

Seed Treatment Effects on Emergence of *Luffa aegyptiaca*

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Abstract

Luffa aegyptiaca (Luffa sponge gourd) is increasingly seen as both a source of vegetative nutrition and as a source of the “luffa” used as to exfoliate during bathing. As such, the commercial growing of *Luffa aegyptiaca* is increasingly being investigated using more intensive farming methods. Two factors traditionally used to promote / speed germination and emergence of vegetable seeds is investigated. It is concluded that temperature pre-treatment of the seeds (-12°C, 24 hours) yields a $p=0.004$ significance in promoting emergence, whilst pre soaking (water, 18°C, 24hrs) yields $p=0.821$

Introduction

Luffa aegyptiaca (Luffa sponge gourd), belongs to the Cucurbitaceae along with Squash, pumpkin and the traditional “cucumber” (*Cucumis sativus* L.). It is an annual climbing vine, originating in tropical and subtropical regions. When cultivated as a foodstuff, the fruit is harvested during the immature stage when both fruit and seeds are soft. The fruit is prepared like a summer squash and lightly cooked or eaten raw. Immature leaves and stems are often picked and prepared similar to spinach. Once ripe, the fruit is allowed to mature on the vine, traditionally until the first frost kills the vine itself. At this point, the skin is removed, and the soft inner is expunged from a fibrous network. Once dried, this network maintains a stable shape for many years and is used as a cleaning tool, with the desirable effect of providing a sanitary exfoliating surface.

Whilst traditionally grown by artisan farmers for local, domestic consumption, the increasing international trade in Luffa seeds has led to several commercial investigations into the viability of seed treatments to ensure germination, emergence and seedling establishment. (Huyskens, 1993) and (Joy, 1987)

Little work is cited that investigates interventions designed to promote germination or emergence of the seeds. Reducing the emergence time can lead to earlier, stronger seedling establishment and an increase in the viability of the fruit as a commercial crop. Surprisingly, little work has been undertaken to systematically investigate seed pre-treatment. *Luffa aegyptiaca* is anecdotally very variable in its germination rates and two studies, by Davis and Wehner substantiated this with a maximum of 75% emergence. (Davis, 1997) (Wehner, 1997)

Methods to improve seed germination and break dormancy are widely studied in the literature, with some notable contributions by (Darby, 1976) (Fieldhouse, 1975) and (Nelson, 1980). However emergence of *Luffa aegyptiaca* is little studied. (Wehner T., 1996) conducted a study looking at the overall percentage emergence when pre-treated with water, acetone, ethephon and seed scarification. They conclude that all treatments reduce the emergence percentage when compared to water alone.

It is the purpose of this paper to investigate seed pre-treatment to favourably induce seed emergence in a sample of *Luffa aegyptiaca* drawn from a single cultivar.

Experimental Procedure

Two treatments were investigated – storage of seeds at -12°C, 3°C and 18°C for 24 hours prior to sowing and pre-soaking with distilled water at 18°C for 24 hours.

A main effects investigation was constructed as follows:

		Time			
Temp	Soak	1	2	3	Mean
-12	no				
3	no				
18	no				
-12	yes				
3	yes				
18	yes				

Three repeats corresponding to three individual seeds were planted after each pre-treatment. The time for emergence was measured, rounded to the nearest hour. In this case, emergence was defined as the time taken for the first two leaflets to emerge completely from the growing medium.

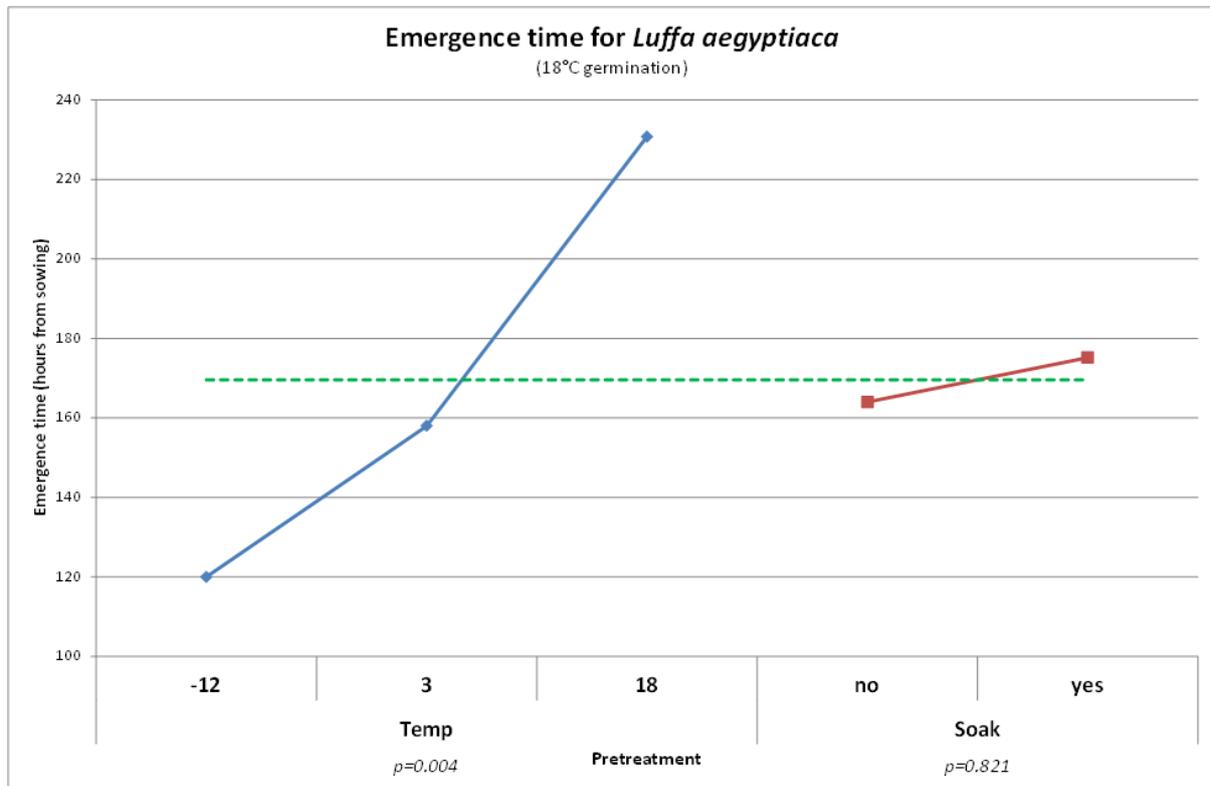
Standard growing medium was prepared and held at 18°C in a seed incubator. Seeds were planted at a depth of 4cm, backfilled and watered with 20ml of 18°C deionised water. Throughout the experiment, the growing medium was kept at 18°C and water every 48hrs with 20ml of 18°C water. Excess water was allowed to drain and was removed.

The main effects of each factor were combined into a main effect table, alongside the overall grand mean:

		Temp	Soak	Mean
Temp	-12	120.00		169.58
	3	158.00		169.58
	18	230.75		169.58
Soak	no		164.00	169.58
	yes		175.17	169.58

Results & Discussion

A main effect plot was constructed and ANOVA used to assess the statistical significance of each factor.



It can be clearly seen that pre-treating by varying the temperature has the greatest effect on the time for emergence, with a change from -12°C to 18°C increasing the emergence time by nearly 110 hours. Interestingly, pre-soak seems to have no significant effect.

All seeds sowed successfully germinated, in some way refuting work cited from literature of a 75% success rate of emergence. However, the relatively small sample size would suggest a further field study of both these factors and the percentage emergence rate.

Conclusions

We have shown that pre-treating *Luffa aegyptiaca* by freezing the seeds to -12°C for 24 hours prior to sowing has a beneficial effect on the emergence time, reducing it by approximately 5 days.

Extensions

This work has removed soaking as a factor in improving the emergence time of *Luffa aegyptiaca*, further work to investigate the effect of scarification and sowing temperature is indicated from the literature cited.

Works Cited

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