Production of strawberry remontant in the conditions of the Krasnodar Territory

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Abstract. This article presents innovative methods of growing agricultural products, namely, elite remontant strawberries of the Elizabeth II variety in the conditions of greenhouse vertical cultivation using vermicompost organic fertilizer. The practical significance of the study consists in the development of measures, the implementation of which will solve the problems of agriculture resource-saving production, taking into account and adapted to the environmental relations. As part of the study, the authors proposed intensive cultivation of strawberry crops for the full calendar year, which increases the agricultural production efficiency. The authors proposed the economic and legal aspects of the intensification of agriculture in land use small areas. The analysis of the profitability of the enterprise using the methods described in the study.

1 Introduction

In the modern world, innovative technologies are widely used in all spheres of human life. In the agro-industrial complex, innovative technologies are used to optimize agricultural production, as well as to improve the quality and environmental performance of manufactured products. In a market economy, manufactured products must be competitive, and for this they must meet quality and price characteristics, and the volume of products sold and the economical allocation of resources in the production process will contribute to the formation of the enterprise profitability as a whole. In the process of introducing innovative technologies into the agro-industrial complex, producers thereby formed ways to solve problems associated with the distribution of resources in the agricultural production process. The relevance of the study is to create a “closed” production concept that will optimize production, reduce entrepreneurial risks, and increase crop productivity.

The production process of any product is an expensive type of activity, enterprises by any means strive to optimize the production process and reduce its cost significantly. Some enterprises solve this problem by forming subsidiaries that produce the necessary elements of production, some by acquiring tax, and some by introducing innovative technologies.

The closed concept of production proposed by the author of the study is to provide the enterprise with everything necessary for production from its own resources, that is, we can say this concept is based on the principle of enterprise for the enterprise, where all or most of the resources are produced by the enterprise itself. A closed system in this case will be

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the production of all renewable resources: electricity, heat, water and fertilizers by the enterprise itself using various technical means. Further, this concept will be described by example and demonstrated in the production process.

The study is based on the analysis of production within the agricultural sector. So in order to understand the production specifics, it is necessary to apply a systematic approach.

2 Methods

In the process of solving the set tasks, methods were used. In the research process, such general scientific and special research methods were used as: a systematic approach, comparative analysis, logical generalization, empirical observation.

The informational and empirical basis of the research is presented by research materials of domestic and foreign scientists on the problems of profitable farming in conditions of intensive farming, articles and periodicals, data and materials posted on the Internet.

3 Results

In the framework of this study, it is necessary to highlight the following stages of preparation and the production implementation of finished products. It should be noted that these stages will take into account the closed concept of production. Those. the concept of an independent enterprise, which produces not only finished food products, but also produces most of the necessary resources consumed in the production process.

Thus, the production organization cycle can be represented as:

1) preparatory stage of production

This stage will include the purchase or rental of a land plot on which production will be organized. Purchase of necessary equipment for the production of resources consumed by the enterprise, such as solar panels; closed water supply systems; stock of annelids, for the production of organic fertilizer biohumus; materials for the construction of a new sample greenhouses; vertical landing systems; irrigation systems and light systems, as well as strawberry seedlings of the Elizabeth II variety, a harvester for picking berries.

2) stage of production processes installation.

This stage will include the installation of closed-type greenhouse systems. What will be a greenhouse, which has a light system and an energy supply system from solar panels, a closed water supply system and an irrigation system, a condensate water intake system in the air, as well as a ringworm population around the perimeter for the production of own fertilizers, and illiquid products can serve as compost for fertilizer production.

The greenhouse complex is an industrial building designed to accommodate implements of production and labor processes, as a result of which agricultural products of cultivational nature are produced. A greenhouse is a greenhouse, a protective structure for growing plants. In this production system, a greenhouse in the form of a parallelepiped is proposed, which allows economical use of space and resources. The size of the greenhouse unit, i.e., the greenhouse leading to the greenhouse complex, can vary depending on the characteristics of a particular land plot. Material for covering the greenhouse will be cellular polycarbonate. The location of the greenhouse will save resources in terms of heat energy, as the infrared radiation from the sun heats plants and soil. Air heated from internal surface holds inside the walls and the structure roof.

After the construction of the greenhouse complex, it is necessary to schematically depict the layout of communication systems, tanks with worms and shelving with vertical strawberry growing systems. This study proposes a parallel planting of seedlings, i.e. to distribute the racks along the room parallel to the long wall in several rows, placing the

boxes with seedlings on top of each other, which will allow economical use of the area and simplify the maintenance of landing systems.

Light lamps and irrigation systems must be placed according to the arrangement of racks with vertical growing systems, which will allow spending water in moderation and creating the necessary temperature conditions in the room. It would be more expedient to use solar panels in the production process, as this will reduce the enterprise fixed costs. Closed water supply systems will allow the use of water resources several times in the production process, which will also reduce the fixed costs of the enterprise.

This stage also includes the launch of annelid worms into the reservoirs around the perimeter of the greenhouse, which will produce biohumus organic fertilizer. Biohumus is an organic fertilizer, a product of the organic agricultural waste processing by earthworms and with the participation of other soil organisms. It should be noted that this is a natural biological process. In the process of biohumus production, soil properties are also improved, since weed seeds passing through the body of the worm lose their germination ability. Biohumus significantly increases productivity due to the fact that it nourishes the soil with essential nutrients [1].

Biohumus can be an independent product, and can also be sold by a number of annelids, since they multiply rapidly and have high productivity of organic fertilizer.

3) stage of planting and launching continuous production of finished products

This stage includes the most time-consuming process. This is a planting of cultivated plants. In this case, strawberries of the variety Catherine II.

Strawberries are the plants and fruits of some types of wild strawberries. The variety of this berry, Elizabeth II, was bred by breeders from the Don Nursery in 2001. Distinctive features of this variety are powerful sprawling bushes with emerald green leaves; large berries that have a bright color and high density. The weight of the fruit varies on average from 40 to 60 grams, in some cases the weight of the fruit can reach up to 100 grams. The most important thing in these fruits is taste characteristics. The fruits have a sweet taste with a bright honey aroma. Variety Elizabeth II is one of the most productive. On average, this variety has up to 6 waves of harvest per season. From one square meter of landings, up to 12 kg is collected. Harvesting that it is necessary to take into account when calculating the profitability of production and calculating the required expended planting area. The variety is resistant to many diseases. Suitable for vertical cultivation. The type of soil will provide a high level of yield. Plants are able to tolerate high frosts, therefore, in the climatic conditions of the Krasnodar Territory, the risks of breeding are minimal. The fruits have a long shelf life; during transportation, the fruits do not lose their shape.

After purchasing seedlings, you can produce planting material yourself in the framework of a closed cycle of production at the enterprise. An update of planting material is required approximately every 2 years. There are several ways to obtain planting material:

- 1) seeds;
- 2) mustache;
- 3) by dividing the bush.

The seed method is the most laborious and takes the largest amount of time to implement. Strawberry seeds of this variety are very small. Do not bury the seeds in the soil. Before sowing, the soil is watered, compacted and seeds are sown on the finished soil. Shoots appear after about three weeks. Seedlings with about three leaves are planted in the ground.

The variety of repair strawberries propagates well with a mustache. With this type of planting material propagation, a productive bush is selected and a mustache is sprinkled with the emerging rosette in the soil. This method allows you to get the crop quickly and without the resources for provision cost.

You can also increase the amount of planting material by dividing the bushes, but this method is feasible only about 2 years after the start of production. Since the plants must be strengthened and be able to transfer this procedure.

Thus, at the initial stage of production, it can be distinguished as the most optimal method of planting material propagation by sockets or mustaches. Since for the beginning production of the enterprise, the simplicity and effectiveness of the method, as well as the cost of resources, should be taken into account.

It should also be noted that this variety requires minimal water resources. Watering this type of plant should be carried out once every 2 days.

The income from the sale of finished products, namely strawberries, will constitute the economic basis of production, taking into account this indicator, profitability of production will be calculated. In this case, it is necessary to take into account that these products will be grown taking into account environmentally friendly characteristics and without the use of chemical fertilizers, which will increase competitiveness in the market, taking into account quality indicators.

This stage will be a continuous production cycle. Beginning with transplanting seedlings, the next stage will be followed before the first harvest, when the plants must grow stronger and take root in the created conditions. The next stage of this stage will be the propagation of planting mass for the further reproduction of already fruiting bushes, which will need to be updated after 2 seasons. In order to update the entire mass, it is more expedient to do this continuously throughout the entire production, which will not require large expenditures of resources. In the future, the stages of harvesting and updating of planting material will replace each other throughout the entire production process.

4) the stage of finished products sale.

This stage includes the organizational form of the sale of finished products in the agricultural market. In this market segment, competition is quite high. Therefore, some of the methods used to modernize production will increase the competitiveness of products among other products.

The concept of closed production is a cyclical system for constructing the structure of production. Renewable resources are produced by the enterprise itself in order to ensure production. Optimization of technological processes will simplify production and reduce the time spent on production.

4 Discussion

The agroindustrial complex is an intersectoral complex that includes several sectors of the economy aimed at the production and processing of agricultural raw materials and the receipt of products from it that reach the consumer in finished form [2].

The agro-industrial complex includes 4 large groups of activity fields:

- 1) agriculture;
- 2) industries and services that provide agriculture;
- 3) industries that process agricultural products;
- 4) industries that procure agricultural products.

In the framework of this study, it is necessary to consider agriculture as an element of the agro-industrial complex. Agriculture is a branch of the economy aimed at providing the population with food products and raw materials to ensure the production of other industries number [3]. The development and productivity of agriculture affects the balance of the economy and food independence of the country.

Agriculture includes the following main sectors:

- 1) mushroom growing;
- 2) livestock;

3) feed production;

4) crop production.

Krasnodar Territory is one of the leading Russian regions in the production and processing of agricultural products and food supplies throughout the country. First of all, climatic conditions contribute to productivity, as well as the availability of free fertile land. Agricultural land of the Krasnodar Territory makes up 1/10 of the total land of the Southern Federal District. Within the region, chernozemic soils prevail, the area of which is 4 616 thousand ha, which is 4 percent of all Russian chernozem soils and 2 percent of the world reserve of this resource. Black soil is characterized by dark color, friability and good structure, this type of soil is rich in nutrients and a high level of productivity. Thus, we can say that within the Krasnodar Territory, it is most effective to conduct crop production.

First of all, on black soil soils, a high yield, as well as high quality products. Natural conditions make it possible to grow in the Krasnodar Territory cultures of both the temperate zone and some cultures of the subtropical zone. Krasnodar Territory occupies a leading position in the yield of grain crops, sunflower and berries [4].

Thus, we can conclude that within the Krasnodar Territory it is most effective to engage in crop production within the framework of the agro-industrial complex. Despite the huge land reserves, resource conservation is one of the main areas in the agricultural sector. Achieving a balance in saving resources and enterprise productivity is handled by specialists in the field of economics and law. So there are ways to solve some resource-saving tasks.

5 Conclusions

Profitability is the profitability of the organization, expressed as a percentage, a generalized indicator of the effectiveness of the organization, which characterizes the amount of profit per ruble of the money spent. So, taking into account all the expenses of the organization and its revenue, the profit and efficiency of the enterprise as a whole are calculated.

So, at the initial stage of the organization of production, the main costs will be incurred to purchase the site. The size and landscape features of the site for the construction of greenhouses must be taken into account precisely at this stage, in order to calculate the necessary area of the site, it is necessary to calculate the possible production taking into account the characteristics of this plant variety. So from 1 bush strawberries of this species can be collected on average from 1 to 2 kg of crop per season. Since in hothouse conditions, the repair strawberry will bear fruit all year round, it is necessary to calculate the average amount of harvest per month. So for a three-month period, an average of 1 kg of berries is collected from 1 bush. Thus, in the annual period from one bush 4 kg of berries from the bush, which in the month will be approximately 330 grams. Strawberries of this variety allow planting up to 12 plant bushes on 1 square meter of soil area. From this we can conclude that from 1 square meter of plantings per month it will be possible to get 4 kg of berries. Thus, if you use the space optimization system, namely, suspended vertical growing systems, it will be possible to achieve high production efficiency. So it will be possible to define space as a real and nominal area. So the real area will be the soil coverage in suspended growing systems in several rows parallel to the floor in the same plane. The nominal area will be the area occupied by one suspension system. In this case, the suspension system will occupy 0.2 square meters, since its size will be 20 cm per 100 cm. Thus, the size of the real area of one suspension system will be 1 square meter. When the modules are located at a height of 40 centimeters in a row parallel to each other. So, from 1 square meter of the greenhouse, when hanging vertical growing systems at a distance of 60 centimeters, 2 hanging systems can be installed, which will contribute to the collection of 8 kg of strawberry per month. Thus, with an average cost of strawberries in the market of 200

rubles, we can say that from 1 square meter of the nominal area you can get revenue in the amount of 1600 rubles. Taking into account the concept of closed production, the costs will be incurred only for the purchase of non-renewable resources in the production process, for example, water, which is necessary for closed water supply systems, namely the replacement of water in the system once every 2 weeks.

Thus, it is possible to calculate the profitability of production taking into account 1 square meter of the greenhouse, namely, the spent expenses and the organization's income in production. Profit will grow in direct proportion to the entrainment of the nominal area of the greenhouse complex.

Thus, we can say that in the process of agricultural production, the use of innovative technologies of the agricultural complex will increase production efficiency, namely, to simplify the process and reduce fixed costs.

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