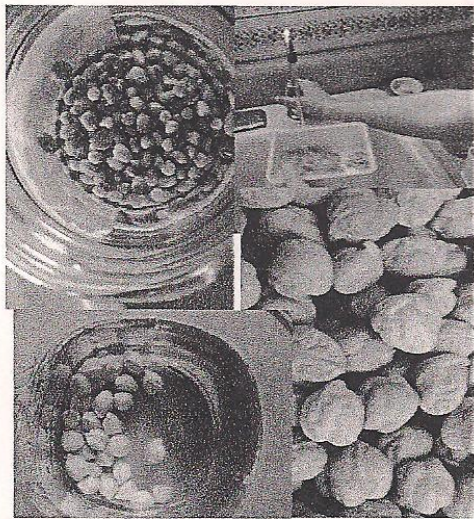
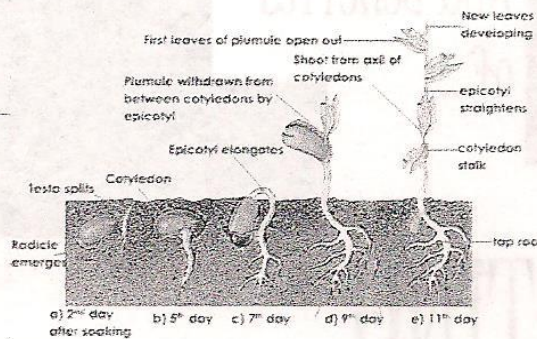


## Steps to sprouting:



- ❑ First you choose the type(s) of beans you wish to sprout.
- ❑ You then put the beans in a jar and soak them.
- ❑ You rinse them twice daily until they have gone through the germination process.

# What is germination?



- Germination is the process of a seed growing into the start of a plant.
- First the seed lodges itself into the ground and soaks for a day or two.
- After this happens the testa, the shell of sorts that covers the seed, splits and the cotyledons emerge which release the radical.
- The radical, the root of the sprout, then grows the hypocotyl which searches for light.
- On the hypocotyl's quest for sunlight it makes its way above ground carrying the embryo or seed attached above itself, by doing so it becomes the stem of the sprout.
- As the hypocotyl grows the epicotyl, the top of the embryo, splits with the cotyledons which are the two sides of the seed and it releases the plumule which will be the first official leaves of the plant it would originally grow into but as they are only going through the sprouting process, in this project, this is as far as the plant goes in its journey.

# What are the Health Benefits of Sprouts?

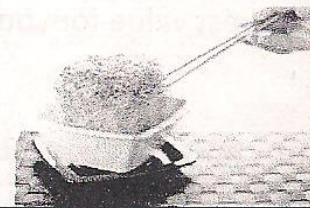
- In the eighteenth century there were a great amount of people dying of the disease know as scurvy. **Scurvy** is a condition where an individual has a vitamin C (ascorbic acid) deficiency. The name scurvy comes from the Latin *scorbutus*, and humans have known about the disease since ancient Greek and Egyptian times. Scurvy commonly is associated with sailors in the 16th to 18th centuries who navigated long voyages without enough vitamin C and frequently perished from the condition.
- Scurvy was common among sailors but it had spread to more of the population of people. Captain Cooke's sailors' had come down with sever cases of scurvy and all that they had were dried beans and such. Cooke put the beans in water and let them go through the germination process and fed them to the sailors in hopes that the beans would cure their vitamin c deficiency. And it did. So when they returned home it became the medical phenomenon and everyone was being healed. Once everyone was healed they soon forgot the miraculous remedy.
- But, years later, a doctor named John Wiltshire put both lemons and sprouts to the test on 60 scurvy hospital patients from Siberia. As Lemon juice and sprouts have an equal amount of vitamin C, He put 30 patients on 4 ounces of fresh Lemon juice daily and the other 30 on 4 ounces of haricot bean sprouts daily. After a month they found that the patients', who had been fed the sprouts, health had improved much more than the lemon juice fed patients. When the patients were released physicians recommended sprouts to scurvy patients as they were the cheapest and best way to avert scurvy.



## What are the Health Benefits of Sprouts Cont.

---

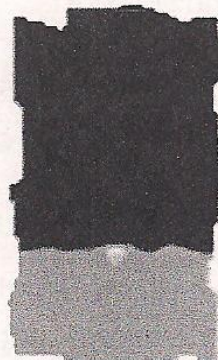
- ❑ When food is cooked at a temperature 105° F or above the enzymes in the food are destroyed.
- ❑ **Enzyme-** *one of a large class of complex proteinaceous substances of high molecular weight formed in and produced by living matter which are responsible for promoting the chemical reactions upon which life depends (e.g. digestion, respiration, reproduction, etc.)*
- ❑ By that definition it is easily see that enzymes are crucial to the human body and if one does not consume them it is not probable the digestion system , and such, will be promoted in that person. Sprouts, not being cooked, are full of enzymes that have not been destroyed and therefore supporting one's digestion, respiration, reproduction, etc.



## In Conclusion...

---

- ❑ In conclusion I highly recommend sprouting. Not only is it a healthy alternative for vitamin C deficiency medicines, as well as being helpful with other infirmities, but it is a fun and easy project for all.



# WHICH CANDLE IS BEST?

## Introduction

---

Candles are used for light, scent and decoration. Candles have two parts that work together. Candles are made mostly of wax, but there are different types of wax used to make candles. The other part of the candle is the wick. The wick can also be made out of different materials, but it is usually a piece of string or cord that is used to hold the flame of the candle. Candles come in different colors, sizes, consistencies, fragrances and prices.

## Materials

---

Three tea light candles:

One paraffin candle – cored wick (materials not specified, but most likely zinc). Cost = \$.25

One soy candle – 100% cotton wick. Cost = \$1.42

One beeswax candle – 100% cotton wick. Cost = \$1.59

## Questions

---

Which type of candle will burn the longest?

Which candle is the best value for your money?

## Background Information from Research\*

---

Anatomy of a candle: Candles have two parts that work together – the fuel (or wax) and the wick. The most common type of wax used to make candles is paraffin. Paraffin is a hydrocarbon and comes from petroleum. Soy wax is made from soybeans. It is considered to be a clean burning wax because it doesn't contain any toxins and it is becoming more popular. Beeswax is a softer wax and is very malleable. Beeswax candles are known for their long burn time and their naturally sweet scent. Soy wax and beeswax are renewable and sustainable resources. Petroleum is not a renewable resource.

All candles need a wick. The wicks are made of cotton, treated with chemicals that slow down its burn rate. The wick may only be made of the treated cotton or it may have a stiff core that helps it to stay straighter as it burns. The cores are usually made from either a stiffened piece of cotton, a tightly rolled strip of paper, or zinc. (NOTE: The cores used to be made of lead, which is no longer allowed in the U.S., but is still found in candles produced in China, South America, and Mexico).

The candle wick works by drawing up (“wicking”) the melted wax/fuel up to the flame. When the liquid fuel reaches the flame, it vaporizes and combusts.

The burning of the fuel takes place in distinct regions (which you can see by the different colors within the candle's flame). In the bluer region, closest to the wick's base, hydrogen is being separated from the fuel (wax) and burned to form water vapor. The brighter, yellow part of the flame is made up of the remaining carbon which is being oxidized to form carbon dioxide.

As the mass of solid fuel melts and is consumed, the candle becomes shorter. The parts of the wick that are not vaporizing fuel are consumed in the flame, shortening the wick.

---

## Procedures

---

We set the candles on a glass holder. We lit the candles and set a timer. We made observations and took notes every 20 minutes until the candles burned out. (See Observation Table)

## Hypotheses

---

Student 1 – I think the paraffin candle will burn the longest because the wick looks longer than the other ones.

Student 2– I think the beeswax candle will burn the longest because it looks the most dense and like it will hold up a lot longer than the others.

Observations/Notes	
20 minutes	Student 1 noticed that the beeswax candle had the biggest flame and the least amount of liquid wax around the wick.
40 minutes	Student 2 noted that the beeswax had the least amount of liquid wax and the soy candle had the most.
60 minutes	Students note that beeswax candle has least amount of liquid wax and the largest flame. The bottom of the metal container of the paraffin candle is now visible & almost all of its solid wax has melted.
1 hr. 20 min.	Beeswax still has least amount of liquid wax. All solids in the paraffin candle have completely melted. The liquid wax is clear.
1 hr. 40 min.	Beeswax candle has turned to liquid with the bottom metal wick fastener now visible. It still has the largest flame.
2 hours	The paraffin is almost completely pure liquid, the beeswax is mostly pure liquid, and the soy has a little bit of liquid.
2 hrs. 20 min.	Paraffin and beeswax are completely liquid, but there is more paraffin left in the tea light container than the beeswax. The soy candle has become half liquid and half solid.
2 hrs. 40 min.	Beeswax liquid wax is almost gone. Paraffin candle still burning steady. Soy candle is almost completely liquid now.
3 hours	The soy candle is pure liquid but it has a big flame. Paraffin still pure liquid, it has the same small flame. Beeswax has the biggest flame, but it is almost out of liquid which means nothing left on it!
3 hrs. 20 min.	Paraffin flame is dying down, the beeswax is still burning regularly, and soy is completely liquefied and burning but is still steady.
3 hrs. 40 min.	Beeswax candle went out (3 hrs. 42 min). Paraffin flame is small, but still burning steady. Soy is still burning steady with lots of liquid wax left.
4 hours	Paraffin is burning off liquid wax. Soy still burning steady, lots of liquid wax left.
4 hrs. 20 min.	Paraffin liquid wax almost gone, but still has small flame. Soy burning steady.
4 hrs. 40 min.	Paraffin flame went out, all liquid wax has burned (4 hrs. 37 min.) Soy still burning, but liquid wax is reducing.
5 hours	Soy candle still burning, but liquid wax is almost gone.
5 hrs. 20 min.	Still burning, but liquid wax is almost all gone.
5 hrs. 30 min.	Soy candle burns out.

## Results

---

The beeswax candle went out first, burning for a total of 3 hours and 42 minutes. The paraffin candle went out second, burning for a total of 4 hours and 37 minutes. The soy candle burned the longest for a total of 5 hours and 30 minutes. The beeswax candle had the largest and hottest flame throughout the burn period (and it smelled really good). Even though it took longer than the paraffin to melt into liquid wax, the beeswax liquid burned off faster than the paraffin. The soy candle was the slowest to burn off its liquid wax. It put off a steady, warm, but not hot flame. Each of the hypotheses was incorrect. Note: Results may be different for a different size/shape of candle.

## Conclusions

---

Based on the burn time and cost, the paraffin tea light candle appears to be the best value for your money. But since paraffin contains toxins within the wax, the wick, and in the petro-carbon soot they produce, and are made from a non-renewable resource, they are the least environmentally friendly (see additional information below). Our conclusion is that the soy tea light candle is the best value for the money, for your health, and for the environment.

## Additional Information

---

In making our conclusion, we also took the following information into consideration. Some websites we visited said that the EPA has warned that burning paraffin candles made with lead wicks (usually from China or South America) can emit unsafe levels of lead if many candles are burned at once. They also warn of reduced indoor air quality due to soot buildup from paraffin wax candles. Heavily scented paraffin candles produce the most soot. (Much of this information came from websites promoting soy & beeswax candles).

\*Sources:

[ezinearticles.com](http://ezinearticles.com)

[wikipedia.com](http://wikipedia.com)

[howstuffworks.com](http://howstuffworks.com)