

Which taste is most liked by the seeds?

Science Fair Project Report

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Submitted by

Alfana Jasrin.A (Grade 5)



ARRAHMAAN
INTERNATIONAL SCHOOL

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Which taste is most liked by the seeds?

ABSTRACT

I have done my science fair project on “*Which taste is most liked by the seeds?*”. As we all know, germination is the process of seeds developing into new plants under favourable environment of water, temperature, air and sunlight. Water plays an important role in germination among all the favourable conditions. We cannot expect the water to be same at all the time. Mostly some substances are mixed with water but we don’t ever know whether it affect the plant growth or not. In order to virtualize this, I selected six basic tastes as variants. For the six different tastes, I selected samples of Sugar water, Salt water, Lemon water, Chilly water, Areca nut water and Neem water.

Through my project I found that the “Astringent” flavor is the best mediums for germination among tastes I had taken. It gave suitable medium for germination and sprout. Neem, lemon gave lengthy sprout. Salt, sugar, chilly shows lowest growth rate. In areca nut water foliage leaves are formed. Among the 20 gm of seeds maximum number of seeds germinated in normal water too but seeds in Astringent taste (Arecanut) taste shows good growth. I think it may be due to the constituents of Arecanut.



INTRODUCTION

Germination is the process by which an organism grows from a seed or similar structure. The most common example of germination is the sprouting of a seedling from a seed of an angiosperm or gymnosperm. In addition, the growth of a Sporeling from a spore, such as the spores of Hyphae from fungal spores, is also germination. Thus, in a general sense, germination can be thought of as anything expanding into greater being from a small existence or germ.



The process of awakening of the embryo at the end of the dormancy period is called seed germination. The embryo lies dormant within the seed for a considerable period and germinates to give rise to seedling, which grows further and develop to produce an adult plant. Seed germination is the process of seeds developing into new plants. First, environmental conditions must trigger the seed to grow. Usually, this is determined by how deep the seed is planted, water availability, and temperature.

Condition for seed germination

There are both external and internal factors which are necessary for the germination of seeds. Those are as follows:

External factors of seed germination

There are four external factor for the seed germination; those are:

i) *Air (or oxygen) supply*: - Constant oxygen supply is necessary for increasing the respiratory rate of germinating seeds.

ii) *Water or moisture*: - Water is essential for bringing about the changes in the vital activities of a germinating seed, which comprise hydrolysis of the stored organic substances in the cotyledons. So, Water is crucial to seed germination. The seed must go through imbibition to active root growth.

iii) *Light*: - The process of seed germination can even occur in the darkness, so light has no direct effect on the seed germination, but it is quite necessary for the growth and development of seedling.

iv) *Temperature* - The optimum temperature is required to carry out certain fundamental activities in the protoplasm of the germinating seeds. Some seeds germinate when it is cold, such as plants in northern environments. Other seeds only germinate when the weather reaches spring temperatures, which is why we see so much plant growth in the spring like temperate climates. Other seeds only germinate after extreme temperatures.



STATEMENT OF THE PROBLEM

Normally, when we think about planting seeds, we think of planting them in the soil that's been put into containers and pouring normal tap water or kitchen water. A healthy seed placed into soil and given the proper amounts of water, light, and heat will sprout, or germinate, and grow into a plant. But what will happen when we pour different taste water to the seeds? Will the seeds germinate in different liquid? Which taste will be the yummy flavor for seed?



HYPOTHESIS

Sweet is the favorite taste for germinating seed.

DESIGN OF STUDY

INDEPENDENT VARIABLE:

- Different taste (Sugar water, Salt water, Lemon water, Chilly water, Areca nut water and Neem water)

DEPENDENT VARIABLE:

- Germination of seed

CONTROLLED VARIABLES:

- Temperature
- Seed
- Quantity of water

MATERIALS:

- Sugar (Sweet)
- Salt (Salty)
- Chilly (Hot)
- Lemon (Sour)
- Neem leaves (Bitter)
- Areca nuts (Astringent)
- Tap water
- Red gram, Moong dal, Red soya beans.
- 7 plastic container (all the same color and size)
- Permanent marker
- White and black Cotton cloth
- Metric ruler
- Paper towels

PROCEDURE:

Trail 1:

A. Different taste water:

- *Mix 2 gram of sugar, salt in 50 ml of water.*
- *Grind the chilly, areca nut and neem leaves separately and filter the essence and add the 2 ml essence to 50 ml water.*
- *Measure the concentration of each taste solution using PH meter.*

B. Design of Study:

- Using the permanent marker, label each of the 7 container with the name of different tastes and place the container on the tray.
- Take seven pieces of cotton cloth with 10cm length×10 cm breadth.
- Place a white cotton cloth, some cotton and a black cotton cloth inside the container. Do the same for all the containers.
- Open the package of seeds and divide them.
- Then place 6 Red gram, 10 Moong dal, 5 Red soya beans seed to make rows and column in each container.
- Add the five taste in separate container with seeds.
- Then place one normal water and mixture of six tastes in container.
- Place all the containers under constant temperature and air.
- Sprinkle 2ml of water daily.
- Keep a daily record of observations on how many seeds started to sprout out and continue to germinating, every day continuously for one week.

- Record the length (in centimeters) of each sprout in every container. And can make it easier to measure the sprouts by removing each one, placing it on a paper towel, and measuring its length with a metric ruler. Once I had measured every sprout, need to figure out the average length of the sprouts in each taste.
- Follow these steps to calculate the average length of all the sprouts in each of the taste:



Measuring PH of tastes

Place the seeds and add the taste water

DAY 2



Day 2

Day 2 measurement



DAY 3:





Fungal growth in normal water

TABULATION

Seed germination:

Day 1: Six taste and normal germinated and sprouted. (moong dal)

<i>S.no</i>	<i>Six taste</i>	<i>Normal</i>
<i>1.</i>	<i>3 sprouted-0.5,0.3,0.2cm</i>	<i>1 sprouted- 0.1cm</i>

Day 2: Six taste, normal, lemon, neem germinated and sprouted

<i>S.no</i>	<i>Six taste</i>	<i>Normal</i>	<i>Lemon</i>	<i>Neem</i>
<i>1.</i>	<i>Fungal attacked in all sprouted seeds and 1 seed germinated</i>	<i>3 germinated</i>	<i>Red gram- 1 germinated(0.3cm) Moongdal- 2 germinated, 2 sprouted-0.6 cm</i>	<i>1 germinated</i>

Day 3: Six tastes, Areca nut, Chilly, Lemon, Neem and Normal are germinated and fungal attacked.

<i>S.no</i>	<i>Six taste</i>	<i>Normal</i>	<i>Lemon</i>	<i>Neem</i>	<i>Areca nut</i>
<i>1.</i>	<i>Completely fungal attacked</i>	<i>4 moong dal germinated. 1 seed=1.8cm</i>	<i>Fungal attacked Red gram-2 sprouted Moong -4 sprouted and 1 germinated</i>	<i>Moon dal-1 sprouted-0.6 cm</i>	<i>Rupture of seed coat in soya beans.</i>

Day 4: Observation

- *All the seeds in different tastes were fungal attacked except neem.*
- *I found, it may be occur in open lid container.*
- *So I continue this project in closed condition using cloth.*

Trail:2

- Do the same procedure using moong seeds without container..
- Take a black cotton cloth ,cut and divide into 7equal parts(10cm×10cm)
- Soaking the 7 cloths into different taste also normal and six tastes for half an hour.
- After that, measure 20 gm(approximately 394 seeds) of moong seeds.
- Place the seeds into respective taste cloths.
- Tightly pack using rubber band.
- Hanging the entire 7 tastes pouch using a rope.



- *Tabular coloumn: 20 gm of moong seeds in each taste pouch.*

Day 1:

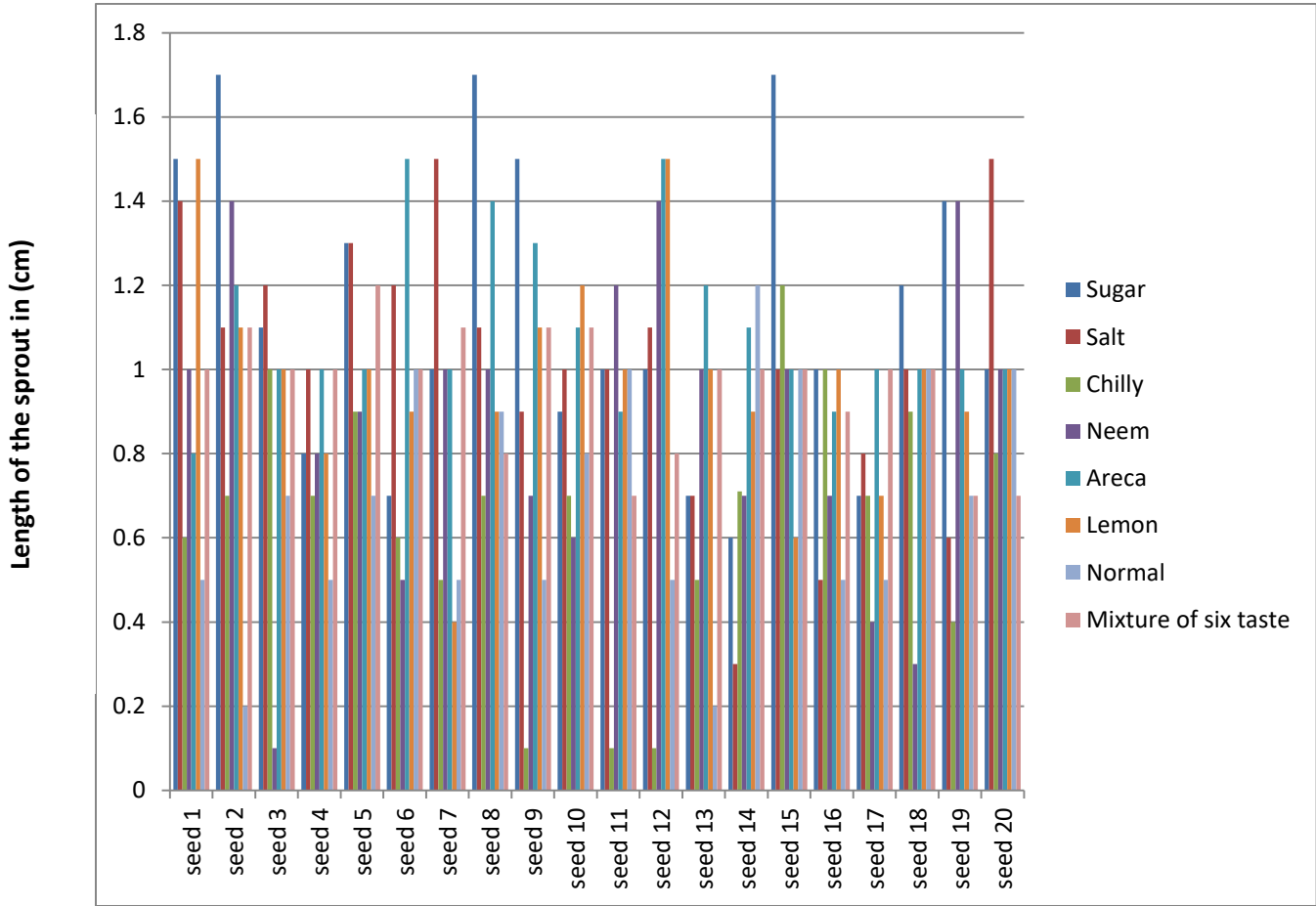
<i>Seed</i>	<i>Sugar</i>	<i>Salt</i>	<i>Chilly</i>	<i>Neem</i>	<i>Areca nut</i>	<i>Lemon</i>	<i>Normal</i>	<i>Mixture of six taste</i>
<i>No of seeds germinated</i>	<i>127</i>	<i>193</i>	<i>103</i>	<i>120</i>	<i>165</i>	<i>94</i>	<i>167</i>	<i>106</i>
<i>Seed-1</i>	<i>1.5cm` .</i>	<i>1.4cm</i>	<i>0.6cm</i>	<i>1cm</i>	<i>0.8cm</i>	<i>1.5cm</i>	<i>0.5cm</i>	<i>1cm</i>
<i>Seed-2</i>	<i>1.7cm</i>	<i>1.1cm</i>	<i>0.7cm</i>	<i>1.4cm</i>	<i>1.2cm</i>	<i>1.1cm</i>	<i>0.2cm</i>	<i>1.1cm</i>
<i>Seed-3</i>	<i>1.1cm</i>	<i>1.2cm</i>	<i>1cm</i>	<i>1.1cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>1cm</i>
<i>Seed-4</i>	<i>0.8cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>0.8cm</i>	<i>1cm</i>	<i>0.8cm</i>	<i>0.5cm</i>	<i>1cm</i>
<i>Seed-5</i>	<i>1.3cm</i>	<i>1.3cm</i>	<i>0.9cm</i>	<i>0.9cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>1.2cm</i>
<i>Seed-6</i>	<i>0.7cm</i>	<i>1.2cm</i>	<i>0.6cm</i>	<i>0.5cm</i>	<i>1.5cm</i>	<i>0.9cm</i>	<i>1cm</i>	<i>1cm</i>
<i>Seed-7</i>	<i>1cm</i>	<i>1.5cm</i>	<i>0.5cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.4cm</i>	<i>0.5cm</i>	<i>1.1cm</i>
<i>Seed-8</i>	<i>1.7cm</i>	<i>1.1cm</i>	<i>0.7cm</i>	<i>1cm</i>	<i>1.4cm</i>	<i>0.9cm</i>	<i>0.9cm</i>	<i>0.8cm</i>
<i>Seed-9</i>	<i>1.5cm</i>	<i>0.9cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>1.3cm</i>	<i>1.1cm</i>	<i>0.5cm</i>	<i>1.1cm</i>
<i>Seed-10</i>	<i>0.9cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>0.6cm</i>	<i>1.1cm</i>	<i>1.2cm</i>	<i>0.8cm</i>	<i>1.1cm</i>
<i>Seed-11</i>	<i>1cm</i>	<i>1cm</i>	<i>1cm</i>	<i>1.2cm</i>	<i>0.9cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.7cm</i>
<i>Seed-12</i>	<i>1cm</i>	<i>1.1cm</i>	<i>1cm</i>	<i>1.4cm</i>	<i>1.5cm</i>	<i>1.5cm</i>	<i>0.5cm</i>	<i>0.8cm</i>
<i>Seed-13</i>	<i>0.7cm</i>	<i>0.7cm</i>	<i>0.5cm</i>	<i>1cm</i>	<i>1.2cm</i>	<i>1cm</i>	<i>0.2cm</i>	<i>1cm</i>

<i>Seed-14</i>	<i>0.6cm</i>	<i>0.3cm</i>	<i>0.7cm</i>	<i>0.7cm</i>	<i>1.1cm</i>	<i>0.9cm</i>	<i>1.2cm</i>	<i>1cm</i>
<i>Seed-15</i>	<i>1.7cm</i>	<i>1cm</i>	<i>1.2cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.6cm</i>	<i>1cm</i>	<i>1cm</i>
<i>Seed-16</i>	<i>1cm</i>	<i>0.5cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>0.9cm</i>	<i>1cm</i>	<i>0.5cm</i>	<i>0.9cm</i>
<i>Seed-17</i>	<i>0.7cm</i>	<i>0.8cm</i>	<i>0.7cm</i>	<i>0.4cm</i>	<i>1cm</i>	<i>0.7cm</i>	<i>0.5cm</i>	<i>1cm</i>
<i>Seed-18</i>	<i>1.2cm</i>	<i>1cm</i>	<i>0.9cm</i>	<i>0.3cm</i>	<i>1cm</i>	<i>1cm</i>	<i>1cm</i>	<i>1cm</i>
<i>Seed-19</i>	<i>1.4cm</i>	<i>0.6cm</i>	<i>0.4cm</i>	<i>1.4cm</i>	<i>1cm</i>	<i>0.9cm</i>	<i>0.7cm</i>	<i>0.7cm</i>
<i>Seed-20</i>	<i>1cm</i>	<i>1.5cm</i>	<i>0.8cm</i>	<i>1cm</i>	<i>1cm</i>	<i>1cm</i>	<i>1cm</i>	<i>0.7cm</i>
<i>Average</i>	<i>0.5cm</i>	<i>1cm</i>	<i>0.78cm</i>	<i>0.91cm</i>	<i>1.07cm</i>	<i>1.08cm</i>	<i>0.7cm</i>	<i>1.01cm</i>

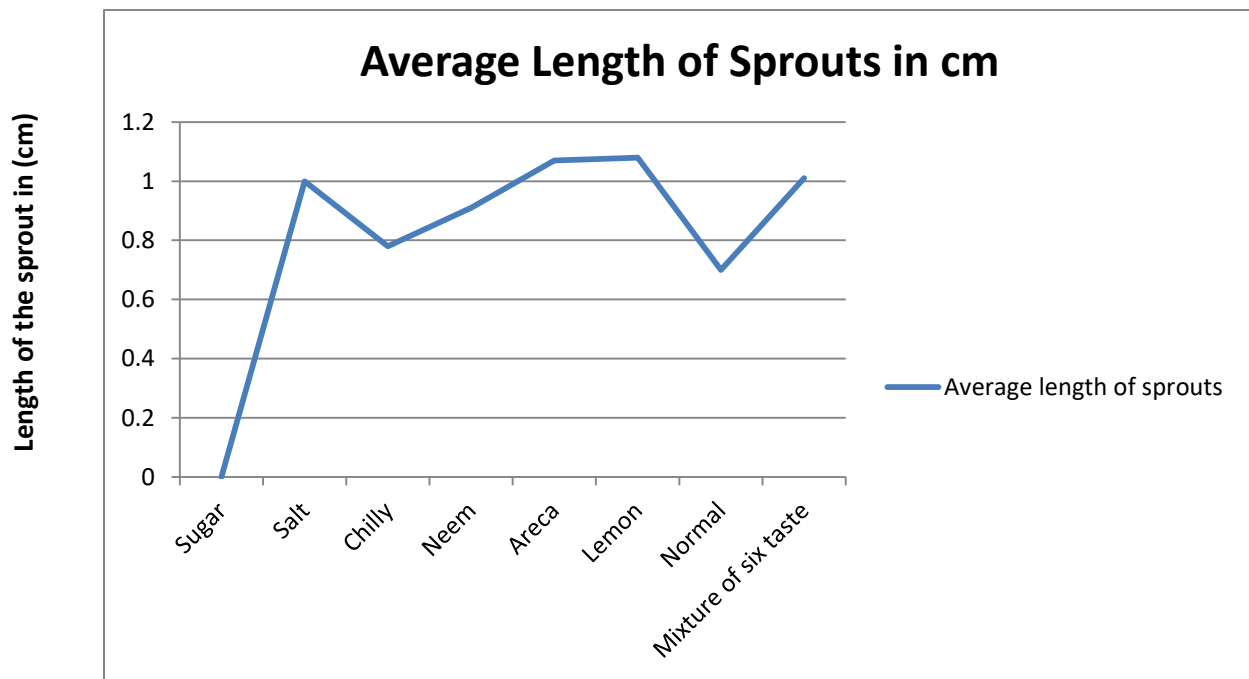
GRAPHICAL REPRESENTATION

Graph 1: Seed Germination in cloth pouch (8 Cloth pouches)

Length of the sprout in (cm)



Graph 2: Average length of sprouts (8 different cloth pouches)



RESULTS AND DISCUSSION

In open lid container:

- Mixture of six taste container sprouted first and all the moong seeds in that taste seem to be germinated. Also seeds in normal water germinated.
- Next day additionally lemon and neem germinated. But seeds in sugar, salt, neem, areca germinated very slowly.
- Third day seeds in mixture of six tastes affected by fungus.
- After four to five days all the containers affected by fungus. So I drop this process.

Cloth pouch germination:

- In this process I got good growth of sprout growth.
- Compare to the seeds in all the separate tastes, normal and mixture of six tastes, “Astringent” is the best mediums for germination. It will give suitable medium for germination and sprout.
- In the second day sprouts seems wealthy in Astringent taste (Arecanut).
- Neem, lemon gave lengthy sprout.
- Salt, sugar, chilly shows lowest growth rate.
- In areca nut water foliage leaves are formed.
- Among the 20 gm of seeds maximum number of seeds germinated in normal water too but seeds in Astringent taste (Arecanut) taste shows good growth.
- I think it may be due to the constituents of Arecanut.





- **Characteristic of Areca nut:**

- **Betel nut (Areca Catechu)**

Betel nut is a part aphrodisiac, has an uplifting and stimulating effect, and can cause a euphoric feeling, also alters time-perception.

- **Effects**

The chewing of betel gives a cheerful relaxation and a nice feeling in the mouth that rises up to the brain.

- **Usage**

You can have a teaspoon of powdered Betel nut mixed with water or coffee. For a better effect mix it with lime and chew on it for some time. Never use more than 3 grams at a time and 6 grams a day.

- **Warning**

Regular chewing of betel nut is very bad for the teeth and colours the teeth red. It also increases the chance of getting ulcers or cancer in the mouth, pharynx, oesophagus, and stomach. High doses can cause diarrhea and dizziness. One of the consequences of long-term use is a light addiction.

- Above cause and effects for human beings but in this project some other thing in areca stimulating complete germination. So, i think it helps to reduce the nutrient insufficiency for seed germination.

CONCLUSION

- *My hypothesis, “Sweet is the favourite taste for germinating seed.” has been proven false.*
- In our day to day life we are using sugar, salt as good preservatives and neem as germicides.
- But I understood from this project that seed germination does not depend upon these criteria.
- Compare to all the tastes, only the seeds in which areca and neem water are treated properly germinated.
- In areca taste, seeds are developed into next level. Seed coats broke, dicotyledon separated, and then foliage leaves appeared. The shoot and roots are also separated properly.
- I think the best water medium for germination is arecanut water.

APPLICATION

- Cotton Germination provides an excellent medium for germinating seeds. They are pathogen-free and make it easy to control the moisture content for proper germination. ...
- All the seeds are easily germinated and also get complete moisture and air.
- We get good seed from this type of germination before planting.
- High seed quality is necessary in agriculture to produce food worldwide. Seeds are pillar inputs to grow many crops.
- If seeds have low quality, translated in the inability to germinate or by having a low vigour, then production will be threatened.

FUTURE ENHANCEMENT

Use this technique to implement in Hydroponics and soil. Analysis about the nature of Astringent taste and research in areca nut whether it can act as fertilizing manure for the growth of plants.

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"There are times when silence speaks so much more loudly than words of praise to only as good as belittle a person, whose words do not express, but only put a veneer over true feelings, which are of gratitude at this point of time."

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