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THE CONDITIONS OF ADAPTATION OF EGGPLANT-REGENERATE (*SOLANUM MELONGENA* L.) UNDER *IN-VITRO* AND *IN-VIVO* CONDITIONS

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Abstract

The article presents the results of the study on the development of an effective regenerative system technique for the selection of eggplant cell, This is because the subject is not addressed by the former researchers. The first section describes the conditions within the laboratory in terms of the definition and description of the selected plants, their suitability and compatibility in certain laboratory conditions. The second section deals with how the selected plants adapt to the environmental conditions outside the laboratory. It also includes monitoring and monitoring the adaptation of all plant varieties and assessing the environmental response in terms of soil type, temperature, humidity and lighting as influential environmental factors as well as the biologic response in terms of plant length, plant length and root, Environmental issues, vessels with a capacity of 0.5 kg (diameter 10 cm) were used; 1 kg (diameter 20 cm.) And 2.5 kg (diameter 40 cm.) And planted chernozem in various supports a typical, peat ground universal Agrobalt + perlite 20%, soil soil + chernozem typical 1: 1 found out. The air temperature in the greenhouse was in the range of 20-25 C, humidity - 75-80%. That the maximum engraftment of test-plants of eggplant (99%) was recorded when they were adapted in the substrate from the peat soil universal Agrobalt containing 20% perlite.

The results showed the development of an effective regeneration system for the eggplant option, which includes the use of eggplant seedlings for seven days as preliminary explorers for plants.

Key words: *In-vivo*, *In-vivo* explant, nutrient medium, plant regenerant, cell selection, kalyusogenesis

Introduction

Eggplant (*Solanum melongena* L.) is classified as a vegetable family, which is one of the most important economically important family families, and includes more than 75 species and 2,000 plant species spread around the world (Mohammedi 1990). India the eggplant originates in the origin of the ancient wild species that originated in central India and southeastern China and from there spread to Africa, Spain and other regions of the world (Al-Khafaji *et al.*). Demand and absorption of markets for all quantities offered on m As well as the need for the use of modern scientific methods in the cultivation and production of eggplant. These methods are the cultivation of plant tissues inside the laboratory (sterile conditions) as a first stage and adapting the plant to the external environmental conditions (sterilized) as a second stage which Researchers from different countries have shown that the critical period of plant transplantation in the laboratory is to be transferred from test tubes to non-sterile growth conditions - in the soil. Therefore, the development of measures to ensure that a considerable amount of plant material reproduced by biotechnology methods (Ivchenko and Shabetya), remains of paramount importance. During the culturing period in vitro conditions are tube plants under controlled conditions of temperature and humidity, so immediately after transplantation in in vitro conditions. In this regard, after transplantation in the open ground approximately 50-75% regenerated plants die. The reasons for poor survival tube plants is insufficient functioning of the stomata, underdevelopment cuticular leaf cells in the absence of test-tube plants temperature gradient between atmosphere and the substrate (Murashkin *et al.* 2015). To overcome the above violations allows the primary adaptation of regenerated plants, the task of which is to restore water and mineral metabolism in them. Therefore, to ensure the maximum percent

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adaptation valuable starting material eggplant primary optimized adaptation methods regenerated plants to soil conditions and protected studied particularly in phenophase main passage adapted tube plants during their growth in the ground conditions.

Material and research methods

Venue Greenhouse Complex Units "Agrotehnopark" Belgorod State Agricultural University. Plant samples were taken in the laboratory under sterile environmental conditions in accordance with the recommended recommendations for the sterilization of the food environment, laboratory instruments and environmental conditions that control them indoors from temperature and illumination, which were 3.0-4.0 lx, photoperiod - 14 hours, temperature-17°C (night)-22°C (day) (Butenko 1986; Zubko *et al.* 1988; Egorova *et al.* 2013), where these samples were transferred and planted on substrates, will be mentioned later to start the first adaptation of the plant.

The first adaptation of the installation The initial adaptation of the installations of the test tube was carried out on different substrates and certain environmental conditions

- universal peat ground "Agrobalt" + perlite 20%
- soil + black soil typical 1: 1

For transplantation of plants used vessels with a capacity of 0.5 kg (diameter 10 cm); 1 kg (diameter 20 cm.) And 2.5 kg (diameter 40 cm.).

The composition of the soil peat universal "Agrobalt":

Peat decomposition rate - up to 20%

Acidity - pH (H_2O) - 5.5 - 6.6%

pH (KCl) - 5.0 - 6.2%

Content of nutrients not less:

Nitrogen (N) - total - 150 mg / l;

Phosphorus (P_2O_5) - 150 mg / l;

Potassium (K_2O) - 250 mg / l;

Magnesium (Mg) - 30 mg / l;

Calcium (Ca) - 120 mg / l.

+ trace elements

The mixture contains 20% perlite.

Composition of soil universal soil:

Nitrogen (NH_4 + NO_3) - 170 mg / l;

Phosphorus (P_2O_5) - 160 mg / l;

Potassium (K_2O) - 270 mg / l;

Acidity pH (KCl) - 5.5.

The criteria for adaptability and personality stabilization were determined in accordance with the guidelines (Kilchevsky *et al.* 1985). Statistical analysis of experimental materials was performed in accordance with (Dospekhov 1985).

The economic efficiency of the use of biotechnological methods in the creation and reproduction of the source material was calculated by reducing costs by accelerating the selection process. A root plant (1-2 cm) was formed and 2-3 pairs of real leaves (Fig. 1) were formed after washing the roots of the plant several times to remove the rest of the food medium for basic adaptation in 0.5 kg vessels (10 cm in diameter) containing Different substrates (typical black soil and agrobalt mass of peat + 20% perlite). The bowls were placed on shelves and the plant was watered with distilled water (Alizidi 2010). After planting the cavities, they were covered with a transparent plastic cover. The air temperature in the greenhouse was in the bands 20-25 SS, and the humidity - 75-80%. After 3 days, the plastic film was removed, as shown in.

After the main installation process, the plant was transferred to 1 kg of containers (diameter 20 cm) for a whole week, and then transferred to 2.5 kg containers (diameter 40 cm). The soil contains various types of substrates (typical black soil and agrobalt) + Perlite 20% for two weeks, and we got the results in the table 1.

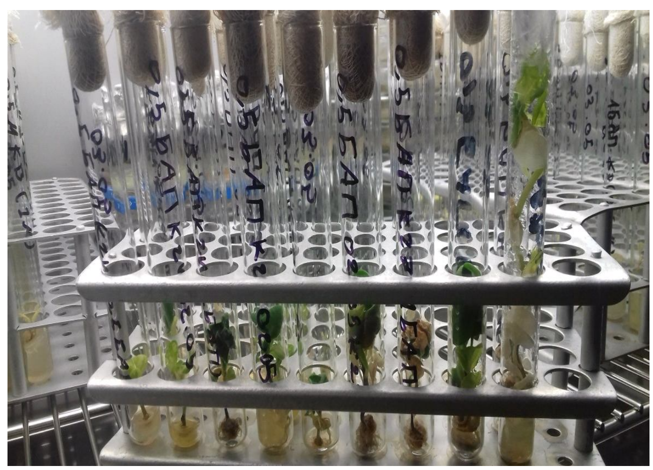

Fig. 1: Eggplant regenerant plants in test tubes

Regenerant plants, which formed the root system (1-2 cm) and formed 2-3 pairs of true leaves for primary adaptation, were transplanted into vessels, which contained various types of substrates (typical chernozem and agrobalt universal peat ground + 20% perlite). The vessels were placed on the shelves and after planting the regenerants were covered with transparent plastic wrap. The air temperature in the greenhouse was in the aisles of 20-25°C, humidity-75-80%. After 3 days, the

Fig. 2: Regeneration plants transplanted into vessels

polyethylene film was removed (Fig. 2).

Results and Discussion

According to the results of the primary adaptation of test-tube plants of eggplant, carried out using different substrates, differences in the regenerant plant development were revealed both in terms of the survival rate of the material and their biometric development parameters. When adapting, the smallest percentage of engraftment of test-tube plants was observed in the experiment in the variant where the cartridges were filled with typical black soil (table 1), where the overall survival rate after 3 weeks of adaptation was 70%. This is because the black soil is typical, is rather dense in structure, Unlike peat mixture only the survival rate was 99% At the first stage, eggplant regenerants require high aeration of the soil, since the root system needs a lot of oxygen.

As a result of research, we found that the maximum engraftment of test-tube plants of eggplant (99%) was recorded when they were adapted to the substrate from the soil of the peat universal Agrobalt containing 20% perlite. Since this substrate is characterized by high rates of air intensity, due to which, during adaptation on this substrate, the root system of test-tube plants was in conditions with high aeration, to which the eggplant plants are very whimsical. That is, this substrate is optimal for the primary adaptation of test-tube plants. The analysis of biometric indicators after the end of the primary adaptation showed that, in cassettes with typical chernozem, the height plants was 9.6 ± 1.2 cm. In the cassettes with peat mixture there was a tendency for some increase in the height of plants, although the difference in performance was in the margin of experience fault. The root system in regenerated plants in cassettes with typical chernozem developed worse than when adapting to the peat mixture. The difference in performance was significant (table 1).

In option using the peat mixture, high parameters of the development of the aerial part of plants (shoots, leaves) and the root system were obtained, using the peat mixture, high parameters of the development of the aerial part of plants (shoots, leaves) and the root system were obtained, which allows to recommend this substrate for the initial adaptation of eggplant. High sterility, hydrophilicity and moisture content of the mixture allows it to occupy a leading position among the substrates for the adaptation of test-tube plants. Separately, it should be said about the methods of feeding test-tube plants when adapting on substrates that are poor in mineral substances (especially on artificial substrates). In her studies on the adaptation of vegetable plants and potatoes (Yanchevskys *et al.* 2015) first drew attention to the peculiarities of the development of the root system in test-tube samples. In eggplant, like most test tube plants, the root system at the time of their transplantation from the tubes was light cream color and had the main rod structure. It has been observed that during the entire period of primary adaptation of the root system is greatly modified. On both substrates was observed on an intensive formation of branched taproot lateral roots white,

Table 1: Viability and biometric parameters of test-tube plants of eggplant after primary adaptation, 2017

Substrates	Living plants (%)			Biometric indicators of regenerated plants after three weeks of adaptation					
				height		maximum length leaf		root length	
	Week	Week 2	Week 3	cm	growth to control cm	cm	growth to control, cm	cm	growth to control cm
black soil typical (control)	95	80	70	9,5 ± 1,3	0	4,1 ± 0,3	0	4,7 ± 1,1	0
Peat mixture	100	100	99	10,3 ± 1,2	0,8	6,4 ± 0,3	2,3	7,1 ± 1,4	3,6
NIR_{05}				2,6		1,1		1,5	

whereby at the end of the adaptation all plants had a well-developed secondary root system. Through such cardinal changes in the development of the roots in the first weeks of plant nutrition adaptation, the solution of mineral salts with the help of the root system is not effective, since even water absorption is problematic for test-tube plants in the first 7-10 days. In order to provide test-tube plants at the first stages of adaptation with nutrients - essential macro- and microelements, we used this technique as foliar application by spraying the leaves with a nutrient solution. This made it possible for plants to quickly absorb nutrients in the form of fine droplets. This event allowed the regenerants to quickly overcome the stress received during their transplantation. Thus, to ensure 99-100% survival of test-tube plants of eggplant during the primary adaptation, a peat mixture should be used, consisting of nitrogen (N)-total-150 mg/L; phosphorus (P2O5) - 150 mg / L; potassium (K_2O) - 250 mg /L; magnesium (Mg) - 30 mg / L; calcium (Ca) - 120 mg / L. + trace elements. The mixture should contain at least 20% perlite. During adaptation, maintain air humidity at 7580% and conduct foliar feeding of plants with a nutrient solution. This technique contributes to the rapid growth of the vegetative mass in test-tube plants and the formation of a well-developed root system. All plants adapted for winter greenhouse conditions (R1), which reached a height of 14-16 cm, with three or four pairs of true leaves and developed root system, transplanted into vessels, increasing the area for the development of the root system (Fig. 3, 4).

Plant growth and development depended not only on the genotype, but also on the nutrient medium on which the plant was cultivated. In the study there were lines k-3; K-13; K-24 and K-27. As well as regenerants of these lines grown on nutrient media: MS b / g (Without hormone); MS + 0.5 L 6-Ben; MS + 0.5 mg /L (Mival-agro).

The variability of the biometrics of the plants of the regenerants during adaptation to the in vivo conditions depending on the genotype and nutrient medium on which these plants were cultivated is presented in table 2.

During the growing season, eggplant plants were phenologically observed in a film greenhouse. The dates of the disembarkation of test-tube plants in the greenhouse, the onset of the budding stage, mass flowering and fruit formation were determined. The biometric indicators of the vegetative phase of development depended primarily on the genotype of the lines; a slight increase in the “plant height” indicator in regenerants cultivated on MS + 0.5L 6-Ben (6-benzylaminopurine) medium can be noted. As for the generative phase of development, plants cultivated on a medium of 0.5 mg / lM (Mival-agro) were the first to enter the flowering and fruiting phase. As a result of the studies performed, the effect of genotypes, as well as the cultivar types of test-tube plants of eggplant on the

Fig. 3: Transplanted regenerated plants after primary adaptation

Fig. 4: Regenerant plants after the second transplant

Table 2: Variability of biometric indicators of regenerated plants

lines	The medium	Plant height		The number of side branches		Number of leaves	
		27.12.17	11.01.18	27.12.17	11.01.18	27.12.17	11.01.18
К-3	W/H	36	46	2	3	24	27
К-13	W/H	35	47	2	3	18	29
К-24	W/H	27	37	2	3	17	25
К-27	W/H	43	50	4	5	24	25
К-3	0,5 BEN	31	39	1	2	10	14
К-24	0,5 BEN	41	50	1	3	11	21
К-27	0,5 BEN	46	47	1	3	21	24
К-13	0,5 M	35	40	2	2	14	18

Table 3 : Effect of genotypes of test-tube plants of eggplant (R1) on the growth and development of plants

	Survival rate,%	Plant morphology			Total yield, kg / sq.m	Seed yield, g / sq.m
		height cm	quantity fruits, pieces	fruit weight, g		
east asian	90,9	60,6 ± 3,2	8,2 ± 0,7	145,7 ± 6,3	4,9	6,7
west asian	98,8	63,1 ± 5,5	6,1 ± 1,4	242,3 ± 7,1	6,7	9,4
east asian		61,2 ± 2,2	7,1 ± 0,7	156,4 ± 6,4	5,1	6,8
west asian	99,9	66,1 ± 4,5	5,2 ± 1,3	257,2 ± 6,6	6,5	10,3
Research 0.05					1,8	3,7

survival rate of explants, morphological parameters of an adult plant and productivity (table 3) was noted. The survival rate of test-tube plants of the studied samples, the West Asian type was 98.8% - 99.9%, and for samples of the East Asian type 90.9% - 93.9%.

The height of the test-tube plants R1, of the West Asian subspecies, was slightly higher than that of the East Asian, which is fully consistent with the morphological description of the corresponding varieties. The morphological parameters of plants obtained in vitro were identical to plants grown in the traditional way. The main indicator of the effectiveness of the developed method of adaptation and rearing of test-tube plants is the yield of fruits and seeds. Summarizing the data obtained during the research on the primary adaptation and rearing of eggplant regenerants, it can be concluded that test-tube plants of eggplant should be planted in greenhouse conditions on a special peat mixture, providing optimal conditions for the full development of plants. This makes it possible to get high-grade seeds. The research results showed that to accelerate the breeding process of reproduction of valuable eggplant lines by biotechnological methods in an in vitro culture is appropriate. So, as a result of the research, an effective technology of regeneration system for eggplant cell selection has been developed, which includes the use of seven-day-old eggplant seedlings as primary explants of the seedlings of the seedlings balanced for nutrient medium MS for induction of kalyus genesis and the formation of regenerated plants for non-sterile conditions and optimal substrates for planting adapted test-tube plants in the greenhouse.

Recommendations

As a result of the research, an effective technology of regeneration system for eggplant cell selection has been developed, which includes the use of seven-day-old eggplant seedlings as primary explants of the seedlings of the eggplant, balanced in composition of the nutrient medium MS for induction of calyus genesis and the formation of regenerated plants, primary adaptation of test-tube plants to non-sterile conditions and optimal substrates for planting adapted test-tube plants in the greenhouse.

That is why the recommendations were as follows:

1- Getting seedlings on non-hormonal nutrient medium MS

2- Planting seedlings on a nutrient medium MS enriched with 0.5 mg/l Mivala-agro or 6-benzylaminopurine to induce calusogenesis and regeneration of organogenic sprouts.

3- Primary adaptation of test-tube plants in peat substrate with perlite (20%).

4- Planting test-tube plants of the R1 generation in the greenhouse for seed production.

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