

Difference Between Germination and Sprouting

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Key Difference – Germination vs Sprouting

Seed is a biological structure that is encased by a protective outer covering. Seeds consist of an **embryo** that later develops into a seedling through germination. Seeds act as a food source and are considered to be a major aspect of plant reproduction. Development of a seed into a new plant when it meets required factors to end the dormancy period is known as germination. Germination is only achieved by seeds that contain an embryo. Germination leads to the development of a seed into a seedling which then develops into two structures: plumule and radicle. Sprouting is a process by which seeds are soaked and developed into digestible forms to be used as food sources. Thus, the key difference between germination and sprouting is that **germination is the process by which an organism grows from a seed or similar structure while sprouting is the process by which seeds are induced to sprout or germinate for commercial purposes.**

What is Germination?

Germination is the development of a plant from a seed or spore after a period of dormancy. During seed germination, a seed initially develops into two structures: a plumule and a radicle. The initial requirement of a seed to germinate is the presence of an embryo once its development is completed. Seed without an embryo will not germinate. Germination of a seed requires different factors. Due to external environmental conditions, a seed may follow a period of dormancy. Once the dormancy period is completed, the seed initiates the process of germination, which resumes the growth of embryonic tissues and develops into a seedling.



Figure 01: Germination of a Seed

External factors such as ambient temperature, the intensity of light, water and oxygen are required for the germination of seeds. Water is an essential factor for seed germination. When seeds mature, the water content in the seed is utilized excessively. During seed germination, water is taken up into the seed through a process known as imbibition. This creates a reserve of water that is sufficient enough to moisten the seed for germination. Imbibition causes the seed coat to swell and ultimately break. During plant development, the seeds act as food reserves which contain [starch](#) and [proteins](#). This is utilized during seed germination to provide nourishment to the growing embryo. These food reserves are broken down into chemicals that are needed for seed germination by the activation of hydrolytic enzymes through imbibition. Oxygen is utilized in seed germination during their metabolic processes including [aerobic respiration](#) which provide the necessary energy requirements for the growth of the seed until leaves are formed. Seed germination occurs over a wide range of temperatures. Depending on the type of seed, the temperature for the germination process will differ.

What is Sprouting?

Sprouting is an example of germination that involves the soaking of seeds for several hours, leading to the formation of a protrusion. Once this process is completed, the seeds are consumed as a food source. In the context of agriculture, sprouting is an important aspect. Seeds are regarded as food sources with less digestible properties. When consumed, there is a high probability of these seeds passing through the gastrointestinal tract without being digested. Some seeds do not have the properties of edibility at all.

Seeds in their raw conditions may also have harmful effects on living systems. They either inhibit the absorption of other nutrients (anti nutrient properties) or contain substances such as lectins and saponins that affect the lining of the gastrointestinal tract. Sprouting is a method that converts the indigestible form of seeds into the digestible form of seeds. The anti-nutrient properties could be decreased with the enhancement of bioavailability of nutrients within the seeds. This is achieved through sprouting to a greater extent but also through soaking and [fermentation](#). The bioavailability of zinc, [calcium](#), and iron is enhanced by the process of sprouting. Sprouting also reduces the availability of tannin and [phenol](#). The reduction of anti-nutrient levels depends on the length of soaking, length of sprouting and the level of pH.



Figure 02: Mung bean sprouts

What are the similarities between Germination and Sprouting?

- For both processes, the availability of a viable seed is required.
- In both processes, seedlings appear.

What is the difference between Germination and Sprouting?

| Germination vs Sprouting | |
|---|--|
| Germination is the process by which an organism grows from a seed or similar structure. | Sprouting is the process where the seeds are induced to sprout or germinate for commercial purposes. |
| Factors Affecting the Process | |
| A viable seed, water, temperature, oxygen, and the availability of light are the factors affecting germination. | Length of soaking, pH, and length of sprouting are the factors affecting sprouting. |

Summary – Germination vs Sprouting

Seeds are biologically important structures that are involved in plant reproduction. Seed can undergo either germination or sprouting. Sprouting is an example of germination. Germination is the process by which an organism grows from a seed or similar structure. Sprouting is a process by which a seed is developed into a digestible

form that provides different nutritional factors. This is the difference between germination and sprouting. For the accomplishment of both processes, the presence of a viable seed is important.

Reference:

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2. "Seed germination" By U.S. Department of Agriculture – Seedling (Public Domain) via [Commons Wikimedia](#)

How to Cite this Article?

APA: Difference Between Germination and Sprouting. (2017, September 15). Retrieved (date), from <http://differencebetween.com/difference-between-germination-and-vs-sprouting/>

MLA: "Difference Between Germination and Sprouting" *Difference Between.Com*. 15 September 2017. Web.

Chicago: "Difference Between Germination and Sprouting." *Difference Between.Com*. <http://differencebetween.com/difference-between-germination-and-vs-sprouting/> accessed (accessed [date]).



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