Influence of different substrates for tomatoe seedling on harvest with hidroponic conditions

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Abstract: *Conducted research of different substrates influence on tomato seedlings with hydroponic conditions. Based on phonological data was established the most perspective substrates for industrial introduction are mixed substrates perlite + coconut shaving and perlite + wood sawdust.*

Keywords: *low volume hydroponic, organic and mineral substrates, tomato*

INTRODUCTION

Now in Kazakhstan intensive growth of the areas of the greenhouses appropriate to modern requirements, including with use such safe resources technologies, as cultivation of vegetables in low volume hydroponic on organic and mineral substrates is marked. As substrates for low volume hydroponic basically offer to use imported substrata, such us mineral cotton wool, or a coconut substratum. For Kazakhstan this technology innovational, at correct operation of modern greenhouses with application low volume technologies of cultivation it can provide reception of a crop about 1 m^2 up to 32 kg of a tomato and 45 kg of a cucumber.

Primary goal of greenhouse vegetable growing of Kazakhstan is the increase of manufacture of vegetables in an out-of-season time. Experts of "KazAgro" plan that in aggregate volumes of manufacture of the entered and sold greenhouses will lower deficiency of vegetables in inter-season period on 30-40 %. [1]

The international and national experience of researches realization and also practice of use of their results show that this task fastly can be solved, using a perspective method – low volume hydroponic.

In hydroponic to plants it is not necessary to compete for nutritious elements as it occurs at soil cultivation, they receive all necessary nutritious solution and at correct observance of cultivation technology to make faster grows of plants and more intensively there is a feedback of a crop [2].

Alongside with conclusive advantages, hydroponic has also a list of problem questions. One of the major questions is selection of optimum substrata for roots development.

MATERIALS AND METHODS

The material used as a substratum should answer what requirements? It should be substance with the following properties:

- structural with rather large particles which would not get enough sleep between net borders or between cells of a grid;
- capable to absorb and keep a plenty of water that daily it was not required to humidify its nutritious solution;
- steady against decomposition and not capable to rot;
- chemically neutral, that is such which does not allocate any products, capable to do much harm to plants, and does not influence a nutritious solution [2].

RESULTS

The market economy has not left also a trace from once powerful Soviet agricultural mechanical engineering and years of the turned out scientific - practical base, - on change by it came the foreign equipment and technologies.

Promotion of foreign technologies has resulted to that the Kazakhstan greenhouses are completely supplied only with the foreign equipment and materials, most volumetric of which is the substrates. Basically as a substrates mineral cotton wool and a coconut shaving, and use of import substrata finally influence on the vegetables cost price.

In Russia to this problem have paid attention for a long time ago. Now the Russian greenhouses successfully use as substrates for hydroponic based on local materials - riding peat from Leningrad region, vermiculite which extract in Murmansk area etc.

In Kazakhstan available and builded greenhouse complexes basically are designed for work with the substrates imported from distant foreign countries. Meanwhile, in Kazakhstan there is a set of sources of mineral and organic substrates.

Nowadays placed active work on selection and definition of an optimum kind and structure of substrates components for tomato cultivation in low volume hydroponic conditions, providing improvement of quality of sprouts, reduction of the cost price and increase of efficiency of a tomato will be carried out. With the purpose of an establishment of such substrates in 2013 in a greenhothouse of the Kazakh Scientific Research Institute of potato and vegetable growing which was located on Northern slope Zailiyskiy Alatau at height of 1000-1050 m above sea level incorporate experience.

The agricultural technician in experiences standard for preparation of sprouts in low volume hydroponic conditions.

Field experience were carried out by the standard classical technique: the Technique of field experience. B.A.Dospehov, 1985 [3].

For realization of researches various domestic mineral, organic substrata, and also mixes were picked up and prepared:

The circuit: To define optimum substrates for sprouts of tomatoes

- mineral cotton wool - the control
- coconut shaving - the control
- perlite
- rice peel
- wood sawdust
- perlite + coconut shaving
- perlite + rice peel
- perlite + wood sawdust

Crop of seeds in substrata have carried out - January, 10 in cartridges 5x5 see. The care of plants consist in irrigations with nutritious solution in day. Landing of sprouts to a constant place have carried out February, 14.

Realization of biometric researches has shown essential distinctions in development of plants on different substrates. The weakest plants were marked on a substratum a rice peel that can be connected with high air content of this material. The most advanced plants in experience were marked on control variants and on mix substrates such us perlite + coconut shaving and perlite + wood sawdust (Table 1).

Table 1.

Biometric supervision over sprouts of a tomato (6.02.2013).

Substrates and mixes	Thickness of a stalk (mm)	Height of a plant (cm)	Quantity of leaves (pieces)
Mineral cotton wool - the control	4,4	9,2	3
Coconut shaving - the control	3,1	6,8	2,2
Perlite	2,6	5,2	2,4
Rice peel	2	3,3	0,6
Wood sawdust	2,4	5,2	2
Perlite + coconut shaving	3,4	8,4	2,6
Perlite + rice peel	2,2	5,1	2
Perlite + wood sawdust	3,2	6,3	2,2

Before landing of sprouts repeated biometric researches were carried out. By results of these researches the most advance plants is marked on substrata perlite + coconut shaving and perlite + wood sawdust. Plants on variant a rice peel are still marked as the most underdeveloped in experience (Table 2).

Table 2.

Biometric supervision over sprouts of a tomato (14.02.2013).

Substrates and mixes	Thickness of a stalk (mm)	Height of a plant (cm)	Quantity of leaves (pieces)	Surface of leaves, (cm^2)
Mineral cotton wool - the control	5	17,4	4,2	125
Coconut shaving - the control	3,2	11,8	3,5	40,5
Perlite	3,2	8,4	3,4	45,2
Rice peel	1,6	6	1,8	5,5
Wood sawdust	2	7,2	3	31,5
Perlite + coconut shaving	4,6	15,6	4	77
Perlite + rice peel	2,6	8,4	3	34,5
Perlite + wood sawdust	3,8	12,4	3,6	45,5

CONCLUSION

As a result, at use of a homogeneous nutritious solution, identical cultivation conditions and agricultural technicians, action of various substrates on growth and development of tomato plants an early stage is fixed. So, the most advanced sprouts was fixed on variants with mixed substrates perlite + coconut shaving and perlite + wood sawdust.

The analysis of the received data allows to draw a conclusion, that the most perspective for the recommendation in manufacture are mixed substrates perlite + coconut shaving, perlite + wood sawdust.

REFERENCES

[1]. The Forecast of the vegetable market development. Kazagromarketing. Astana. 2010.

[2]. Industrial hydroponic, translation from English. Bentli M.M.: the Ear., 1965.

[3]. Dospehov B.A., The Technique of field experience., 1985.

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Докладът е рецензиран.