abstract:

To meet the demand for an appropriate soaking duration and priming type, there is a need to embrace cheap, fast, natural, accessible, and adaptable physiological techniques as soaking of seeds in fresh cow milk(FCM) and sea water (SW). Fresh cow milk contains hormones that relieve seeds physiological and mechanical dormancy. In light of this, this study was conducted to assess the effect of fresh cow milk and hydration on different seed quality attributes like Germination percentage, Mean germination time, Germination rate, Mean daily germination, Germination , Coefficient of germination velocity, Germination value, Peak value. The study involved two factors, different hydropriming of sea water and different concentrations of fresh cow milk (0.0, 25%,50% 75% and 100%) and the other factor was seed soaking duration with 3 levels (6, 12 and 24 hours). Result revealed that the percentage germination and germination rate and mean daily germination value of seeds soaked in all concentrations of fresh cow milk for time 6,12 hour of was increases in GP%, MDG, GR, CGV in higher concentration 75,100% compared to control. The percentage germination % and GR and MDG and CGV for all concentrations and treatment times for seeds soaked in sea water. The result revealed that decreases of same parameters for soaking duration 6,12 hour in higher concentration of sea water.

Key words: Fresh cow milk, Hydration, Sea water, *Glycine max*.Soaking duration

Introduction :

Soybean (*Glycine max* .L.) is one of the most important contributors to protein and vegetable oils. Water deficit during growth stages can limit soybean yield (Candogan *et al*., 2013). Plant Characteristics: Annual plant with groups of three hairy leaflets and a raceme of white to pink flowers. The soybean, or soya bean is a species of legume native to East Asia, widely grown for its edible bean. Soy is a staple crop, the world's most grown legume, and an important animal feed. Soy is a key source of food, useful both for its protein and oil content. Soybean is frequently grown in stressful environments; such as soils with high arsenic concentrations (Masuda and Goldsmith 2009, Bundschuh J *etal* 2012). Soybean (*Glycine max*) contains protein content of approximately 35-50% of protein depending on its origin. It is a significant source of protein for humans and is also beneficial for animal nutrition. A good source of several necessary amino acids is soybean protein. Phytoestrogens, conjugated carbohydrates, inorganic compounds, fatty acids (soybean oil), and inorganic substances are also found in large quantities in soybean. A significant amount of unsaturated fatty acids, B vitamins, and minerals like nitrogen, potassium, magnesium, iron, calcium, and phosphorus enhance their nutritional value (Rucinski P, 2018). Vegetable soybean is regarded as a functional food crop because it is abundant in phytochemicals that are good for humans (Beckman and Ames. 1997). Inadequacy of simple, cheap, fast, natural, accessible and adaptable modern physiological methods such as the use of fresh cow milk and sea water to break dormancy of the *Glycine max*. Most of the methods of pre sowing treatment such as physical, chemical and mechanical only

*Corresponding Author:
Received: 25th May, 2026; Revised: 6th June, 2026; Accepted: 8th June, 2026; Available Online: 29rd July, 2026
(DOI): 10.70102/AEJ.2026.18.2s.35

degrade the seed coat for germination (Aliero, 2004; Abubakar and Muhammad, 2013) without, always, rapidly and uniformly influencing the physiology of the seeds (Dewir *et al*., 2011) and seedlings (Gehlot and Kasera, 2012) as well as not overcoming physiological dormancy of seeds (Habib *et al*., 2015). There is dearth of information on the effect of natural sources of hormones such as fresh cow milk and sea water on the germination of the seeds of *Glycine max* species. In light of this, this experiment was conducted to assess the effect of fresh cow milk and hydration on the germination and mean germination time of *Glycine max*. Hormones help to relieve physiological dormancy in seeds (Schmidt, 2000) as well as encourage mass production of seedlings for agro-forestry programmes (Adelani *et al*., 2014a). Salt stress often causes serious problems in crop species production areas. Salinity is one of a major threat in harvesting good some plants. In this study, potential of seed priming techniques to improve the performance of *G.max* in a saline field was tested. this is seed priming is a technique which is used to improve seed germination in field. The salt stress caused cell membrane damage, production of toxic chemicals and accumulation of reactive oxygen species in the plant body (Govt 2018:Sarker *etal*., 2015). We have conducted our research while keeping few research objectives in mind as given below. The seed priming is an affective parameter which reduces adverse impacts of salinity. The seed priming is an effective and durable technique to enhance the performance of abiotically stressed plants, in term of biochemical and physiological changes (Oliveira & Gomes-Filho, 2016). The seed priming with various types of salt solution having high osmotic potential, can be used to proceed first seed imbibition phase, but prevent radical projection phase (Mustafa *et al*., 2017). The wide variety of seed priming techniques were deployed to induce positive pre-germination changes in seed. Environmental stresses reduce the quality and quantity of agricultural production. (Pirasteh-Anosheh *et al*., 2016b). Salinity is a major factor limiting crop production in the world. (Maas and Hoffman, 1977) believed that salt stress is one the most important abiotic stresses that adversely affecting plant growth and development and crop yield. Many of scientists and the experts believe salinity and drought are equally important in having adverse effects on plants and could not say that one being more important than the other. Plants experience salt stress at different growth stages, such as germination, vegetative and reproductive growth. Under stressful environments, rapid and uniform germination of crops, particularly of annuals, is necessary to achieve enhanced quality and yield potential (Pirasteh-Anosheh *et al*., 2014). An important approach to increase crop yield under salt stress is seed invigoration. Seed invigoration strategies include hydropriming, Plant establishment is improved by seed priming in many crop species. Priming is defined as seed pre-sowing in solutions that allow them to imbibe water to improve the first stage of seed germination; however, this prevents radical protrusion through the seed coat. Seed germination is a critical stage of the plant life cycle. During germination, the dormant seed becomes highly active and eventually becomes a healthy seedling (Rajjoul *etal*., 2012, Finch- and Leubner- 2006).

1.2. Materials and methods

1.2.1. Experiment details

Experimental Procedure:

Experiment : Effect of fresh cow milk and sea water on the germination of the *glycine. max* seeds.

Factor A: Types of priming . hydropriming, (0.0 % distal water and sea water 25%,50%,75%,100%) and priming with (25%,50%,75%,100%) fresh milk of cow.

Factor B:Soaking duration with three levels i.e. 6 h, 12 h, and 24 h. To investigate the effect of fresh cow milk on the germination of the *g. max* seeds , a split-plot experimental design with three replications was involved (Nuga *et al*., 2014; Aduradola, 2000; Aduradola, 2003; Goos and Vandebroek, 2003; Aduradola, 2004; Aduradola *et al*., 2005; Gomez and Gomez, 1984, Sananse and Maidapwad, 2014). Four concentrations of fresh cow milk and sea water (25, 50, 75 and 100%) and three treatment times (6, 12 and 24 hours) constituted main and sub plot treatments, respectively. thirty (30) seeds were soaked in four concentrations of fresh cow milk and sea water (25, 50, 75 and 100%) for 6, 12 and 24 hours. The concentration of fresh cow milk was prepared in the laboratory after treatment, seeds were washed with distilled water and air dried for 30 minutes and treated with fungicides (vinclozolin) to prevent seed from fungi contamination which can negatively affect germination. Seeds that were not soaked in fresh cow milk and sea water served as control. A seed was considered germinated when the radicle was able to break open the seed coat at the sight of plumule emergence. For both experiments, germination percentage and mean germination time were calculated using the following formula (1 and 2) suggested by Schelin *et al*., (2003). Sample of ten (10) seeds were taken for each treatment method (sea water and fresh cow milk), and untreated (control), which gives a total number of 30 sample seeds for the research. The germination percentage for each seed batch (10 replications of each 3 treatments) was taken for a period of one week (7) days after sowing. he data was subjected to analysis of variance (ANOVA) after observation for a period of one week (7) days after sowing in order to know the difference between the treatments.

1.2.2. Measurements

1.2.2.1. Germination test

Data were recorded considering the following parameters:

1- Germination percentage (%) = = number of seeds that germinated / Number of seeds sown * 100. (Ruan *et al*., 2002)

2- Mean germination time was calculated using the relation. (Labouriau and Valadares, 1976; Labouriau, 1983; Ranal and Santana, 2006)

Mean germination time (MGT) = n1 x d1 + n2 x d2 + n3 x d3 + --------/ Total number of days. Where (n) is the number of germinated seed (d) is the number of days. (Ellis & Roberts (1981)

3-Mean Daily Germination(MDG) = Final GP / number of days to final GP. (Czabator, F. J. (1962). Scott SJ, *etal*., (1984)

4-Germination rate (GR)= N / D (Rastegar. *et al*., 2011)

(N) number of emerged seeds in day (D) is day after planting

5-Coefficient of germination velocity (CGV) = A_1+ A_2 + A_3…+ A_n/ A1T1 + A2T2 +….. (Maguire 1962)

Where (A) is the numbers of seeds germinating and (T) is the number of days taken to germinate, was calculated.

6- Peak Value (Czabator, F. J. (1962).;Shatpathy,*etal*., 2018).

PV = Highest germinated seed / Number of days.

7- Germination Value (Czabator, F. J. (1962).;Shatpathy,*etal*., 2018)

GV = PV X MDG.

2.2.3. Analysis of Data:

Data collected were analyzed using computer program of Minitab (Version 13) a one-way analysis of variance (ANOVA) test to check significant differences among the means. The differences between the means were compared and all results were considered statistically significant at P < 0.05. (Steel et al., 1996).

3. Results

3.1. Effects of fresh cow milk and sea water:

3.1.1. Seed germination:

Table 3.1. Shows of the means differences among control and four other treatment of sea water (SW) and fresh cow milk (FCM) and soaking duration 6,12 and 24 hour, considering the performance of seed germination percentages of *Glycine max*. Mean of seed germination percentages (%) of soybean were calculated under different dilutions of salinity of sea water and fresh cow milk. Observed that , results of (Table &Fig .3.1) showed that there are significant differences between effective treatments (SW & FCM) on germination characteristics and the different treatments resulted in significant differences among germination properties. This parameters were significantly germination percentages for soaking duration 6,12 and 24 hour of the germination period. The results of this research showed that the germination percentage of *Glycine max* increase due to the application of priming in different duration and concentrations. According to the obtained results, treatment for 75,100% fresh cow milk with 6 and 12 hour soaking duration was the most effective treatments for improvement of seed germination(F=15.61,P <0.000 ,F=29.35,P <0.000) respectively. Whereas higher concentrations of cow milk and sea water 75,100% and soaking duration 24 hour, were lower germination percentages (F=23.20,P <0.000,F=199.92,P <0.000) respectively. Tukey's pairwise comparisons test reveals

Table 3.1. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on the Seed Germination Percentage % for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.
Different letters = significant

reatment	Germination Percentages %					
	H (SW)	2 H(SW)	4 H (SW)	H (CM)	2H(CM)	4(CM)
.00	3.30^{a}± 1.80	3.30^{a}± 2.30	0.00^{a}± 2.60	3.30^{a}± 1.80	3.30^{a}± 2.30	0.00^{a}± 2.60
5	3.30^{b}± 2.30	6.70^{b}± 3.90	6.70^{a}± 3.80	0.00^{b}± 4.01	6.70^{b}± 4.90	6.70^{b}± 2.30

0	0.00^{a}±1.50	0.00^{c}±1.50	0.00^{b}±0.00	3.30^{b}±2.30	3.30^{b}±3.20	0.00^{b}±1.50
5	3.30^{b}±2.30	0.00^{ad}±0.00	3.30^{c}±1.75	6.70^{c}±2.30	3.30^{a}±3.50	6.70^{c}±0.90
00	3.30^{c}±3.20	6.70^{d}±0.88	.30^{d}±0.90	6.70^{c}±3.20	0.00^{c}±2.60	6.70^{c}±1.70

Note: SW = Sea Water , CM = Cow Milk ,H=Hour. GP% = Germination Percentage %.

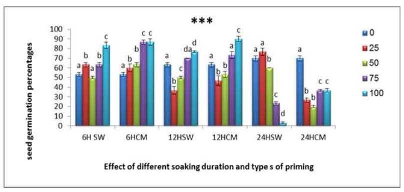

Fig 3.1. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on seed germination percentage % for each 6, 12 and 24 H of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SE Mean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk.

significant differences in germination percentages of *Glycine max* between higher concentrations of fresh cow milk, and sea water (75 , 100 %). And among lower concentrations 25,50% for same priming including the control and soaking time 6,12 and 24 hour for germination percentages. The result of main effect of treatment times on the germination of seeds *Glycine max* soaked in sea water(SW) is presented in Table 3.1. The percentage germination value was lowest (75,100%) for control treatment and highest (25, 50%) for seeds soaked in sea water for 24 hours (figure3.1.). whereas showed the result of germination percentages on soaked in (SW) for 6 and 12 hours was higher (75,100%) for concentration SW. Significant percentage germination was recorded for seeds soaked for all treatment times compared to control. It can be deduced that variation among treatment time did not influence germination percentage of *G.max* seeds. Increase in treatment time did not significantly increase the germination percentages of seeds. Table. and figure 3.2 observed that mean germination rate (GR) was increases on the higher dilution 75,100% for fresh cow milk and soaking duration 12 hour, this parameter was significantly(F=29.35,P<0.000), The (GR) period. Tukey's pairwise comparisons test reveals significant differences in germination rate of *G max* the results showed significant differences within different treatments of the same dilutions, higher dilution 75,100% of sea water was decrease on soaking duration 12 hour (F=56.07,P<0.000). unlike the higher concentration 75,100% of cow milk and sea water for24hour of soaking time ,show the result of decreases compared for lower concentration for same concentration for sea water(F=23.20,P <0.000,F=199.92,P <0.000) respectively. Besides ,the 6hour for cow milk and sea water increases (F=15.61,P<0.000,F=32.41,P <0.000) respectively.

Table 3.2. Effect of different dilutions of salinity of water(sea water) and fresh cow milk on the Germination Rate (GR) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean Similar letters = not significant. Different letters = significant

reatment	R 6H (SW)	R 6H(CM)	R 12 H (SW)	R 12 H (CM)	R 24 H (SW)	R 24 H (CM)
.00	.80^{a}±0.02	.80^{a}±0.02	.90^{a}±0.03	.90^{a}±0.03	.00^{a}±0.03	.00^{a}±0.03
5	.90^{b}±0.03	.90^{b}±0.06	.55^{b}±0.05	.70^{b}±0.06	.09^{a}±0.05	.40^{b}±0.03
0	.70^{a}±0.02	.90^{b}±0.03	.70^{c}±0.02	.80^{ab}±0.05	.90^{b}±0.00	.30^{b}±0.02
5	.90^{b}±0.03	.20^{c}±0.03	.00^{d}±0.0	.05^{c}±0.05	.30^{c}±0.03	.52^{c}±0.01
00	.20^{c}±0.04	.95^{b}±0.04	.10^{e}±0.01	.30^{d}±0.04	.05^{d}±0.01	.52^{c}±0.02

Note: SW = Sea Water , CM = Cow Milk, H= Hour, GR= Germination Rate.

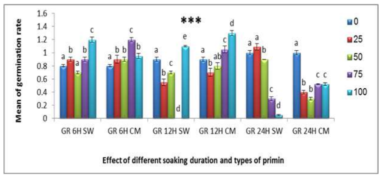

Fig 3.2. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on mean germination rate(GR) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk

Parameter of mean germination time of *glycine max* under different dilution of fresh cow milk (FCM) and sea water (SW), this parameter was significantly (F=15.37,P <0.000,F=183.12 P<0.000)respectively. Tukey's pairwise comparisons test reveals significant differences in mean germination time of *G max* the results showed significant differences within different treatments of the same dilutions, higher dilution the result observed of increase on higher concentration 100% for 6,12 hour of sea water and reduced (MGT) of cow milk (Table 3.3). The result of the experiment revealed that soaking of 24 hour was decrease for MGT of (SW) and (FCM)(F=180,P<0.000,F8.92=,P<0.000) respectively. Figure 3.3.

Table 3.3. Effect of different dilutions of salinity of water(sea water) and fresh cow milk on the Mean Germination Time (MGT) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean Similar letters = not significant. Different letters = significant

reatment	GT 6H (SW)	GT 6H (CM)	GT 12 H (SW)	GT 12 H (CM)	GT 24 H(SW)	GT 24 H(CM)
.00	.30^{a} ±0.02	.30^{a} ±0.02	.70^{a} ±0.04	.70^{a} ±0.04	.14^{a} ±0.09	.14^{a} ±0.09
5	.20^{b} ±0.10	.70^{b} ±0.13	.40^{b} ±0.16	.80^{b} ±0.20	.70^{b} ±0.12	.70^{b} ±0.11
0	.90^{ab}±0.06	.14^{a} ±0.06	.80^{a} ±0.13	.30^{a} ±0.14	.30^{a} ±0.09	.09^{c} ±0.14
5	.70^{bc}±0.20	.30^{c} ±0.20	.90^{c} ±0.10	.30^{a} ±0.12	.30^{c} ±0.10	.70^{b} ±0.04
00	.00^{d} ±0.40	.30^{ad}±0.20	.00^{d} ±0.10	.30^{c} ±0.15	.30^{d} ±0.08	.80^{b} ±0.09

Note: SW = Sea Water , CM = Cow Milk, H=Hour, MGT= Mean Germination Time.

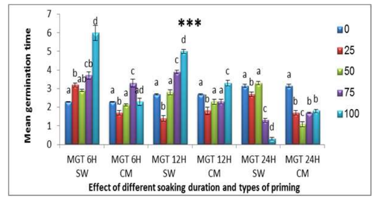

Fig 3.3. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on mean germination time (MGT) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk

Result of parameter mean daily germination (MDG) for soy bean table & figure 3.4 has increased with soaking duration up to 6,12 hours and then it starts declining of 24 hour for soaking duration for fresh cow milk (F=23.20,P<0.000), this parameter was significantly (F=32.41, ,P<0.000, F=29.35,P<0.000) respectively. Tukey's pairwise comparisons test reveals significant differences in mean daily germination of *G max* the results showed significant differences within different treatments of the same dilutions, the result observed of increase on higher concentration 75,100% for 6,12 hour of sea water and reduced (MDG). Table 3.4. Results reveal that a great influence on (MDG)for seed soy bean. FCM (fresh cow milk) has considered better priming agent than that of (SW) sea water.

Table 3.4. Effect of different dilutions of salinity of water(sea water) and fresh cow milk on the Mean Daily Germination (MDG) for each 6 ,12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant. Different letters = significant

reatment	DG 6H	DG 6H (CM)	DG 21H (SW)	DG 12 H	DG 24 H(	DG 24 H

	(SW)			(CM)	SW)	(CM)
.00	$.60^{a}\pm0.25$	$.60^{a}\pm0.25$	$.05^{a}\pm0.33$	$.05^{a}\pm0.33$	$0.00^{a}\pm0.4$	$0.00^{a}\pm0.4$
5	$.05^{b}\pm0.30$	$.60^{b}\pm0.60$	$.24^{b}\pm0.55$	$.70^{b}\pm0.70$	$1.00^{b}\pm0.6$	$.80^{b}\pm0.30$
0	$.10^{a}\pm0.22$	$.05^{a}\pm0.30$	$.10^{ab}\pm0.22$	$.62^{c}\pm0.45$	$.60^{b}\pm0.00$	$.90^{c}\pm0.20$
5	$.05^{b}\pm0.30$	$2.40^{b}\pm0.30$	$0.00^{c}\pm0.0$	$0.5^{a}\pm0.50$	$.30^{c}\pm0.25$	$.24^{d}\pm0.13$
00	$1.9^{c}\pm0.45$	$.50^{c}\pm0.45$	$1.00^{ab}\pm0.12$	$2.9^{dc}\pm0.4$	$.50^{d}\pm0.13$	$.24^{d}\pm0.25$

Note: SW = Sea Water , CM = Cow Milk, H=Hour, MDG= Mean Daily Germination.

The results of the main effect of different concentrations of fresh cow milk and sea water on the coefficient of germination velocity (CGV) of *glycine max* seeds are presented on table and figure 3.5. Been shown to the (CGV)values of seeds same plant , soaking duration 6, 12 hour been shown result , the higher concentrations of fresh cow milk 75,100% increase than same concentration sea water was decrease. ($F=18.57, P<0.000, F=24.27, P<0.000$) respectively. The lowest of (CGV) value was

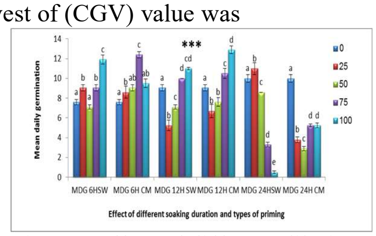

Fig 3.4. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on mean daily germination (MDG) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.
* ** = significant at $P< 0.001$. ± = SEMean. Similar letters = not significant.
Different letters = significant. SW = Sea water . CM = Cow milk

recorded for seeds treated in 75,100% concentration of fresh cow milk and sea water for soaking 24 hour. The coefficient of germination velocity of seeds soaked among different concentration of fresh cow milk were significantly different ($F=20.24, P<0.00, F=232.16, P<0.00$) respectively. It can be inferred that high concentration of fresh cow milk , influence the CGV of seeds soy bean. Tukey's pairwise comparisons test reveals significant differences in CGV of *Glycine max* between higher concentrations of fresh cow milk, and sea water and lower concentration fresh cow milk and sea water. Results of parameters of Germination Value (GV) on seed soy bean by different of fresh cow milk and sea water were the results generally reduced GV in soaking 24 hour in higher concentration all priming types ($F= 20.63, P< 0.000, F=84.20, P< 0.000$) respectively. Tukey's pairwise comparisons test reveals significant differences in GV of *Glycine max* between higher concentrations of fresh cow milk, and sea water and lower concentration fresh cow milk and sea water. The influence of FCM on the height GV of *G max* grown under different dilution for FCM and SW . shown in table and figure 3.6. The heights of GV of G max in higher concentration 75,100% were promotes on all priming types for soaked duration 6,12 hour and decreases on lower concentration for soaking 6,12 hour for FCM and SW ($F=18.19, P<0.000, F= 34.52, P<0.000, F=34.57, P<0.000, F=69.76 ,P<0.000$) respectively.

Table 3.5. Effect of different dilutions of salinity of sea water(SW) and fresh cow milk (FCM) on the Coefficient of Germination Velocity (CGV) for each 6 , 12 and 24 h of *Glycine max* L. (soybean) seeds.
* ** = significant at $P< 0.001$. ± = SEMean. Similar letters = not significant. Different letters = significant.

treatment	GV 6H (SW)	GV 6H (CM)	GV 12 H (SW)	GV 12 H (CM)	GV 24 H (SW)	GV 24 H (CM)
.00	$.33^{a}\pm0.008$	$.33^{a}\pm0.008$	$.33^{a}\pm0.006$	$.33^{a}\pm0.006$	$.31^{a}\pm0.005$	$.31^{a}\pm0.005$
5	$.30^{a}\pm0.006$	$.50^{b}\pm0.010$	$.40^{b}\pm0.012$	$.40^{b}\pm0.015$	$.40^{b}\pm0.007$	$.20^{b}\pm0.006$
0	$.25^{b}\pm0.007$	$.40^{c}\pm0.008$	$.30^{c}\pm0.012$	$.33^{a}\pm0.001$	$.30^{a}\pm0.008$	$.30^{a}\pm0.022$
5	$.25^{b}\pm0.003$	$.40^{c}\pm0.011$	$.26^{c}\pm0.008$	$.45^{b}\pm0.013$	$.25^{c}\pm0.003$	$.32^{a}\pm0.010$

00	.20^{c} ±0. 008	.43^{c} ±0. 015	.22^{d} ±0. 002	.40^{b} ±0. 009	.06^{d} ±0. 015	.30^{a} ±0. 000 5

Note: SW = Sea Water , CM = Cow Milk ,H = Hour, CGV = Coefficient of Germination. Velocity

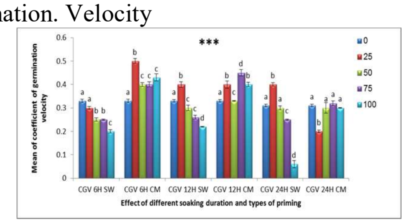

Fig 3.5. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on Coefficient of Germination Velocity (CGV) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk

Table 3.6. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on the Germination Value (GV).for each 6,12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant. Different letters = significant.

reat me nt	V 6H (S W)	V 6H (C M)	V 12 H (S W)	V 12 H (C M)	V 24H (S W)	V 24 H (C M)
.00	.99^{a} ±0. 40	.99^{a} ±0. 40	.50^{a} ±0. 60	.50 ^{a}±0 .6	0.4 0^{a}± 0.7 0	0.4 0^{a}± 0.7
5	.50^{b} ±0. 6	.30^{b} ±0. 90	.60^{b} ±0. 50	.90 ^{b}±0 .8	2.9 0^{b}± 1.1 6	.80^{b} ±0. 20
0	.20^{a} ±0. 30	.50^{a} ±0. 60	.24^{c} ±0. 30	.40 ^{b}±0 .6	.35^{c} ±0. 00	.90^{c} ±0. 12
5	.50^{b} ±0. 6	5.6 0^{b}± 0.8	0.0 0^{a}± 0.0	1.7 ^{c}±1 .1	.30^{d} ±0. 14	.80^{d} ±0. 12

00	4.8^{c} ±1. 02	.6^{c}± 0.9 0	2.0 4^{d}± 0.3	6.9 ^{d}±0 .9	.07^{d} ±0. 02	.90^{d} ±0. 30

Note: SW = Sea Water , CM = Cow Milk ,H=Hour. GV= Germination Value.

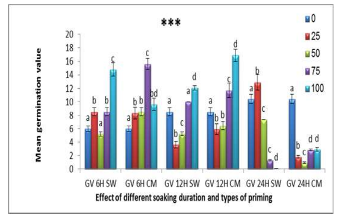

Fig 3.6. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on germination value (GV) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk

Mean of seed germination peak value (PV) of soy bean were calculated under different concentrations of fresh cow milk and sea water. Observed that , results of (Table and figure 3.7) showed that there are significant differences among effective treatment (FCM, SW) on germination peak value characteristics and the different treatments resulted in significant differences between (PV) properties. This measurement were significantly on peak value for soaking duration 6 ,12 and 24 hour The results of this research showed that the (PV) of *Glycine max* increase due to the application of priming in different duration and concentrations. According to the obtained results , treatment for 75,100% fresh cow milk with 6,12 hour soaking duration was the most effective treatments for improvement of peak value (F=15.61,P<0.000,F=32.41,P<0.000,F=29.35, P<0.000,F=56.07,P<0.000). respectively. Whereas higher concentrations of fresh cow milk and sea water 75,100% and soaking duration 24 hour were lower PV(F=23.20,P<0.000,F=199.92,P<0.000) respectively. Tukey's pairwise comparisons test reveals significant differences in PV of *Glycine max* between higher concentrations of fresh cow milk, and sea water (75 , 100 %). And among lower concentrations 25,50% for same priming including the control and soaking time 6,12 and 24 hour for germination peak value.

Table 3.7. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on the Peak Value (PV) for each 6 , 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant. Different letters = significant.

reatment	V 6H (SW)	V 6H (CM)	V 12 H (SW)	V 12 H (CM)	V24H (SW)	V 24 H (CM)
.00	.80^{a} ±0.025	.80^{a} ±0.025	.90^{a} ±0.033	.90^{a} ±0.033	.00^{a} ±0.040	.00^{a} ±0.04
5	.90^{b} ±0.030	.90^{b} ±0.06	.50^{b} ±0.055	.66^{b} ±0.07	.09^{a} ±0.050	.40 ^{b}±0.03
0	.70^{a} ±0.022	.90^{a} ±0.03	.70^{c} ±0.022	.80^{a} ±0.04	.90^{b} ±0.000	.30^{c} ±0.02
5	.90^{b} ±0.030	.20^{b} ±0.03	.00^{a} ±0.00	.05^{c} ±0.05	.30^{c} ±0.03	.50 ^{d}±0.01
00	.20^{c} ±0.040	.95^{c} ±0.04	.09^{a} ^{d}±0.01	.30^{d} ±0.04	.05^{d} ±0.012	.50 ^{d}±0.02

Note: SW = Sea Water , CM = Cow Milk, H=Hour. PV= Peak Value.

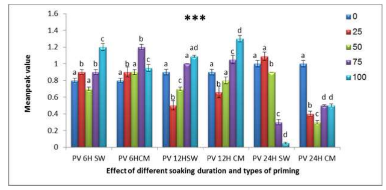

Fig 3.7. Effect of different dilutions of salinity of water (sea water) and fresh cow milk on peak value (PV) for each 6, 12 and 24 h of *Glycine max* L. (soybean) seeds.

* ** = significant at P< 0.001. ± = SEMean. Similar letters = not significant.

Different letters = significant. SW = Sea water . CM = Cow milk.

The seeds of most wild plants and legumes require a period of dormancy before they will germinate. This genetic requirement ensures that the seed will "wait at least" at least until the next favorable growth period. Some seeds can remain dormant and yet viable with embryo in a state of suspended animation for hundreds of years Eventually, the embryo resumes growth (Cutis and Barnes, 1983).. The excellent performance of fresh cow milk in breaking the dormancy in Glycine max seeds in the study could be attributed the presence of hormones such as (IAA) Indole Acetic Acid and (ABA) Abscissic acid (Adelani and Maisamari, 2016). Cow milk (organic) has been shown to contain 35 different hormones and 11 growth factors (Djamgoz and Jane, 2015). Hormones are known to speed up the rate of germination of plant seeds. Major plant growth regulators (PGRs) significantly enhanced seed germination rate in black gram and horse gram (Chauhan *et al.,* 2009), floral buds in Jojoba (Prat *et al*., 2008) and other growth parameters in different plants. Growth regulators are organic substances besides nutrients, synthesized in plants, causing alteration in their cellular metabolism (Rastogi *et al*., 2013). Various studies of hormonal treatments for different crops, Senna siamea, Prosopis africana and Parkia biglobosa seeds (Ebofin *et al*., 2003) and in Lagenaria siceraria seeds (Vwioko and Longe 2009).The present study involving priming of soybean seeds by various methods lead to improvement in overall faster and uniform seed germination and increased particularly by fresh cow milk .It is assumed that seed priming enhances the mobilization of seed reserves as a result of activation or synthesis of key enzymes (Fu *et al*., 1988). In present research, maximum activities was recorded in seeds of soybean under fresh cow milk. The results are in agreement with the findings of Sharma *et al*. (2014) in okra. Nasri *et al.* (2011). Furthermore, Al-Menaie *et al.* (2010). Milk has considered better priming agent than that of water. This investigation conducted on the effects of fresh cow milk and sea water on the germination of soy bean seeds revealed that the percentage germination values of seeds soaked in concentrations of fresh cow milk for all times of treatments were performance in soaking 12 hour in higher concentration cow milk. Can be suggested that priming is mostly preferable for seed germination and related quality of glycine max seed.

4. Discussion& CONCLUSION :

5. References:

1-Abubakar, Z. A and Muhammad, A. (2013). Breaking seed dormancy in tamarind (*Tamarindus indica)*. A case study of Gombe Local Government Area. *Journal of Applied Sciences and Environmental Management* 17 (1): 83-87

2-Adelani, D.O and Maisamari, I.J. (2016). Effect of fresh cow milk and coconut milk on the germination of baobab (Adansonia digitata) seeds. Biological and

Environmental Sciences Journal for the Tropics 8 (4):7-16.
3-Adelani, D.O.,Suleiman, R. A., Olaifa, R. K and Yohanna, E. A. (2014a). Hormonal pretreatments of African locust bean tree seeds (*Parkia biglobosa* Jacq benth). *In: Sudano-sahelian Landscape and Renewable Natural Resources Development in Nigeria.* Ogunsanwo, O.Y; Akinwole, A.O; Azeez, I.O; Adekunle, V.A.J. and Adewole, N.A (eds); *Proceedings of the 37th Annual Conference of the Forestry Association of Nigeria*, Pp 337-346.
4-Aduradola, A. M. (2004). Preliminary investigation of some factors affecting germination in Piliostigma reticulatum (Hoschst. L) Seeds. Journal of Agriculture and Environment 4 (1):29-34
5-Aduradola, A.M. (2003). Effect of some pretreatment on germination in seeds of Acacia nilotica Wild ex Del and Zizyphus spina christii. Del. Journal of Agricultural Science and Environment 3:10-13.
6-Aduradola, A.M. (2000). Effect of some pretreatments on the germination in seeds of Acacia nilotica (C) Wilf ex Del and Zizyphus spina christii (C) Del. The Bioprospector 2:62-70.
7-Aduradola, A.M., Adeola, B. F and. Adedire, M.O. (2005). Enhancing germination in seeds of African Star Apple, Chrysophyllum albidum (G. Don). Journal of Food, Agriculture and Environment 3(2):292-294.
8-Aliero, B. L. (2004). Effects of sulphuric acid,mechanical scarification and wet heat treatments on germination of seeds of African locust bean tree, *Parkia biglobosa*. *African Journal of Biotechnology* 3 (3): 179-181.
9-Al-Menaie, H.S., Al-Ragam, O., Al-shatti, A., Mattew, M and.Suresu, N.(2010). The effects of different treatments on seed germination of the Cassia fistula L and Cassia nodosa Buch-Ham. Ex Roxb. In Kuwait; African Journal of Agricultural Research, 5(3): 230- 235.
10-Beckman KB, Ames BN. Oxidative decay of DNA. J Biol Chem. 1997; 272(32):19633-19636
11-Bundschuh J, Litter MI, Parvez F, et al. One century of arsenic exposure in Latin America: A review of history and occurrence from 14 countries. Sci Total Environ. 2012; 429:2-35.
12-Candogana, B.N., M. Sincik, H. Buyukcangaz, C. Demirtas, A.T. Goksoy, and S. Yazgan (2013). Yield, quality and crop water stress index relationships for deficit-irrigated soybean [Glycine max (L.) Merr.] In sub-humid climatic conditions. Agricultural Water Manage. 118, 113– 121.
13-Chauhan JS, Tomar YK, Singh NI, Seema A, Debarati (2009). Effect of growth hormones on seed germination and seedling growth of black gram and horse gram. Journal of American Science, 5(5): 79- 84.
14-Curtis, H. and Barnes, N.S (1983). Invitation to Biology, third edition. Worth publication, INC. New York, USA.
15-Czabator, F. J. (1962). Germination value: An index combining speed and completeness of pine seed germination. Forest Science 8: 386 – 395.
16-Dewir, Y. H., El-Mahrouk, M. Eand. Naidoo, Y. (2011). Effects of some mechanical and chemical treatments on seed germination of *Sabal palmetto* and *Thrinaxmorrisii* palms. *Australian Journal of Crop Science,* 5(3):248-253.
17-Djamgoz, M and Jane, P. (2015). 10-Step Plan to help you Overcome and Prevent Cancer' Vermilion publisher, 9 pp
18-Ebofin, A. O., Agboola D.A.., Ayodele, M.S and Aduradola, A.M. (2003): Effect of some growth hormones on seed germination and seed seedling growth of some savannah tree legumes. Nigerian Journal of Botany, 16: 64-75
19-Ellis, R. H. and E. H. Roberts (1981) . The quantification of ageing and survival in orthodox seeds. Seed Sci. Tech. 9: 373-409.
20-Finch-Savage WE, Leubner-Metzger G. Seed dormancy and the control of germination. New Phytologist. 2006; 171(3): 501–523. https://doi.org/10.1111/j.1469-8137.2006.01787.x PMID: 16866955
21-Fu, J.R., S.H. Lu, R.Z. Chen, B.Z. Zhang, Z.S. Liu, and D.Y. Cay (1988). Osmoconditioning of peanut (Arachis hypogea L.) seeds with PEG to improve vigor and some biochemical activities. Seed Sci. Technol. 16: 197–212.
22-Gehlot, M and Kasera, P.K. (2012). Improvement of seed germination behaviour in *Phyllanthusamarus* by acid and mechanical scarification pretreatments. *Ecoprint*, 19: 1-5.
23-Gomez, K.A and Gomez, A.A. (1984). Statistical Procedures for Agricultural Research, Second Edition, John Wiley and Sons, New York, United States of America, 690PP
24-Goos, P and Vandebroek, M. (2003). D-optimal split-plot designs with given numbers and sizes of whole plots. Technometrics, 45: 235-245
25-Govt, O. P. (2018). Economic Survey of Pakistan. Govt. of Pakistan, Finance and Economic Affairs Division, Islamabad 2017-2018.
26-Habib, Y., Nasiri, M and Tavili, A. (2015). Effect of Different Physicochemical treatments on seed dormancy of medicinal herbs (*Portulaca oleracea* L.). *Research Journal of Medicinal Plants*, 9: 72-80.
27-Labouriau LG, Valadares, MEB. 1976. On the germination of seeds of Calotropis procera (Ait.) Ait. F. Anais da Academia Brasileira de Ciências 48
28-Labouriau LG. 1983. Uma nova linha de pesquisanafisiologia da germinação das

sementes. Anais do XXXIV CongressoNacional de Botânica. SBB, Porto Alegre, 11-50.

29-Maas EV, Hoffman GJ. 1977. Crop salt tolerance–current assessment. J Irrig Drain Divis 103: 115-134.

30-Maguire JD. (1962). Seed germination - aid in selection and evaluation for seedling emergence and vigour. *J Crop Sci*. 2: 176 - 177.

31-Masuda T, Goldsmith PD. World soybean production: area harvested, yield, and long-term projections. Int Food Agribusiness Manag Rev. 2009; 12(1030-2016-82753):1-20.

32-Mustafa, H.S.B., T. Mahmood, A. Ullah, A. Sharif, A.N.Bhatti, M. Nadeem and R. Ali. 2017. Role of seed priming to enhance growth and development of crop plants against biotic and abioticstresses. *Bull. Biol. Allied Sci. Res*., 2: 1-11.

33-Nasri, N., R. Kaddour, H. Mahmoudi, O. Baatour, N. Bouraoui, and M. Lachaâl (2011). The effect of osmopriming on germination, seedling growth and phosphatase activities of lettuce under saline condition. Afr. J. Biotechnol. 10: 14366–14372.

34-Nuga, O; Amahia, G.N and Aderogba, F (2014). Construction of split plot design for estimating variance component. European Scientific Journal 10(8):408-418.

35-Oliveira, A.B.D. and E. Gomes-Filho. 2016. How are germination performance and seedling establishment under abiotic stress improved by seed priming? A review. *Aust. J. Crop Sci*., 10(7): 1047-1051.

36-Pirasteh-Anosheh H, Emam Y, Ashraf M. 2014. Impact of cycocel on seed germination and growth in some commercial crops under osmotic stress conditions. Arch Agron Soil Sci 60(9): 1277–1289.

37-Pirasteh-Anosheh H, Ranjbar G, Pakniyat H, Emam Y. 2016b. Physiological mechanisms of salt stress tolerance in plants: An overview. In: Azooz MM, Ahmad P (eds) Plant-environment interaction: responses and approaches to mitigate stress. John Wiley Sons, Ltd, Chichester, pp. 141-160.

38-Prat L, Batti C, Fichet T. 2008. Effect of plant growth regulators on floral differentiation and seed production in jojoba (Simmondsia chinesis (Link) Schneider). Industrial Crops and Products, 27: 44-49.

39-Rajjou L, Duval M, Gallardo K, Catusse J, Bally J, Job C, et al. Seed germination and vigor. Annual Review of Plant Biology. 2012; 63(1): 507–533. https://doi.org/10.1146/annurev-arplant-042811- 105550 PMID: 22136565

40-Ranal MA, Santana DG. 2006. How and why to measure the germination process? Brazilian Journal of Botany, 29: 1-11. doi:10.1590/s0100-84042006000100002

41-Rastegar Z., Sedghi M. and Khomari S. (2011). Effects of accelerated aging on soybean seed germination indexes at laboratory conditions. *Notulae Scientia Biologicae*. 3 (3): 126 - 129.

42-Rastogi, A., Siddiqui, A., Mishra, B. K., Srivastava, M., Pandey, R., Misra, P., Singh, M and Shukla, S, (2013) Effect of auxin and gibberellic acid on growth and yield components of linseed (Linum usitatissimum L.). Crop Breeding and Applied Biotechnology, 13(2): 1-10.

43-Ruan, S., Q. Xue and K. Tylkowska. 2002. The influence of priming on germination of rice (Oryzo sativa L.) seeds and seedling emergence and performance in flooded soil. Seed Science &Technology, 30: 61-67

44-Rucinski P. Annual Oilseeds and Products Report, FAS, Warsaw, Poland, 2018

45-Sananse, S. L and Maidapwad, S.L. (2014). On analysis of two-way ANOVA using data transformation techniques. International Journal of Scientific Research, 3(11): 480-483.

46-Sarker, M., Hossain, A., and da Silva, J. A. T. (2015). Timing of first irrigation and split application of nitrogen for improved grain yield of wheat in Old Himalayan Piedmont Plain of Bangladesh. *British Journal of Applied Science & Technology* 6, 497.

47-Schelin, M., Tigabu, M., Eriksson, I and Sawadogo, L. (2003). Effect of scarification, gibberellic acid and dry heat treatments on the germination of Balantiesa egyptica seeds from the Sudanian savanna in Burkina Faso. Seed Science and Technology, 31:605-617.

48-Schmidt, L. (2000). *Guide to Handling of Tropical and Subtropical Forest Seed.* Danida Forest Seed Centre, Humbleback, Denmark pp.303.

49-Scott SJ, Jones RA, Williams WA (1984). Review of data analysis methods for seed germination. J Crop Sci 24:1192-1199.

50-Sharmaa,A.D., S.V.S. Rathoreb, K. Srinivasana, and R.K. Tyagia (2014). Comparison of various seed priming methods for seed germination, seedling vigour and fruit yield in okra (Abelmoschus esculentus L. Moench). SCI HORTIC-AMSTERDAM.165: 75–81.

51-Shatpathy,P.,Kar, M., Dwibedi, S. K., & Dash,A. (2018). Seed priming with salicylic acid improves germination and seedling growth or rice (Oryza sativa L.) under PEG-6000 induced water stress. Int J Curr Microbiol Appl Sci, 7(10),907-924.

52-Steel, R.G.D., T.H. Torrie and D.A. Dickey, 1996. Principles and Procedures of Statistics. A Biometrical Approach. 3rd Ed, Pp: 204– 232. McGraw Hill Book International Co. Inc., Singapore

53-Vwioko, E.D and Longe, M.U. (2009) Auxin and gibberellin effects on growth and fruit size in Lagenaria siceraria (Molina standley). Bioscience Research Communications, 21: 263-271.