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USE OF THE PREPARATION CHLORMEQUAT CHLORIDE TO INCREASE RESISTANCE OF REGENERATED POTATO

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ABSTRACT

In world practice, of primary seed potato micropropagation actively used the original seed. Application of growth regulators can significantly improve the efficiency of the accelerated reproduction at all stages of production, in particular the use of seedling culture to reduce losses during transplantation the culture of plants in vivo. In this paper we investigate the possibility of applying retardant chlormequat chloride in the composition of the culture medium of Murashige-Skoog for increasing the adaptive properties of regenerated potato. Studies have shown that the use of the drug in the dosage chlormequat chloride 0,3 ml / l culture medium consisting of Murasige-Skuga culture stimulates adaptive properties of plants and reduce their losses during transplantation in vivo by 21%. Application of the preparation chlormequat chloride in the final stages of micropropagation can significantly improve the efficiency of the technology gain valuable biotechnological material for primary seed potatoes.

KEYWORDS: **Explants, culture medium, retardants, in vitro, in vivo, adaptation.**

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INTRODUCTION

Great economic importance of the potato as a food crop naturally led to the creation of numerous micro-engeeniring technologies for potato[1]. The widespread use of meristem material in seed potatoes due to the high culture of this affection viral diseases, significantly reducing productivity and quality of seed in subsequent reproductions[2]. With accelerated breeding potatoes, the improved biotechnological methods or replication of new varieties of the main ultimate aim - getting the maximum number of full tuberous units for of primary seed [3]. To achieve this, work is carried out in three directions:

- A sufficient number of test tube virus-free potato plants;
- Reduction of losses during transplantation in vivo;
- Stimulation of the tuber in growing meristem material in the soil.

Among the effective methods for rapid multiplication of meristem plants in the first place is micropropagation in vitro, proposed in 1970, Vinkler G.N. and Butenko R.G. [4] . Further seed production due to the transfer to the conditions in vivo, which are stressful for the culture of plants. In this regard, there is a problem to create additional factors increase not only morphogenic but adaptive properties culture plants. The use of growth regulators in the production of virus-free potato is widespread at all stages of production [5] . Were also used for this purpose and preparations of retardants, which include chlormequat chloride . TUR preparation or CCC, as a regulator of the group retardants known for a long time [6]. It was first obtained in 1904 by Schmidt, his action is based on inhibition of cell growth of the young stem the growing and strengthening of their division in the transverse direction, it increases the diameter of the stem, enhanced development of mechanical tissue thickens sheath cells and increases the number of fibrovascular bundles[7]. Many studies found that treatment retardants increases resistance of crops to a lack of water, high and low temperatures, excess salts [8.9.10] . With the help of growth regulators group retardants solve the problem of maintaining a collection of plants in vitro, ie, lengthening of the period between successive propagation by cuttings [11]. For this Trofimets L.N., Boyko V.V., Zeyruk T.V. offered to introduce the culture medium Murashige-Skoog TUR preparation at a concentration of 0.5 ml / l and Alar in a concentration of 5 mg / l, while the period between cutting increased 3-fold [12, 13] . The most commonly used retardants at potato cultivation in vitro, suggest to use to encourage tuber formation in vitro. The regularity that the conditions that lead to the removal of apical dominance, inhibition of axial growth induce and stimulate nodulation. In this direction worked Tovar P., Chandra R., Dodds J., Schilde R., Espinoza D., Estrada R., Butenko R.G., Babaev S.A., Zhumageldinova J. et al. [14 – 17] . They had been established an inverse correlation between the growth of the stem and tuber formation in vitro, when growth stops stem begins the process of tuber. In our opinion the use of retardants in vitro can not be limited only to these areas. This article discusses the use of retardants to enhance the adaptive properties of regenerated potato. The problem of adapting the culture of plants when they are translated in vivo remains very important. The high value of the original plant material produced by biotechnological means, requires constant improvement of methods and techniques that increase the survival rate of test-tube plants in the conditions in vivo [18] . for the objective of our study was to examine the influence dose of preparation chlormequat chloride in the composition of the culture medium on the growth and development of regenerated potato.

MATERIALS AND METHODS

The research object is regenerated potato grade Nevsky. The culture medium consisted of salts of the Murashige-Skoog[13], indolebutyric acid - 1 mg / l, 20 g / l sucrose, 80 mg / l casein hydrolyzate. Preparation chlormequat chloride used as a 60% aqueous solution. Micropropagation was conducted under aseptic conditions of box according to [1]. In the phytotron at cultivation temperature was maintained at 25-27 ° C during the day and 20-22 ° C at night, relative humidity 70%, light intensity 4000 lux.

In the experiment investigated 40 plants in each variant in 4 multiple replications.
Variant 1 - 0,3 ml L-1 on medium of Murashige-Skoog;
Variant 2 - 0.5 ml L-1 on medium of Murashige-Skoog;
Variant 3 - 1.0 ml L-1 on medium of Murashige-Skoog;
Variant 4 - 2.0 ml L-1 on meium of Murashige-Skoog;
Embodiment 5 (control) - medium of Murashige-Skoog without addition of preparation chlormequat chloride . Measurements of plant height and number of internodes were performed 10 days after the start of culture. To account for the cultural survival of plants under greenhouse conditions was based upon experience, used a mixture of soil, biohumus-sand 1.1 experience laid on 40 plants in each variant in 4 multiple replications. Counting of established plants produced 10 days after planting in vivo.

RESULTS

Studies in variants using the preparation chlormequat chloride observed a decrease in plant height is inversely proportional to an increase in dosage, were also installed the sharp differences in the reaction of regenerated morphogenesis of the class, depending on the dose of preparation chlormequat chloride . Symptoms of intoxication were observed in the test-tube plants at a dose of 1.0 ml / l (in part) and 2.0 ml of complete, at a dose of 2.0 ml was not observed at all plant growth in all grades, noted death of tissue grafts. In other cases marked darkening leaves, reducing the height of the internodes and thickening of the stem, this can be seen on Figure 1.

Figure 1
Development of regenerant-plants grade Nevsky, when introduced into the culture medium dose of preparation chlormequat chloride (numbers correspond to variants of experiment).

Regenerant-plants in variants using of preparation chlormequat chloride as part of the culture medium were more dark green, compact look that is developed at the leaf surface had a thickened stem with reduced growth. There was an inverse proportional relationship, the higher the dosage, the lower the height of regenerants. Dosage chlormequat chloride t 1.0 ml / l caused the presence of necrotic tissue explants - aberrations, many plants had virtually no stem, indicating that the mutational effects of

this dosage, which is unacceptable when micropropagation. These observations are presented in Table 1 Analyzing the data in the table, it may be noted chlormequat chloride stimulatory effect of preparation in a dosage of 0.3 ml and 0.5 ml of 60% pd 1l on medium of Murashige-Skoog morphogenesis culture plants of grade Nevsky. As a result of his exposure increased the number of leaves on the plants of these options, which certainly indicates an increase in the physiological potential of plants.

Table 1

Change biometric of characteristics regenerated by the addition of preparation dose chlormequat chloride in medium of Murasige-Skuga

№	Parameters	Variants with dosages chlormequat chloride				Control
		0,3 ml/l	0,5 ml/l	1 ml/l	2 ml/l	
1	Height	6,4	4,8	3,2	2,1	8,2
2	- relative to control	- 22%	- 58,5%	- 61 %	- 75%	-
3	Number of internodes	5,7	4,9	3,3	1, 0	4,5
4	- relative to control	+ 26,7%	+ 9%	- 37%	- 78%	-

Number of internodes on the plants of the first variant has increased by 26.7%., In the second variant by 9%, in the third and fourth variants there was reduction in the number of internodes by 37% and 78%, accordingly, indicating that the negative effect of these dose on morphogenesis regenerated. In all variants observed reduction in plant height relative to the control, if the first and second variant is 22% and 58.5%, accordingly, the third - the fourth variant is 61% and 75%. In this way, use of preparation in doses chlormequat chloride 0,3ml 60% B.P. 1l on of medium of Murashige-Skoog and 0.5 ml of 60% pd 1L on medium of Murashige-Skoog helps to seal test-tube plants, that is, an increase in the ratio of the number of leaves per centimeter of plant height and possible multiplication factor. In studying the effect of preparation dose chlormequat chloride in the composition of the culture medium on the survival rate of regenerated plants found a direct proportional relationship survival of morphogenic development of regenerated plants.

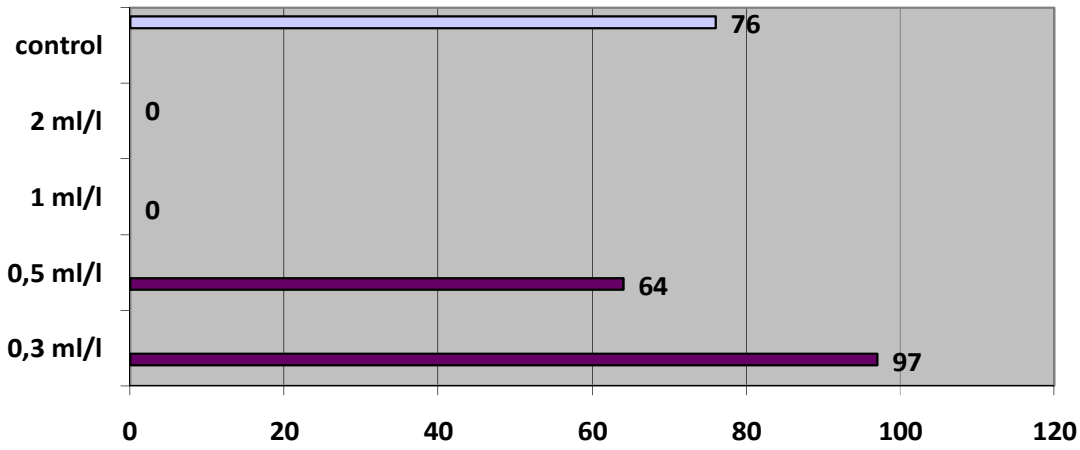

Figure 2

Survival regenerants potato depending on the dosage of preparation in the culture medium chlormequat chloride.

DISCUSSION

In variants with dosages of preparation chlormequat chloride , leading to the appearance of ugly plants, as well as signs of intoxication observed low percentage of survival in the conditions in vivo. That is the drug that increases the resistance of plants to adverse environmental factors within certain limits is toxic to plants and not only is the frequency of chromosomal aberrations, but also reduces the survival rate of regenerated plants. The survival rate is almost zero in the form the largest concentration of preparation in the medium, the oppressed toxic dosage plants, as expected, almost completely died during transplantation, as shown in picture 2 plants having a higher ratio of leaves to 1 cm height showed the highest survival rate - 97%, this result was obtained from the regenerated plants grown at a dosage of chlormequat chloride 0.3 ml / l in height, they were 22% below control, but by the number of internodes 26.7% ahead of the control.

CONCLUSION

The studies revealed that the add-on chlormequat chloride a dosage of 0.3 ml / l in the culture medium of Murashige-Skoog stimulate morphogenesis of plants - regenerants marked increase in the number of internodes of 26.7%. Using chlormequat chloride of preparation in a dosage of 0.3 ml / l culture medium consisting of Murashige-Skoog at the final stage of micropropagation reduces the loss of regenerated plants during transplantation in vivo by 21%. In this way, add-on of of preparation at a dosage chlormequat chloride 0.3 ml / l in the culture medium of Murashige-Skoog in the final stage before transplanting micropropagation in vivo is effective for enhancing the overall resistance of the culture of plants and their adaptation properties. Growth regulators group retardants undoubtedly of great interest to agricultural biotechnology, particularly for growing virus-free potato, the improved method of the apical meristem, and require a more extensive study, as still remains to the end a problem of increasing the coefficient multiplication of virus-free potato plants - test tube reduction of losses during transplantation in vivo.

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