Effect of Soaking in Water Treatment on the Germination Rate of Eggplant (*Solanum melongena* L.)

Nwe Ni Aung[1], Khin Aye Aye San[2]

Abstract

The study investigated the effects of water treatment technique including soaking in water for 6, 12, 24 hours and a control (no treatment) on the germination rate of eggplant (*Solanum melongena* L.) under environmental conditions. The various hours of water treatments were T1 (non-soaked in water, control), T2 (Soaked in water 6 hours), T3 (Soaked in water 12 hours), and T4 (Soaked in water 24 hours), respectively. In this experiment, the plastic bags were used for germination tests of eggplant, it was conducted at the experimental site of the Department of Botany, East Yangon University Campus, Yangon Region. Data collection was taken on the rate of total germination seeds, dormancy seeds, survival seed rate and germination rate. The result showed that T3 (Soaked in water 12 hours) gave in higher percentage of germination (100%), compared with other treatments. And then, T2 (Soaked in water 6 hours) (98%), T4 (Soaked in water 24 hours) (96%) and finally non-treated T1 (Control) (90%), respectively.

Keywords: *Solanum melongena*

Introduction

Eggplant (Solanum melongena L.) is a member of the family Solanaceae. Brinjal is called eggplant in South Asia and South Africa; but in North America and Australia is called aubergine. In United States, it is called eggplant. The eggplant is a heat- loving vegetable in the Solanaceae family that prefers hot weather. Eggplant requires at least 7 hours of direct sunlight and temperatures between 70°F and 80°F (Amy Grant, 2018). Eggplant contains potassium, iron, folate, vitamin C, and vitamin K. The peel of skin of eggplant (purple color) provides anthocyanin (anti-oxidant). It can balance blood cholesterol levels and reduce diabetes. For diet can also help to lose weight containing fiber in eggplant. The beginning of the growth of a seed into a seedling is known as germination. In germination, three needs are met; water, temperature, and medium (such as soil, tissue etc.). Among them, water is extremely important to plants, for photosynthesis and other functions (Mohamed Shaban, 2013). Seed pre-treatment plays an important role in increasing and improving germination rates. The priming with water treatment is simple and cheap, which can be used to emerge the cotyledon well through the period with seeds in contact with water rather than other treatments. Also, water pre-treatment decreases the low germination percentage in seedlings in arid and semi-arid regions (Mohamed salim Azad *et al*., 2011). The advantage of water treatment is that it can activate the process of germination. Besides, thin seed-coats such as eggplant seeds need lots of water to germinate well from the planning medium. Many observations recommend 8, 12, and no more than 24 hours for water pre-treatment of eggplant germination. If there is too much soaking, the seeds will rot and decompose. Additionally, drought and environmental factors can reduce the percentage of germination and seedling growth in barley grain. However, making water pre-treatment for barley grain seeds increases chances their of overcoming drought stress and low germination rate. Water pre-treatment is the most effective for improving germination in onions (Akira Fukushima *et al*., 2008). And then seed germination of low-quality rice needs water treatment. In water pre-treatment for wheat and cotton seeds, which can facilitate the development of seedlings and germination rates (Heather Rhoades, 2018). For canola plants, the Brassicaceae family in Austria, water pre-treatment can be used for seedling growth and development of it (Heather Rhoades, 2018). So, water pre-treatment can be used for seed germination of many species.

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Material and Methods

A. Seed Material and Study Site

Seeds of eggplant were obtained from the Myay-Pa-Da-Thar-Kun. The field work was carried out at the Department of Botany, East Yangon University. Viable seeds with uniform size, color, and shape were selected for this experiment.

B. Seed Treatment and Soil temperature

All these seeds of eggplant were soaked in water for various hours except control and sealed and tied with the white clothe before treatments. In germination for eggplant, the indoor soil temperature must be between 20°C and 24°C at day.

C. Experimental Layout

In testing for germination, twenty-five plastic bags were used for each treatment and this experiment was set up in plastic bags (13x9) cm, containing 5g soil medium in each bag for water treatment. Soil was mixed with ash in a ratio of 3:1. Two seeds were sown in each plastic bag. There are four treatments in this experiment and each treatment used 50 seeds.

For eggplant seeds, the water treatment by seeds follows as;

T1 = Control (Non-soaked)
T2 = Soaked in water (6 hours)
T3 = Soaked in water (12hours)
T4 = Soaked in water (24 hours), respectively.

Data Collection and Methodology

Germination rate proceeds through different soaked times course of seed. In this experiment, total germinated seeds, survival and germination rates, and dormancy rates were observed. In this study, the germination rate was calculated using the following formula developed by Sudhakar Pattanaik *et al*, (2015).

Germination rate = (Number of germinated seeds/Total number of seeds) × 100
Survival rate = (Number of survival seeds/Total number of seeds) × 100

Figure 1: Soaked in different water treatments of eggplant

Figure 2: Thoroughly crushed and sieved to remove hard soil balls, stones and garbages to prepare natural soil

Figure 3: Preparation for germination test of eggplant *Solanum melongena* (L.)

Results

The result showed that,T3 (Soaked in water for 12 hrs) gave the best result in percentage of seeds (100 %) although T2 emerged firstly, followed by T2 (Soaked in water 6 hrs) (98 %) and T4 (Soaked in water 24 hrs) (96 %). However, T1 (Control) showed the least percentage of germinated seed. (90 %). (Table, Figures 4, 5, 6, 7, 8 and 9).

Table : Effect of Different water Treatments on Percentage of Germinated Seeds of Eggplant

Treatment	Germinated Seed Rate (days)					Total Germinated Seed	Dormancy Seed	Survival Seed Rate	Germination Rate
	27.12.19	28.12.19	29.12.19	30.12.19	31.12.19				
T1(Non-soaked)	-	4	12	16	13	45	5	90%	90%
T2(Soaked in water 6hrs)	30	-	10	9	-	49	1	98%	98%
T3(Soaked in water 12hrs)	-	46	4	-	-	50	-	100%	100%
T4(Soaked in water 24hrs)	-	30	16	2	-	48	2	96%	96%

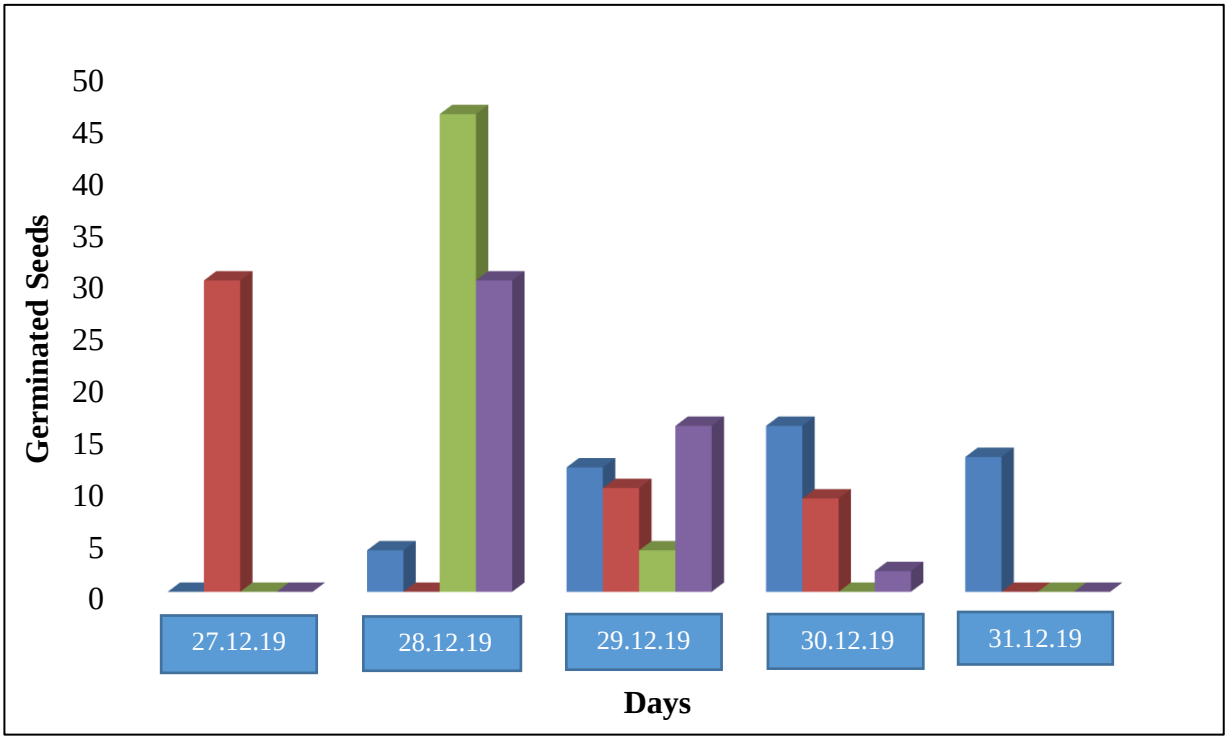


Figure 4: Effect of water treatments on germinated seeds rate of eggplant

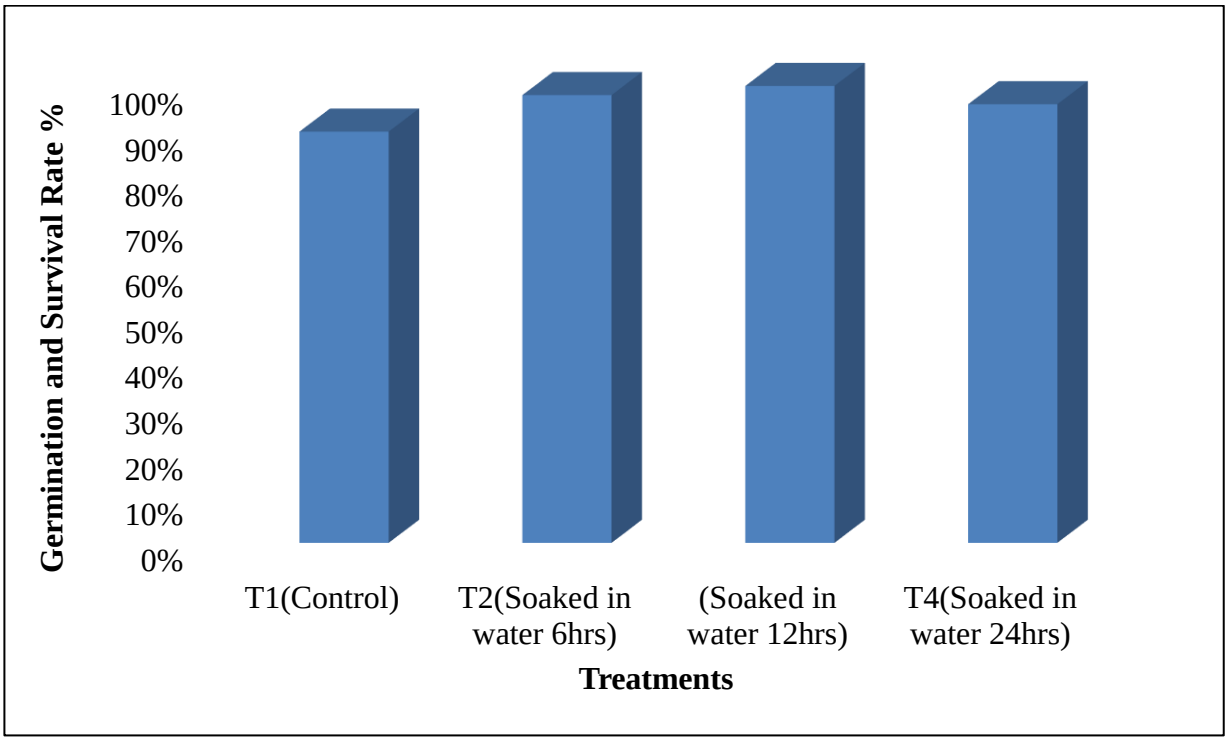


Figure 5: Effect of Water Treatments on Germination and Survival rates (%) of Eggplant

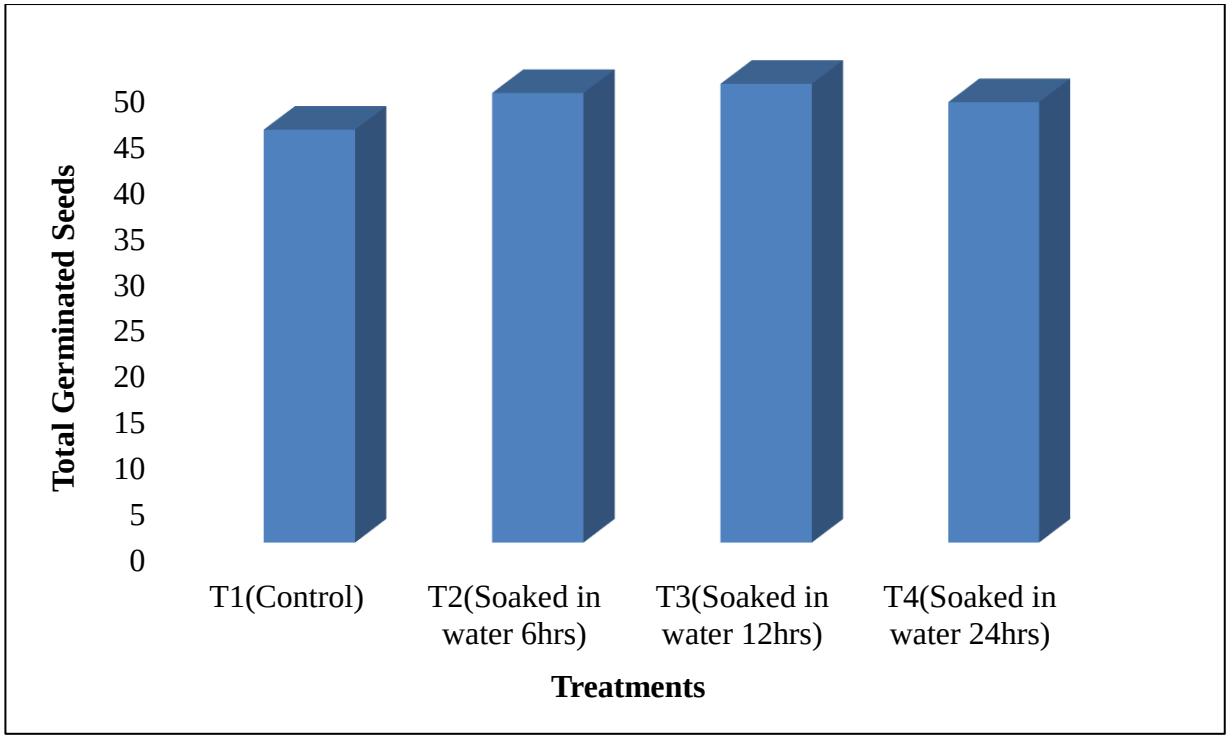


Figure 6: Effect of Water Treatments on Total Germinated Seeds of Eggplant

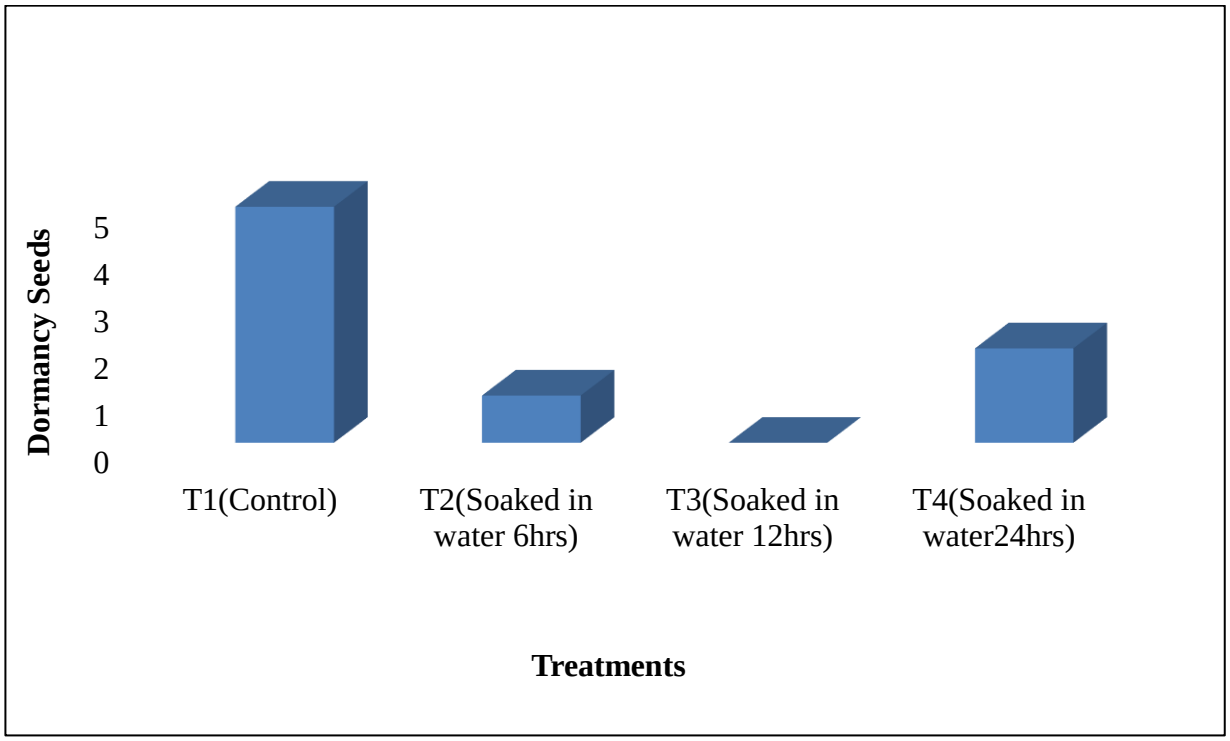
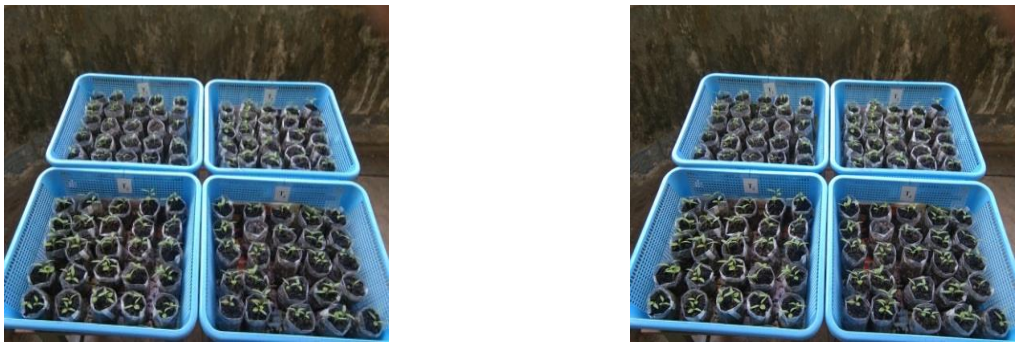


Figure 7 Effect of Water Treatments on Dormancy Seeds of Eggplant

27.12.19 28.12.19 29.12.19



30.12.19 31.12.19

Figure 8 Germination seed rate of eggplant (*Solanum melongena*) in germination test from days to days

Figure 9 Seed germination testing in natural soil (Final results of *solanum melongena* L.)

Discussion and Conclusion

Seeds of eggplant were obtained from the Myay-Pa-Da-Thar-Kun. The field work was carried out at the Department of botany, East Yangon University. Viable seeds with uniform size, color, and shape were selected for this experiment. There are four treatments in these experiments including soaking in water for 6, 12, 24 hours and a control (no treatment) on the germination rate of eggplant (*Solanum melongena* L.). From the above study, T2 (soaked in 6 hours) was effective for early seedling growth after sowing (about 4 days) other than treatments. It is similar to Amoakoh *et al*, (2017) investigated that soaking for 6 hours was the

best treatment to improved seed germination rate and early seedling growth of *Pouteria campachiana* species. Omokhua *et al*, (2017) showed that soaking pre-treatment for 12 hours had the highest germination percentage of any water pre-treatment on soybean. Again, Usman *et al*, (2010) suggested that in water for pre-treatment for 8 hours and 12 hours; he said that 12 hours water pre-treatment gave the highest germination percentage in Acacia Senegal seeds rather than soaking for 8 hours. Similarly with Omokhua and Usman, in eggplant germination, T3 (Soaked in water for 12 hours) has the best germination and survival rate of the other treatments and is followed by T2 (Soaked in water for 12 hours), T4 (soaked in water for 24 hours) and T1 (control), respectively. According to Gray *et al*, (1997), the germination improvement depends on the timing of water treatments of seeds. Anne Muthannje Mbora, (2012) described the germination rates of *Macadamia integrifolia* and *Ziziphus mauritiana* fruits (Soaking for 24 hours, 48 hours and 72 hours and non-soaked), as the lowest germination rates in non-soaked. It is evident that the least germination and survival rate from T1 (non-soaked) in eggplant germination. Basra *et al*, (2004), in a study wheat seeds, concluded that seeds water pre-treatment for 24 hours have a high effect in accelerating germination. In in this experiment, T4 (Soaked in water for 24 hours) gave the best germination and survival rate. So, it is not slightly different with Basra's report compared to the eggplant germination for soaking in 24 hours. These studies revealed the variation of germination and survival percentage, and dormancy seeds on different soaking times of water pre-treatment. Iroko *et al*, (2013) reported a significant observation in the germination of *Vitelleria paradox* seeds by soaking them water in pre-treatment. Again, Missanjo *et al*, (2014) investigated that the highest germination of water treatment for soaked for 12 hours in soybean. In the eggplant germination studies, seeds soaked in water for 12 hours exhibited the highest germination percentage (100 %) when compared to other treatments and control. Also, eggplant seeds for T3 (Soaked in water for 12 hours) in this germination get the highest germination rate as well as fewer dormant seeds in this experiment. So, the eggplant germination by soaking with water (12 hours) studies is completely similar with Missanjo's studies. Haider *et al*, (2016) described how water treatment for germination can give decreased dormancy seed as well as reduce the time for germination. But according to Danthu *et al*, (1995), that soaking in water was generally ineffective. He attributed experiments from comparing to cold and warm water pre-treatment like a *Acacia tortilis*; slightly scratched or hardy seeds. So, it absolutely disagreed with the eggplant germination studies because all other treatments by water had great and fair seed germination rate except control (non-soaked). Early studies by Suszka and Zieta (1997) have shown that soaking in water for seed is a feature that can enhance the germination results of tropical seeds. Above the report is evidently similar in eggplant germination because eggplant seeds soaked in water gave a superior germination rate when compared to control (non-soaked). According to Luna, (2009), vegetable growers should embrace water pre-treatment of seeds before sowing as this will help to reduce dormancy rate in germination. Therefore, the soaking of seeds in water can be used to promote germination of *Solanum melongena* which is the easiest and cheapest treatment. Thus, boost the germination rate of *Solanum melongena* should carry out water treatment. The study of eggplant germination results from the observation would be statistically analyzed for eggplant.

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