Article published on March 6th 2012 | Business

In Botany , the embryogenesis in pteridophytes is the set of processes physiological leading to the transformation of a single cell, the zygote , in an individual known as complex multicellular sporophyte of pteridophytes (group of plants including ferns). This whole process requires a fine regulation of many elements of development , leading to the development of basic morphologies (morphogenesis), the establishment of functionally organized structures (organogenesis) and differentiation tissue.

In pteridophytes the male gametes are mobile, pesentan cilia or other appendages to move, so the presence of water is essential for the occurrence of fertilization . The male gametes move to the archegonia and find their way through the neck, and penetrate the egg cell to form the egg cell or zygote.

The first division of the zygote can be horizontal or longitudinal to the axis of the archegonium. In the first case, the embryos can be exoscÃ³picos , if the shoot apex is directed outward (as in Psilotum , Tmesipteris , Equisetum , and some Ophioglossaceae), or endoscopic , if the shoot apex is directed towards the bottom of the sporangium . If the division is longitudinal, however, the embryos may have jock , a set of sterile cells that pushes the embryo proper inward (as in Lycopodium , Selaginella , and some members of Marattiaceae) or not (Isoetes , some other Marattiaceae and Ophioglossaceae). If the first division is vertical, the shoot apex grows laterally with respect to the axis of archegonium, and has no hanger (as in the ferns leptosporangiados).

Usually the embryo of the pteridophytes has three parts: a foot (the portion attached to the prothallus), the shoot apex and the first root . The embryo is not bipolar like seed plants (spermatophytes).

The somatic embryogenesis , also known as embryogenesis asexual or adventitia, is the development of embryos from cells that are the product of a fusion of gametes during fertilization or, in other words, it is a process by which a structure is produced bipolar (embryo) from a somatic cell . This process occurs with some regularity in nature, occurring spontaneously in more than 60 families of plants, some as important as the composite , Cruciferae , Cucurbitaceae , Gramineae , Rosaceae , legumes and palms . It is therefore a process as natural as zygotic embryogenesis, with such well-known cases like that of citrus , in which both types of embryogenesis , the somatic and zygotic, occur almost simultaneously inside the seed .

By cultivation in vitro , the first in obtaining and developing embryos were Steward and Reinert in 1958 from tissues of carrot . 1 In this model species for studying somatic embryogenesis have been added to date more than 30 species, some as important as alfalfa and several woody forest, which in actualidadse commercially propagated by this method. 2

Somatic embryos can be obtained from many parts of the plant and can be used as explants : root tips and stem, hypocotyls , petioles , stems , leaves young people, in general, tissues and organs with embryonic characteristics, meristematic or reproductive (embryo and inflorescences immature pieces of scutellum , nucellus and endosperm , eggs , etc.). 3 4

Two types of somatic embryogenesis in vitro , direct somatic embryogenesis and indirect. The direct form implies the presence of somatic cells to follow the path predetermined embryogenic

development and primary explant cells develop into embryos (eg, nucellus citrus). The indirect way involves the need for an induction for cells embryogenic follow the path, after passing through a proliferative phase (callus) and change their competence to the expression of embryogenesis. The process occurs in two stages: first, the competent cells in rich media isolated auxins form embryogenic cell clusters called embryogenic centers . In the second phase, once the centers subcultures embryogenic culture medium without auxin, these slowly proliferating and undifferentiated. Then he produced a series of rapid cell divisions in different parts of central and conform embryogenic globular embryos, which they grow, passing through the heart and torpedo and after a phase of maturation and germination give rise to whole plants. 5 somatic embryogenesis as a method, system or plant propagation technology has a number of advantages over other systems. It is possible to get a huge capacity to spread what becomes industrially applicable, can be obtained in a single process complete structures and root apex, which can be stored and perfectly encapsulated, leading to synthetic seeds.

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Article Keywords:
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