

AEROPONICS AND FITOPYRAMIDA AND MODERN RESOURCE – SAVING MODERN TECHNOLOGIES FOR THE CULTIVATION OF VEGETABLE CROPS

Farawn K.K. - PhD-student. Vegetable production department / Russian State Agrarian University- Timiryazev. E-mail: Farawn@mail.ru

Leunov V.I. - Doctor of Agricultural Sciences, Professor, vegetable production department / Russian State Agrarian University- Timiryazev. E-mail: vileunov@mail.ru.

Tereshonkova T.A. – Assist. Prof. All-Russian research institute of vegetable production. E-mail: tata7707@bk.ru.

Al-Rukabi M.N.M. - PhD-student. Vegetable production department / Russian State Agrarian University- Timiryazev. E-mail: maad_n.m@yahoo.com; ma44na54@gmail.com .

Abstract: The article discusses the features of two methods of soilless technology in the context of solving the problems of resource and energy conservation in the production of vegetables. In recent years, Fitopyramida techniques have achieved significant attention in agriculture. It is applied in agriculture to plan the several activities and missions properly by utilising limited resources with minor human interference. Currently, plant cultivation, using new agriculture methods is very popular among the growers. The aeroponics and Fitopyramida are methods of modern agriculture which is commonly practiced around the world.

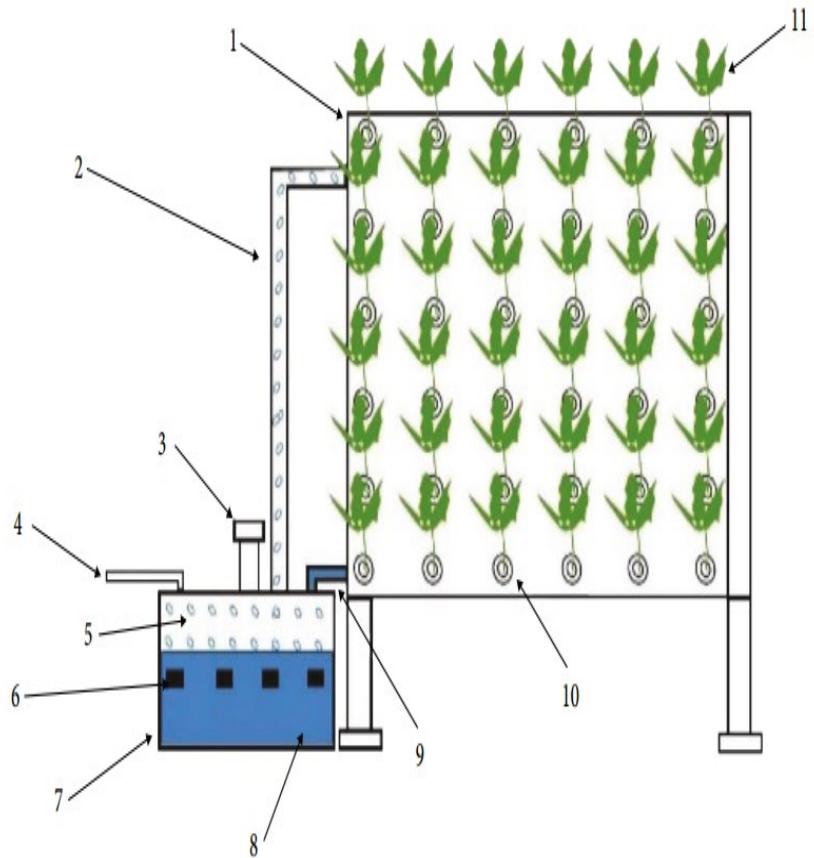
Key words Fitopyramida; Aeroponics; Geoponics conventional farming; water scarcity.

Introduction. Conventional agricultural (Geoponic) practices can cause a wide range of negative impacts on the environment. “Conventional has been historically defined as the practice of growing crops in soil, in the open air, with irrigation, and the active application of nutrients. Some of the negative impacts of conventional agriculture include the high and inefficient use of water, large land requirements, high concentrations of nutrients consumption, and soil degradation [1,2]. The rapid growth of the world population should offset by the same or rather higher rate in the production of the food. To sustainably feed the world’s growing population, methods for growing food have to evolve. The need of large amounts and high quality vegetable products to meet the growing demand of the world population justifies the development of technologies which synchronize the water & nutrient solution demand and supply to greenhouse plants in order to achieve crop yield optimization. The knowledge about water and

nutrient uptake by plants is crucial for developing control strategies which increase the possibility to supply the required amounts of water and nutrients for maximum crop growth and development [3].

Figure 1: Basic diagram of the aeroponic plant cultivation system by.

1. Growth chamber.
2. Nutrient fog transmission pump.
3. Misting fan.
4. Power supply line.
5. Nutrient fog.
6. Ultrasonic atomizers.
7. Nutrient reservoir.
8. Nutrient solution.
9. Nutrient recycle line.
10. Plant holder.
11. Plant.



increasing their farming productivities by implementing the precision farming methods. the water culture is related to the process of hydroponic and aeroponic plant cultivation (Figure 1).

Fitopyramida. An increase in the height of the greenhouse increases its metal consumption and material consumption, and hence the cost. But most importantly, for heating high greenhouses, *ceteris paribus*, it is necessary to spend much more thermal energy in the heating period.

At current energy prices, the share of heating costs in new greenhouses of advanced farms is 50-60%, and even more in old greenhouses. But how to switch to low, inexpensive and economical greenhouses with a height of 3.5-3.7 m, if modern technologies for the production of salads require the construction of greenhouses with a height of columns of 5-6 and more meters? At the same time, the growth rate of productivity significantly lags behind the growth rate of the cost of greenhouses and equipment, the cost of energy.

Are these contradictions resolvable? Yes, they are solvable if the idea of cultivating low-growing plants, in particular tomato, is radically changed.

We have created and tested in real conditions a multi-tiered vegetative pipe plant (MVTU) "Fitopyramida" for hydroponic, non-fertile cultivation of plants by the airborne method (subirrigation aeroponics). We were fascinated by the idea of multi-tiering, which makes it possible to use all the more expensive areas and the volume of modern cultivation facilities incomparably more effectively.

More than five years of research and experimental work has allowed us to obtain a very interesting result. And on the basis of the acquired experience and knowledge, we can draw certain conclusions: future greenhouse technologies will inevitably be forced to apply multi-tiered. In what form, it is only a question of the competitiveness of ideas and the form of their expression. Thus, we can say that the concept of this technology today can be used as an alternative, and in the near future it may become dominant.[4]

Aeroponic System. The aeroponic system is one of the techniques of the soilless culture, where the plant grows in the air with the assistance of artificial support instead of soil or substrate culture. It is an air-water plant growing technique where lower portions such as the roots of the plant are hanged inside the growth chamber under complete darkness in controlled conditions. However, the upper portions of the plant such as leaves, fruits, and crown portion are extending outside the growth chamber. Usually, the artificial supporting structure (plastic or thermofoam) is provided to support and divide the plant into two parts (roots and leaves)[4]. plant. said it is a modern-day agricultural research tool which provides several agricultural research opportunities for a researcher with significant results by providing artificial growth conditions .

Main features of the 2 methods

Fitopyramida

- implemented on Fitopyramida, eliminates the conditions for the accumulation of excess salts in the root zone
- makes it easy to control and manage nutrition
- the roots of the plants are in ideal aeration conditions with periodic flooding
- which contributes to a significant improvement in the nutritional benefits of fruits.

Aeroponic

- Aeroponics is actually a subgroup of hydroponics, except that it uses no growing medium at all, and the plant
- grow by misting rich nutrients water.
- Plant roots in this system are suspended in a dark enclosure
- while anutrient-dense solution is sprayed on the roots at certain intervals.

Conclusion. The main advantage of these modern cultivation systems is the conservation of water and increase productivity per unit area. Fitopyramida, Aeroponics systems reduce water loss and increase water use efficiency compared to the conventional agriculture. Aeroponics is good for solving some problems. It is great for areas with water or poor soil conditions. Fitopyramida is good for solving other problems. Multi-tiered allows to significantly increase the productivity of a unit of

greenhouse area by placing a large number of low-growing plants on several tiers. The "Fitopyramida" can be highly efficient and highly profitable to grow the whole range of low-growing plants: tomatoes, peppers, eggplants, salads, arugula and other green crops, strawberries, flowers, medicinal and other economically significant plants.

References

- [1] J. James and M. P. Maheshwar, "Plant growth monitoring system, with dynamic user-interface," in 2016 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), pp. 1–5, Agra, India, December 2016.
- [2] D. Pimentel, B. Berger, D. Filiberto et al., "Water resources: agricultural and environmental issues," Bioscience, vol. 54, no. 10, pp. 909–918, 2014.
- [3] M. Taher Kahil, J. Albiac, A. Dinar et al., "Improving the performance of water policies: evidence from drought in Spain," Water, vol. 8, no. 2, p. 34, 2016.
- [4] Magazine "Vegetable Production" GREENHOUSE FROM "A" TO "Z" A. Selyansky, E. Lobashev "Hydroponics on the Fitopyramids" 2013.

АЭРОПОНИКА И ФИТОПИРАМИДА И СОВРЕМЕННЫЕ РЕСУРСЫ - СОВРЕМЕННЫЕ ТЕХНОЛОГИИ ВЫРАЩИВАНИЯ ОВОЩНЫХ КУЛЬТУР

Фаравн Халид Кадим, аспирант кафедры овощеводства, ФГБОУ ВО РГАУ-МСХА имени К.А. Тимирязева, Email Farawn@mail.ru.

Аль-рукаби Маад Нассар Мохаммед, аспирант кафедры овощеводства, ФГБОУ ВО РГАУ-МСХА им. К.А. Тимирязева. Email: maad_n.m@yahoo.com; ma44na54@gmail.com

Леунов Владимир Иванович, доктор с.-х. наук, профессор кафедры овощеводства, ФГБОУ ВО РГАУ-МСХА им. К.А. Тимирязева. E-mail: vileunov@mail.ru

Терешонкова Татьяна Аркадьевна, канд. с.-х. наук, зав. лабораторией иммунитета и селекции пасленовых культур, ВНИИО – филиал ФГБНУ ФНЦО, селекционер по томату Агрохолдинга «Поиск». E-mail: tata7707@bk.ru

Аннотация: В последние годы методы фитопирамиды привлекли большое внимание в сельском хозяйстве. Он применяется в сельском хозяйстве для правильного планирования нескольких мероприятий и миссий за счет использования ограниченных ресурсов с незначительным вмешательством человека. В настоящее время у садоводов большой популярностью пользуется растениеводство с использованием новых методов ведения сельского хозяйства. Тем не менее, аэропоника и фитопирамида - один из методов современного сельского хозяйства, широко применяемых во всем мире.

Ключевые слова: Фитопирамиды; Аэропоника; Геопоника традиционного земледелия; нехватка воды.