



Embryo Rescue Technique

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This study defines a useful technique for studying the effects of media, plant growth regulators, and other chemical and physical factors on embryonic growth and differentiation. Embryo culture techniques have been used as invaluable tools in the fields of plant breeding and in vitro culture. There are certain reasons for embryonic miscarriage, including: B. Inability to germinate pollen, endosperm degeneration, poor pollen tube growth, seed dormancy, postzygotic failure, etc. Embryo culture applied to real problems has proven to be the most valuable tissue culture technique for breeders. One of the main uses of this technology is the production of interspecific and intergeneric hybrids. Postzygotic barriers such as endosperm abortion and embryo degeneration leading to reduced fertility have been overcome through the use of embryo culture and several hybrids have been developed in horticulture.

Key words: Embryo, endosperm, seed

Introduction

The term "embryo rescue" refers to in vitro techniques aimed at promoting the development of inherently weak, immature, or hybrid embryos into viable plants. Depending on the organ in culture, embryo rescue is referred to as embryo, oocyte, or ovary culture. It is most commonly used to save embryos from interspecific and intergeneric matings and from embryos that do not fully develop in nature. Embryo culture is a technique that has been used for more than half a century to rescue hybrid fertilised products when they may degenerate. In 1904, Hanning obtained viable plants from mature embryos of two cruciferous plants that were aseptically isolated and grown on mineral salt medium supplemented with sugar (Norstog, 1979). Dietrich cultured mature and immature embryos of various plant species in 1924 to see if they could germinate without terminating dormancy. He reported that mature embryos grew quickly after the resting stage. Immature embryos germinate early without further embryonic development. The production of interspecific hybrids helps transfer desirable genes from wild species to cultivated species. Extensive crosses between species are often difficult to make due to many factors, including pre-and post-conjugation. Postzygotic barriers such as endosperm abortion and embryo degeneration leading to reduced fertility have been overcome through the use of embryo culture and several hybrids have been developed in horticulture.

Embryo Culture

Embryo culture deals with aseptic isolation and in vitro culture of mature or immature embryos with the ultimate goal of obtaining viable plants.

Mature Embryo culture: Culture of mature embryos obtained from mature seeds. This type of culture is done when the embryo cannot survive in vivo or is dormant for a long period of time, or to eliminate inhibition of seed germination.

Immature embryo culture: Also called embryo rescue, broad crosses, mating with nuclear parents, or culture of immature embryos, this technique rescues embryos from areas of high dropout in the early stages of embryonic development. It is mainly used to avoid abortion of embryos with the aim of producing viable (hybrid) plants.

Procedure for Embryo Rescue

In the embryo rescue method, the crossed and enlarged ovules are removed from the pistil after pollination. However, the time between hybridization and ovariectomy was different. The ovaries are usually removed 3-5 days after pollination. After excision, ovaries are surface sterilised first with 70% ethanol for 30 seconds and then with 2% sodium hypochlorite for 10 minutes, followed by rinsing several times with distilled water and placing the ovaries in test tubes. Embryo cultures are kept at 22 ± 2 °C with 16 hours of light and 8 hours of darkness. Fully developed seedlings are removed from the test tubes, washed with distilled water, and placed in sterile vermiculite. After two weeks, seedlings were transplanted into pots and grown in a greenhouse.

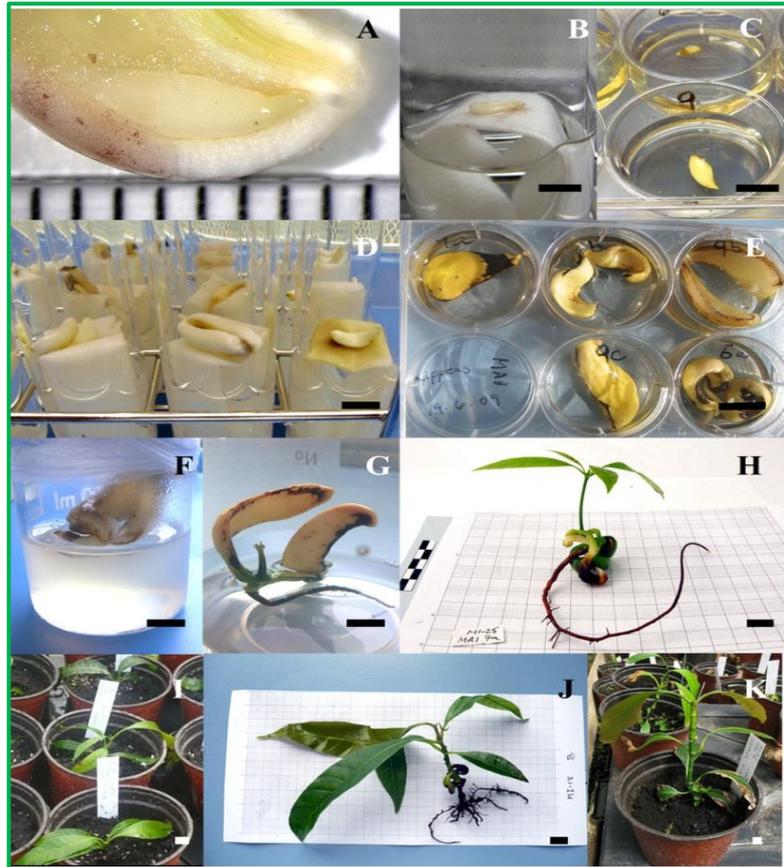


Figure of Embryo culture technique in mango

Application of Embryo rescue Technique

Shortening of breeding cycle: Embryo culture has also been used to shorten the breeding cycle of various horticultural crops where effective germination has decreased from years to months by overcoming the dormancy period. The factors that cause diapause are endogenous inhibitors, cold temperatures, dry storage requirements, light requirements, and embryonic immaturity. By freeing the embryo from the effects of these factors on the seed coat and/or endosperm, the reproductive cycle can be shortened. Vernalization of isolated embryos may also shorten the incubation period. They have developed a rapid generational cycling technique that accelerates the formulation of (Anderson et al., 1990).

Wide crosses: An interspecific hybrid was developed in geranium using the embryo rescue method (Bentvelsen et al., 1990). Aroldo and Noemi (2010) successfully demonstrated embryo rescue and plant regeneration in posthybrid cacti of the genus *Hylocereus* (2010). When it comes to bananas, commercially popular varieties are triploid and therefore seedless. Interspecific hybrids between *Musa acuminata* and *M. balbisiana* have been developed using

embryo rescue techniques (Doreswamy and Sahijram, 1993; Chadha and Sahijram, 2000). Embryo rescue is also used to obtain mating between diploid and tetraploid species.

Seedless ness: Many seedless grape cultivars are stomatoferous, characterised by the arrest of post-fertilization embryogenesis and failure of seed development. Embryo culture can be used to generate haploids or haploids. One technique was to create barley singulars. Interspecific crosses are performed using barley as the pollen parent, and the resulting hybrid embryos are cultured. But these show H. Removal of the Bulbosum chromosome yields haploids of the female parent, H. vulgare (Kasha and Kao, 1970). Haploid lettuce plants were developed using embryo culture techniques (Zenkteler and Zenkteler, 2016). Carnation (*Dianthus caryophyllus* L.) double haploid.

Rapid Testing of Seed Viability: Embryo culture was very helpful in determining seed viability. The use of this technique arose from the early discovery that there was a good correlation between the growth of embryos excised from unripe peach seeds and the germination of mature seeds (Tukey and Carlson, 1945).)Embryo culture allows rapid testing of seed viability if seed dormancy can be avoided.

Factors Affecting the Success of Embryo Culture: Before explaining the application of the embryo culture method, it is necessary to briefly analyse the factors affecting the embryo culture method.

Conclusion

Embryo culture is a useful technique for studying the effects of nutrients, plant growth regulators, and other chemical and physical factors on embryonic growth and differentiation. In addition, interspecific and intergeneric hybrids can be obtained by agriculturally growing plants from forest species, garden plants, and immature embryos of forest species. This greatly expands the field of application of biotechnological methods to improve products. This technique is also used to overcome seed dormancy in some species.

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