The Effect of Salt Stress on the Amylase Activity of Leucaena leucocephala

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1 Introduction

Seed sprout has attracted attention because of its nutritional value. Seed sprouts are rich with useful chemical compounds such as vitamin C, folates and proteins, phytochemicals and saponins. The chemical compound content in seed sprouts is developed during the germination process which is induced by water imbibition into the seed. Water activated cell metabolism is started by the activation of several enzymes including amylase, protease and lipase that degrade the food reserve. The product of this degradation is then used to produce energy and various chemical compounds supporting embryo development. Activation of this metabolism occurs at stage II of germination which is indicated by the stationary phase of seed weight. Some reports stated that abiotic stress can alter seed metabolism during germination and increase its active compound.

Leucaena leucocephala (river tamarind) sprout has been consumed in Indonesia. Regular consumption of sprouts is known to reduce the risk of suffering from cardiovascular disease, osteoporosis, and various cancers, and lowering LDL in the blood, increasing immunity (FG Winarno et al., 2009). However, there is yet to be a study about the consumption of *Leucaena leucocephala* (river tamarind) seed sprouts.

2 Objective

The purpose of this research is to investigate the effect of salt stress on changing in Leucaena leucocephala (river tamarind) metabolisme during germination using alfa amylase as the indicator.

3 Methodology

The measure of the rise of metabolic activity was done by measuring the rate of amylase by observing and timing the change of colour. Each concentration has 3 samples, each from different trees.

1. **Seed sourcing - selection before use for experiment**
2. **Determination of phase 2 of germination of seeds treated with or without NaCl (Figure 1) - randomly divided into four groups, each group containing 10 grams of seeds, each soaked with 0 mM, 50 mM, 100 mM, and 150 mM NaCl. The seed weight was measured every 24 hours until the seed weight reached the stationary phase.**
3. **Amylase isolation and activity test (Figure 2) - Amylase was extracted when seed weight reached the stationary phase. The amylase activity was tested through the amylase's ability to fully break down a 1% starch solution.**

Figure 1 - NaCl treatment of seeds and weighing of seeds

Figure 2 - Enzyme extraction and activity test

4 Results

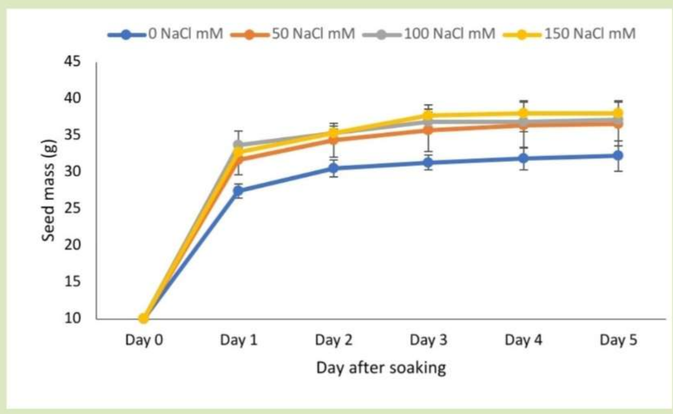

Figure 3 - Effect of various concentrations of NaCl on mass gain of *Leucaena leucocephala* seeds. The data displayed is the average of three replications

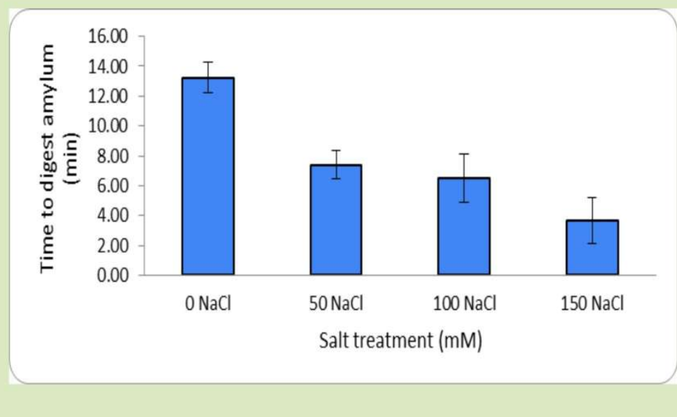

Figure 4 - Amylase activity from the seed extract at Phase II of germination. The data is taken from a three replication. Bar in the graph indicates standard deviation.

5 Analysis

All groups showed rapid weight gain 24 hours after immersion. Weight gain slowed after 24 hours and all groups reached phase 2 on day 5 after immersion (Figure 3). Seed weight gain in the early germination phase is due to water imbibition. Seeds soaked in salt solution weighed more than seeds soaked in water. This may occur due to the salt solution softening the seed coat so that water can more easily enter the seeds that are submerged in the salt solution.

The imbibition of water during germination activates the metabolism of the seed which is initiated by the synthesis of amylase in Phase II. The results showed that seeds soaked in salt had higher amylase activity than seeds soaked in water (Figure 4). These results indicate that salt treatment not only makes it easier for water to enter the seeds but also increases amylase activity in phase II.

6 Conclusion

From the result of the research, it can be concluded that:

- Salt stress, which is an abiotic stress, does in fact affect metabolic activity of Leucaena leucocephala seed, which contributes in increasing the rate of the amylase enzyme.
- Salt stress increases the mass and rate of alpha amylase activity of the Leucaena leucocephala seed in phase II of germination.
- Salt stress increases the seed activation of Leucaena leucocephala seed.