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PLANT MICROPROPAGATION AND AGRICULTURAL BIOTECHNOLOGY IN IRAQ

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Abstract:
It has now become necessary to find harmony between the need to increase production .Agriculture and food, and continuing scientific innovation, especially in the field of biotechnology, different methods to provide food and preserve the environment, this article addresses the advantages of biotechnologies, as well as benefiting from resources and sources and developing traditional biotechniques, especially the technique of tissue agriculture tissue culture that rely on simple methods that require no equipment a complex and expensive laboratory, which can be performed without significant investments infrastructure.

Keywords: Plant Micropropagation, Agricultural, Biotechnology

1-INTRODUCTION : Agricultural applications have witnessed an important transformation from a system based on the use of natural resources to a system based on the use of natural resources. It relies on science and technology in order to increase productivity, this is one of the most clear examples of effectiveness of technology employed in the agricultural field is found in what was called the Green Revolution in the sixties intense scientific and research efforts resulted in the production of varieties and hybrids[1]. Agricultural crops are highly productive, such as rice, wheat, corn, and other crops, the mission for developing country societies despite the shift to science-based agriculture, there are many scientific achievements, and the issue of food security is still one of the goals sought. Many developing countries, including Arab countries, are striving to achieve it, and in general, production 40% due to insects - global agriculture suffers from huge losses ranging from 20 diseases, bush diseases and diseases are a result of weak agricultural protection programmers, in addition to the growing global concern about the limited[2].

Natural resources in the face of pressures of population increase and diminishing suitable lands agriculture and environmental risks are obvious, so it has become necessary to harmonize the need to increase agricultural and food production and continue scientific innovation, especially in the field of agricultural biotechnology to provide food and preserve the environment[3]. This is very important and clear for less developed countries where there are pressures resulting from population increase. The environment is usually at maximum levels. The current study discusses the advantages. Biotechnologies as well as taking advantage of the resources and resources available in Arab countries and the development of available traditional biotechnologies and their implications for the sustainability of agricultural systems food and the role of Arab research centers in introducing and localizing agricultural biotechnologies[4].

Soybeans, sunflowers and rape are tolerant to bush pesticides and resistant varieties are also produced for insect pests and producing molecular parameters in order to diagnose the genetic locations of some important qualitative traits molecular markers for agricultural crops[5].

1-1 Plant Micropropagation

Reproduction in plants in general occurs in two ways as for sexual reproduction, plants are produced from seeds resulting from the union of parental gametes (male and female). In most cases, the seedlings resulting from seeds are genetically different from each other, and each one represents a genetic composition that was created by division and the second method. It is asexual vegetative reproduction without changing or modifying its genetic composition[6].Propagation occurs through tubers, vines, cuttings, etc., and the resulting group of new plants is similar to the original plants, the production of many plants that are completely identical in their genetic composition to the same excellent original plant that is to be propagated, whether this plant was produced through a breeding program or from any other traditional means or from the means of genetic engineering in the plant[7].

Propagation is carried out in plant tissue cultures in two ways: either the formation of lateral growths or the formation of adventitious growths in the form of adventitious embryos - Somatic-Embryogenesis [8]. In the first case, a meristematic apex or a growing apex is grown, and this produces plants with fewer

genetic differences, but the rate of doubling is lower. In the second case, any plant part is used meristematic growing apex - part of the leaf - part of the leaf neck -part of the stem as it goes through the stage of callus production and in this case more plants with genetic differences are produced than in the first method, but the doubling rate is higher[9].

1-2 Propagation is divided by the formation of adventitious growths into:

1- **Direct road**: In this case, the embryo is formed directly from a cell or tissue without the formation of a callus. These cells that work to form embryos are called pre-embryonic cells, such as the neocyte cells in citrus fruits and the leaves and petioles of Ficus lyrata, begonia, and African violet plants, when grown in the appropriate environment according to [10].

2- Indirect route: In this case, the callus is formed first, which is a group of unfolded parenchymal cells, and when they unfold, this process is called differentiation or unfolding, the embryos are then formed when they find the appropriate environment and conditions for this, and the cells that make up the embryos are called embryogenic cells in this case an example of this is: the formation of callus from the leaf of *Ficus lyrata* and its expansion into plants or from the bark tissue of carrots, or the formation of callus from the growing apex of palm trees[11].

1-3 Micropropagation occurs on farms in one of three ways according [12]:

1- Through the callus: The superior ability of plant cells to reproduce in farms and produce callus tissue gives a great opportunity to produce large numbers of plants from these cells when plant differentiation occurs in them. Differentiation occurs either through the formation of roots and vegetative growths directly or through the formation of somatic embryos. Propagation through callus tissue is the quickest method. Exact propagation, but this method is not preferred due to what is known about callus in terms of its genetic instability, as various cases of chromosomal duplication appear in it. Also, callus has not been characterized by plant growth in many important crops until now, and this method is the only one used to propagate important species such as Citrus fruits, palm trees and coffee, as mentioned in some references, but it does not prevent the use of other methods

2- Through the formation of adventitious buds: Although plants made from callus tissue are considered adventitious in origin, what is meant by adventitious shoots are those that form directly from the plant organ without being separated by callus tissue, and very large numbers of economic plants reproduce in this way.

3- By stimulating lateral branching: Lateral growth is stimulated in the farms by providing cytokinin in them at a certain concentration, either with or without auxin. The continued availability of cytokinin in the farm leads to the growth of the lateral buds that form at the meristematic apex that grows from the cultivated buds from the nodal segments, and then the lateral buds that form at the apices grow. New meristeism. Thus, continuing this process several times leads to the formation of a mass of new growths. Although the reproduction of one farm stops in this way after a while, reproduction can continue at this stage by transferring parts of the farm to other new farms. Thus, reproduction can continue indefinitely to the point that it is possible For example, the production of 15-25 million strawberry plants from one plant per year because each plant is able to produce 10 new plants every two weeks .

The rooting process is necessary in cases where plants do not grow from somatic embryos, while roots exist naturally in the case of differentiation from the somatic embryo, which naturally contains a root. In order for rooting to occur, it is necessary to transfer the formed growths to another environment that differs in its hormonal components from the reproductive environment, and the vegetative growths are usually transferred. To these environments, they are about 1 cm long, then the plants are transferred after their roots have formed into sterilized pots with great care and are cared for until they grow, after which they are transferred to greenhouses[12, 13] .

The somatic embryogenesis method is rarely used to propagate plants in plant tissue cultures for the more reasons such as difficulty in forming vegetative embryos in many plants, the possibility of mutations occurring during the formation of vegetative embryos, the difficulty of the method forming the callus revealing then forming the growths, loss of vitality and regeneration of plants with repeated transfers and dormancy may occur with the use of the vegetative embryo formation method, which is difficult crumb[14].

Precise propagation is nothing but a type of multiplication that preserves the characteristics and is identical to the original, true to type. In it, selected strains are selected from plants that reproduce vegetative, and tissue culture techniques are used in the laboratory. Most of the precise propagation is aimed at quantitative propagation of plants, taking into account the prices, the plant units produced in this way are also distinctive plants free of pathogens[15] .

It is known that the method of vegetative propagation by traditional means through cuttings, tubers, vines, or other means is considered one of the slow methods to the point that it does not sufficiently meet the increasing demand for plants, which may prompt many countries to import these plants from abroad, in addition to that some of these plants are difficult to propagate. Therefore, the use of the tissue culture method has led to the production of large numbers of different plants in the fields of vegetable,

ornamental and fruit crops in the laboratory and in a limited space, while preserving their genetic characteristics and their application to the mother plant. Also, by using precise propagation methods, it has been possible to propagate some woody forest plants, as some of them do not succeed by grafting, and it is not easy to form roots on cuttings. Thus, wood yield and other advantages of using careful propagation can be increased[16]. There are some plants that are produced from seeds, but their ability to germinate is very low, and therefore they can be easily reproduced by using specialized methods for micropropagation, where some nutrients or other additives can be added to the environment [17].

Some plants may contain special traits that may have resulted from a new or intrinsic genetic mutation, and they may not be possible to obtain again, and therefore they must be propagated vegetative to retain those traits during hybrid production programs, the production of seeds is expensive, as they are produced continuously from the parents involved in the production of the hybrid, especially in the case of plants that do not have the phenomenon of male sterility[18]. Therefore, using precise propagation as a means of producing a large number of one hybrid plant reduces these costs, the accumulation of information after that led to the acceptance of five stages that lead to the success of this propagation before starting the propagation stages, attention is directed to choosing suitable plants for propagation, as they must carry the standard specifications for plants and must also be free of pathogens and pests. Elite plants that are representative of the variety and breed are often chosen[19,20].

1-4 Micro propagation stages according [21]:

* **The first stage: the construction stage**. It is the beginning stage of tissue culture, as it includes selecting the plant part explant, cultivating it, and sterilizing it under sterile conditions.

* **The second stage: Multiplication stage.** It is a very important stage and upon it depends the failure or success of tissue culture, this stage, the plant part that was grown in the first stage is propagated and doubled in order to obtain the largest number of plants. There are three ways to propagate the plant part used:

1- Encouraging the growth of callus on the transplanted part

2- Encouraging adventitious bud formation: This method depends on increasing the number of adventitious buds that form on plant parts by growing them on suitable media in ideal conditions.

3- Stimulate the formation of axillary branches: This depends mainly on the phenomenon of apical dominance, which encourages the stimulation of the growth of lateral shoots.

* **The third stage: Rooting stage.** The multiplied plants are transferred to a new nutrient medium containing auxins for the purpose of rooting them and thus obtaining complete plants prepared for acclimatization.

* **The fourth stage: Hardening:** After rooting, the plants are transferred to the acclimatization medium, and this stage requires extreme care.

* **The fifth stage: the green house.** The plants are transferred to the greenhouse and then to the field.

1-5 Developing sustainable agricultural and food systems.

There is a lack of research on biotechnology. This is due to the absence of an organization or body that undertakes to establish an effective integration between available information and activities, the aim of sustaining the development of sustainable agricultural and food systems based on data[22]. The internal and global aspects related to biotechnology many studies, including those mentioned above, have indicated that biotechnology can provides practical solutions to agricultural and food problems in developing countries, which helps in convincing decision makers, interested parties and beneficiaries in general that developing biotechnology is important sustainable and up to the farmer sector level will be of tangible benefit[23].

The possible development of sustainable agricultural and food systems using technologies biodiversity must focus its efforts on general basic tasks: removing obstacles to production plant, animal, food and maintaining a clean environment sustainable agricultural and food systems through biotechnology[24] . The most important components of the sustainable biotechnology development program are: education and infrastructure appropriate infrastructure, material and moral support. Iraq need an educational system developed, keeping pace with scientific developments at all levels in order to develop and train resources humanity undertakes to apply and develop biotechnology and infrastructure it includes establishing specialized research centers and institutes and equipping them with materials and supplies basic and necessary on the other hand, cooperation at the level of research institutions in biotechnology with their counterparts at the global level will help encourage research and training specialists and technicians and stimulates cooperation among them and the exchange of specialized information and knowledge and adopting appropriate technologies. Thus, cooperation at the qualitative level aims to reduce disparity, variation, and dissemination of the current and foreseeable benefits of biotechnology throughout the countries of the world[25]. This certainly comes from paying attention to the type of studied technical research that must be done it comes to solve the problems that hinder the development of autonomous technologies[26,27]. In this regard there are five international organizations concerned to

one degree or another with biotechnology and facilitating their transfer and employment in developing countries, as well as their interest in developing their own technologies to develop their human and material resources[28].

4- CONCLUSIONS AND RECOMMENDATIONS

The science of tissue culture is considered one of the most important new fields of development modern genetics and biotechnology science group. And it has become tissue culture is one of the most important modern techniques used in agriculture, this has many benefits in facing agricultural problems around the world. And I have science of tissue culture has achieved wide spread among the various sciences that are interested in studying organism and its stages of development are successive, and it has contributed to the progress of many studies in various fields of science, not the least of which is genetic engineering. The techniques for cultivating plant cells and tissues are modern agriculture tissue consider is an important field of weapons for the development of molecular biology, genetic engineering, and the chemical and pharmaceutical industries, and more than practical development and commercial applications. These technologies have also changed agricultural practices from the concept of some farmers and nursery owners all over the world, It made them seek it a lot to solve the problems of plant propagation, as it led applying it to the introduction of plants, trees and shrubs that were difficult propagated by traditional methods. It established many companies operating within this period currently experimenting with plant tissue culture, and has conducted large-scale operations.

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