Difference Between Dedifferentiation and Redifferentiation

www.differencebetween.com

Key Difference – Dedifferentiation vs Redifferentiation

In plants, differentiation is the process where cells derived from root apical and shoot-apical meristems and cambium differentiate and mature to perform specific functions. Once differentiated, the living plants cells lose the ability of division. However, under certain conditions, this ability of further division can be regained. **The process where mature cells reverse their state of differentiation and acquire pluripotentiality is known asdedifferentiation. The process where dedifferentiated cells lose the power of division again and become specialized to perform a function by converting into a part of the permanent tissue is known as redifferentiation.** This the key difference between dedifferentiation and redifferentiation**.**

What is Differentiation?

Plants cells are derived from meristems of shoot apex, root apex, and cambium by a process known as differentiation where cells get differentiated into different structures in order to perform different functions in the plant body. Major structural changes take place in the plant cell wall and the protoplasm during this process. Tracheary elements of the xylem of vascular plants undergo differentiation. The cells lose the contents of its protoplasm, and the cellulose cell walls get lignified into secondary cell walls, which increase its elasticity and allow the cell walls to withstand extreme pressure conditions during transportation of water to longer distances.

What is Dedifferentiation?

Under certain conditions, plants cells that are already differentiated and lost the ability of further division regain the capacity of division and differentiation. This process is known as dedifferentiation. The fully differentiated parenchyma cells undergo dedifferentiation, which leads to the formation of cork cambium and inter-fascicular cambium. A dedifferentiated tissue has the ability to act as meristem that could give rise to a different set of cells. The ability of those cells for further differentiation depends on different parameters such as

genetic and epigenetic variations. This concept is used in plant tissue culture to develop a callus.

What is Redifferentiation?

Once new cells are formed from the dedifferentiated tissues that act as meristems, the cells lose their ability for further division and differentiation. Eventually, they get mature in order to accomplish specific functions of the plant body. Secondary xylem and secondary phloem are the best examples to describe the process of redifferentiation. Dedifferentiated vascular cambium divides further to give rise to the secondary xylem in the inside and secondary phloem on the outside. The secondary phloem and secondary xylem cells lose their ability for further division; instead, they become mature to fulfill specific functions of the plant body, which include transportation of food and water, respectively. Phelloderm is a layer of secondary tissues that is produced by the dedifferentiated cork cambium. Similar to secondary xylem and phloem, phelloderm's cells lose their ability for further differentiation but become mature in order to perform specific functions such as limitation of dehydration and prevention of the entry of pathogens into the plant body due to the destruction of the epidermis.

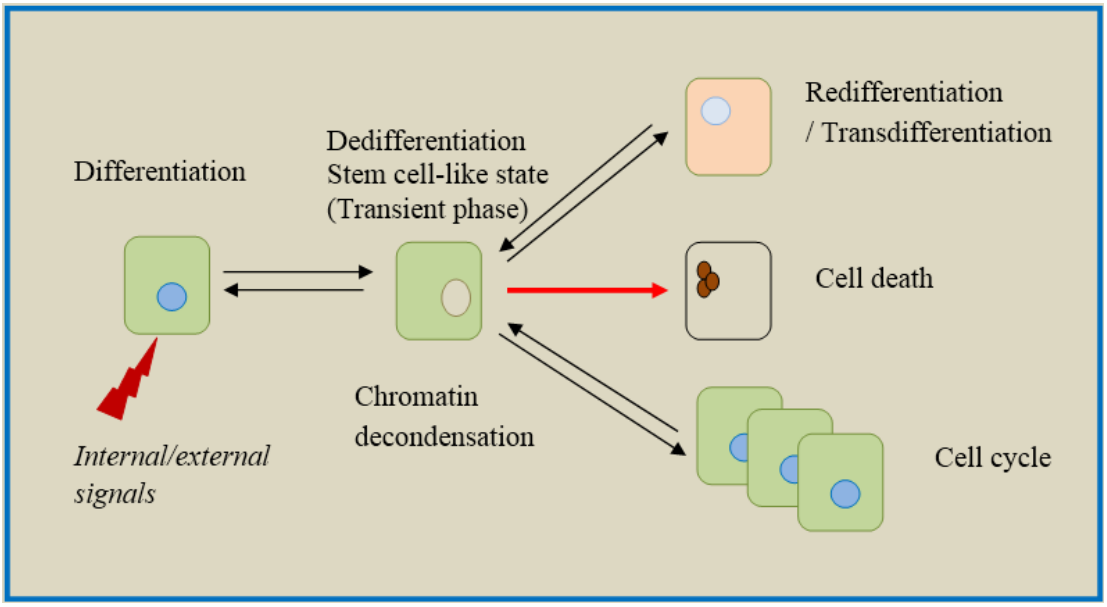

Figure 01: Differentiation and Redifferentiation

What is the difference between Dedifferentiation and Redifferentiation?

Dedifferentiation vs Redifferentiation	
Dedifferentiation is the process that mature cells reverse their state of differentiation and acquire pluripotentiality.	Redifferentiation is the process where dedifferentiated cells lose the power of division and become specialized to perform a function by converting into a part of the permanent tissue.
Outcome	
Cells regain the capacity of further division by dedifferentiation.	Capacity for further differentiation is lost in new cells due to redifferentiation.
New Cells	
New cells formed by dedifferentiation act as meristems for further differentiation.	Redifferentiated cells give rise to secondary structures which carry out specific essential functions.
Examples	
Cork cambium and inter-fascicular cambium are examples of dedifferentiated tissues.	Secondary xylem, secondary phloem and phelloderm tissue are examples for redifferentiated tissues.

Summary – Dedifferentiation vs Redifferentiation

Plant cells derived from meristems such as root apex, shoot apex, and cambium undergo differentiation. Through differentiation, they are converted into structures that carry out specific functions of the plant body. Once differentiated, these cells lose the ability to divide further. Dedifferentiation is a process that takes place under certain circumstances where plant cells which were already differentiated regain their differentiation capacity. Once a dedifferentiated tissue produces new cells, the produced cells lose their ability for further differentiation but mature in order to perform specific functions. This

process is known as redifferentiation. This is the difference between dedifferentiation and redifferentiation.

References:

1.” Primary and Secondary Growth in Stems – Boundless Open Textbook.” Boundless. Boundless, 26 May 2016. Web. Available here. 08 Aug. 2017.
2. Grafi, Gideon. “How cells dedifferentiate: a lesson from plants.” How cells dedifferentiate: a lesson from plants – ScienceDirect. N.p., 27 Dec. 2003. Web. Available here. 08 Aug. 2017.

How to Cite this Article?

APA: Difference Between Dedifferentiation and Redifferentiation. (2017, August 15). Retrieved (date), from http://differencebetween.com/difference-between-dedifferentiation-and-vs-redifferentiation/

MLA: "Difference Between Dedifferentiation and Redifferentiation" *Difference Between.Com*. 15 August 2017. Web.

Chicago: “Difference Between Dedifferentiation and Redifferentiation.” *Difference Between.Com*. http://differencebetween.com/difference-between-dedifferentiation-and-vs-redifferentiation/ accessed (accessed [date]).