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Advantages of Growing Plants by in-Vitro Method

V. N. Mamedova,
Teacher, Termiz Institute of Agrotechnologies and Innovative Development
visola.0418@gmail.com

Abstract:
This article provides information on the advantages of in vitro seedling cultivation and its importance in agriculture. The results of research conducted on the potato plant are described.

Keywords: in-vitro, potato nodule, binocular magnifying glass, scalpels, dissecting tubes, clamps with holders, test tubes with sterile nutrient medium.

INTRODUCTION

preservation, propagation, and embryogenesis of valuable genotypes in biotechnology by culturing tissues isolated from plants in vitro in sterile conditions, in artificial nutrient media (the growth points, side shoots are sterilized in laboratory conditions and introduced into artificial nutrient media for a certain time) implementation and sanitation of planting material is carried out. Decision of the President of the Republic of Uzbekistan on organizational measures to implement the innovative development strategy of the Republic of Uzbekistan in 2022 - 2026 In the decree No. PF-165 "On approval of the innovative development strategy of the Republic of Uzbekistan", special attention is paid to the in vitro cultivation of plants.

Advantages of in-vitro laboratory plant breeding. The following results can be achieved by growing plants in this laboratory:

1. Genetically identical plants are planted and propagated;
2. Through clonal micropropagation, one plant is multiplied to several thousand;
3. Accelerates the transition of the plant from the juvenile period (from the grass or vegetative shoot) to the reproductive period;
4. In order to speed up the selection process, i.e., in the renewal of plant varieties and in large quantities, work is carried out;
5. Since it is in laboratory conditions, it is possible to breed plants in any season without choosing a season;
6. The multiplication factor is very high. 104-105 in herbaceous plants; it is possible to increase it up to -104 for leafy plants.

7. Opportunities to automate the growing process and reduce the area needed for plant growth, etc.
8. It helps to restore outdated varieties of plants, for example, strawberries, potatoes.

Reproduction from cells. Seed plants are propagated in two ways: from seeds and vegetatively. Both of these ways have advantages and disadvantages. One of the disadvantages of seed propagation is the genetic diversity of the seedlings and the length of the juvenile period. In vegetative reproduction, the genotype of the mother plant is preserved and the juvenile period is shorter. But for many species (primarily wood-producing) the problem of vegetative reproduction has not yet been solved. In an in-vitro laboratory, a plant can be propagated from its cells.

This is the main method used in clonal micropropagation of plants activation of the development of meristems in plants based on removal of apical priority. There are two ways to achieve this can: removal of stem apical meristem and then shoot in vitro micro-penning in a hormone-free environment;

add substances that have cytokinin effect to the food medium.

Research Objects and Methods:

The technology of clonal micropropagation of the potato plant has reached the industrial level. The use of the method of activation of meristems in plants allows to grow 105 plants from one potato meristem in a year. Usually the apical meristem is completely free of viruses. In particular, the virus-free apical meristem consists of actively dividing cone-shaped cells 0.1 mm long and 0.25 mm wide. Mainly without injury to the meristem

Since it is difficult to divide it into pieces, it is divided into 1-2 leaf primordia (size

100-250 μm apices). Active recovery of potatoes with thermotherapy and chemotherapy to increase the style of higher meristems carried out together. Thermotherapy method of potato tubers viruses based on inactivating heat treatment. High meristem method in combination with chemotherapy to nutrient mediums

based on the addition of virus-inhibiting substances. Apical potato virus-free plants are obtained from meristems in nutrient medium, they are propagated and replanted in greenhouses and virus-free tubers are obtained. It was obtained in vitro for rapid reproduction of healthy material buds can also be used.

Research Results:

Potato tubers were stored at 4-80C, after grown in the dark at a temperature of 20-220C. Separation of meristems into pieces work was carried out in sterilized laminar boxes with bactericidal lamps. Work stations, table, binocular magnifiers and test tube tripods before starting work wiped with alcohol. Tools used for slicing (tweezers, scalpel and needles) were sterilized after each dissection, for this the tools were dipped in alcohol and ignited in the alcohol burner. Seedlings to meristems sterilized in 0.1% diacid solution for 3-5 minutes before separation.

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Figure 1. Boiled potato nodule.

For this purpose, the sprouts were placed in a chemical glass and a solution of dioxide was poured over it. Then rinsed three times in sterile water. Also 1-6% calcium or sodium it is also possible to sterilize in hypochlorite solution or 0.1% sulema solution. Sterilized sprouts were placed in a Petri dish and one to prevent drying out a few drops of sterilized water were added. Before cutting the sprout into pieces, gradually stripping the upper and side meristems of the leaf the covering leaves were removed from its tip. This is done by a binocular microscope should be done with the help of a separating needle. 100-250 µm in size primary leafless meristem with a simple thin sheath attached to the receptacle divided into pieces. The lateral and upper meristems of the growth point are cut into pieces is separated. A separate sterilized tool should be used to pluck each leaf. A separated meristem at the tip of the tuber to the surface of the nutrient medium will be placed. The mouth of the test tube is closed by sterilizing a cotton plug in an alcohol burner and placed on a tripod. After the rack is filled with test tubes, the nutrient medium is dried it is closed with a cellophane cap so that it does not remain. As a nutrient medium previously in an autoclave for 20 minutes at 1 atm. pressure sterilized Murasige-Skuga nutrient medium is used.

Virus-free potato plants obtained from apical meristems are artificial food
should be multiplied in the environment. Potato breeding is widespread the method is the grafting of a plant in a culture in a test tube. For this the plant is taken from a test tube, each with a leafy stem and an axillary bud divided into pieces. Each pen is filled with Murashige-Sku nutrient medium transferred to test tubes.

Remove the growing point of the stem to the activation of lateral meristems by reducing the apical dominance based on When the lateral shoot of the pen is transferred to the nutrient medium, it is from it a branch grows. The next grafting is carried out every 14-21 days. 5-8 cuttings are taken from one plant. By penning within 3 months 3-5 thousand plants, and within 7 months the reproduction coefficient will be 1:30-40 thousand can be delivered. Then, the materials to be planted are healthy to the next stage of propagation, i.e., to the stage carried out in greenhouses will be passed. In this case, the plants in the test tube together with the agar nutrient medium planted in soil pots. Plants 3-7 days Knop's solution and Murasige-Sku with trace elements according to: 1 x 100 of 5 ml of the initial solution fed with a concentrated 1 ml solution in water. After 7-100 days plants to a permanent place in greenhouses to get virus-free buds and the harvested crop is then planted in the field.

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Figure 2. Potato seedlings planted in nutrient medium.

After healing, the next stage of propagation of planting material is carried out in greenhouses. In this case, the plants in test tubes are planted in soil pots together with agar nutrient medium. On days 3-7, plants are fed with micronutrients according to Knop's solution Murasige-Skugan: 5 ml of the initial solution with a concentration of 1x10 in 1 l of water. After 7-10 days, the plants are transferred to a permanent place in greenhouses to obtain virus-free tubers, and the obtained crop is planted later.

Figure 3. Ready seedlings

The inner surface of the laminar box is wiped with alcohol. Sterile plant the inserted test tube is cleaned with alcohol and sterilized in an alcohol burner.

We take a sterile plant in a test tube with sterile tweezers on a sterile mat, right should have a scalpel in one hand and tweezers in the left hand. Remove the plant with tweezers while holding, with a scalpel 5-10 mm from the joint interval of the stem parts cut lengthwise. A few stem explants for callus formation We remove it from the place with a scalpel. We heat the nutrient

medium until the agar dissolves and We cool it to 37-400C. Open the mouth of the flask and heat it in the alcohol burner put the nutrient medium in Petri dishes. Per plate approx 15-30 ml of nutrient medium is added and allowed to harden for 10-15 minutes. Per petri dish 10-20 scratched stem explants are gently placed on the surface of the agar medium with tweezers is immersed, covered with a Petri dish lid, with two layers of parafilm covered and a light-free climate with a temperature of 22-250C, humidity of 70% placed in the camera.

Summary

Research shows that in-vitro seedling cultivation shows that the planting and propagation of genetically identical plants, the propagation of a single plant up to several thousand units through clonal micropropagation, o accelerated the transition of the plant from the juvenile period to the reproductive period, in order to speed up the selection process, i.e., in the renewal of plant varieties and in a large number of reproduction works, since it is in laboratory conditions, it is possible to reproduce plants in any season without choosing a season, provides opportunities to automate the growing process and reduce the area needed for plant growth.

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