Natural Factors Contributing to the Development of Supply Chain Management in New Biotechnological Production

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***Abstract*- The goal of the research is the economic evaluation of the competitive biotechnological industry development in the Republic of Sakha (Yakutia) in the context of the influence of natural and climatic factors on living creatures and plants based on the supply chain management. The article is devoted to the extreme climate peculiarities of Yakutia and the competitive advantages of the natural raw materials of plant and animal origin, which can be used in the biotechnological industry to improve the living quality of the population. The authors studied the physiographic, natural and climatic characteristics of the region as well as the dependence of its flora and fauna on the habitat conditions. The economic mechanisms of the biotechnological industry development by supply chain management have been defined here.**

Keywords: economic development, supply chain management, biotechnological industry, Natural factors

1. Introduction

Biotechnology development is one of the key approaches used for the innovative growth of the modern economy, including the regional economy. On April 24, 2012, the Russian government adopted "The Comprehensive Program for Development of Biotechnology in the Russian Federation through 2020" [1]. The main goal of the Republic of Sakha (Yakutia), in relation to the natural and climatic factors' influence, is the improvement of the population's quality of living through the implementation of modern health protection technologies, specifically competent and ecologically clean natural resources [2]. To achieve the goals of the survey, it is necessary to address the following:

1. Summarize the information pertaining to the climatic peculiarities in the Republic of Sakha (Yakutia)

2. Define the factors influencing the living organisms and plants

3. Perform the economic mechanisms of the biotechnological industry development in the region

2. References Review

The climate and plants peculiarities of Yakutia have been studied since the middle of the 20th century. Ref [3]published "The Results of Yakutian Vegetation Cover Research" (1969) [4]. The research showed the chemical composition, nutritive quality, and biosynthesis peculiarities of the regional plants. [5] Was one of the first scientists who studied the use of biologically active substances in the traditional Yakutian medicine and published the survey "The Local Flora in Yakuts' Traditional Medicine" in 1962 [5]. [6,7], in his works "Plant Chemistry and the Climate" and "Plant Chemistry Patterns," studied the climate influence on plants and their chemical composition [6, 7]. Nowadays, scientific studies of preparations obtained from the natural raw materials of plant and animal origins are held to improve the living quality of the population in the North. [4] published the article "The Mechanochemical Technology for Producing Biocomplexes Based on Lichen Material," which is devoted to the technology of biocomplex production based on the *Cladonia* lichen material [4]. A. M. Palshina with coauthors conducted a research on the mineral water "Abalakhskaya" and use of north whitefish bone food flour to improve calcium-phosphorus metabolism disorders. The results of the research are presented in the article "Effects of Fish Meal and Mineral Water [Abalakhskaya] on Bone Mineral Density" [2]. At present, there are almost no studies on prospects of biotechnology production development in the Republic of Sakha (Yakutia). V. E. Borisov with coauthors presented the articles "Basic Approaches to the High-Technology Innovative Biotechnological Production Development in the Republic of Sakha (Yakutia)" and "Prospects and Strategic Approaches of Biotechnological Complex Development in the Republic of Sakha (Yakutia)." In the given works, high economic effectiveness of the project implementation in the region is proven. [8, 9]. The

studies of Frost and Sullivan show that the biotechnology market in Russia is rapidly developing. Following the world tendencies, almost all the segments present high growth over the last years. The government adopted a range of programs that support the biotechnology development in different branches. Institutes for development also pay attention to this aspect in their investment projects. The important role in the branch development is performed by the technological platforms ("Medicine of the Future," "Biotech2030," "Bioenergy"), which should connect business and science [10].

3. Research Methods

The authors use qualitative and quantitative methods in their research. The qualitative approach includes the resources review and the analysis of the publications, devoted to the study of the regional climate and its influence on the plants, and the living organisms' capacity to adapt to the severe climatic conditions. The quantitative approach includes the calculations for the biologically active additives production, necessary for new manufacturing development in the region of Yakutia.

4. Results and Discussion

The physiographic region of Central Yakutia is surrounded by the mountain ranges and uplands and consequently is almost devoid of the masses influence. From the northeast it is fenced off by the Verkhoyansk Range, from the east the ocean influence is blocked by the large East Siberia and Sikhote-Alin mountain systems. The most humid for these places air is brought by southern cyclones, but they are quite rare in Yakutia. Western cyclones appear already occluded, meaning that air masses have time to dry and give a small amount of precipitation. The Pacific Ocean influence is also insignificant, not only because of mountain barriers, but also because of the general western air movement. On the north there is the only narrow area without special mountain obstacles along the lower course of the River Lena. However, the cold arctic air invasion reduces the atmosphere moisturizing and increases its transparency. There are two climatic regions in the temperate zone, namely the Leno-Vilyui and Aldan. Leno-Vilyui climatic region of Central Yakutia occupies a flat territory, more protected from cold invasions from the east and the northeast. The Central Yakut Lowland is the region with the most arid climate. In winter, this territory is under the Siberian anticyclone strong influence. During this period, the Atlantic and Pacific warm air masses are very weak or do not flow at all. The windless calm weather prevails, causing a strong cooling of the ground. In summer, evaporation is four times more than rainfall. The frost-free period lasts for 90-110 days. The average air temperature in January is -40 °C, and in July it is in the -18-19 °C range. The absolute temperature minimum is -64 °C, and the maximum is 38 °C. The average annual temperature is -100 °C. The annual precipitation is insignificant and comprises from 200mm to 250 mm, as well as the snow cover reaches a hight of 20-30cm. Spring and autumn are transient and characterized with the temperature rapid rise and fall [11]. Winter is the coldest one in the northern hemisphere, prolonged, severe and with a lack of snowfall. The snow cover disappears around May 1, when the average daily air temperature rises over 0° C. The period with a positive temperature lasts for 154 days, until October 3. The temperature transition over 50° C in spring is observed on May 14, and in autumn on September 19, that is 127 days. The most important period for the plants vital activity with an active temperature of 10° C and higher is about 95-98 days, that is from May 28 to September 4, which corresponds to the frost-free period. The summer is short, but dry and hot. The frost-free period in Central Yakutia lasts for 95 days. In terms of the heat provision of the plants growing season there are no analogues of the zone under consideration among the others, located at the same latitudes. The frozen fawn carbonate soils occupy considerable areas in central Yakutia on the Leno-Vilyui and Lena-Amginsk interfluves. Frozen fawn podzolized soils are also more widespread here. Frozen meadow chernozem and chernozem meadow soils appear on the floodplain terraces, alas and meadow-steppe areas. Saline and salt marshes, which are characteristic of alas and terraces rising above the floodplain, are developed among the saline and nonsaline soils. The frozen peat mushed moss soils are formed in thermokarst lowlands around the lakes, in the small rivers valleys [12]. At present, the higher vascular plants flora of all floristic Yakutia regions includes 1965 species and subspecies from 508 genera and 111 families. In the Central Yakutsk floristic region, where 1,026 species of higher vascular plants appear, meadow and partly steppe grass vegetation is widespread, forming the phytocenosis of four meadow types. Namelly:

1) the alas meadow (lakeside meadows, formed as a result of the buried ice melting)
2) the floodplain meadow (in the large rivers valleys)
3) taiga river bottomland meadow

4) dry meadow.

They have the following square proportions: the alas meadows have 50%, the floodplain meadows have 23%, bottomland meadows have 17%, and dry meadows have 4%.

It is necessary to note that in the conditions of the cryolithozone at the beginning of the winter season such adverse phenomena, which are widespread in the mild climate regions, as the plants asphyxiation and lift, caused by the absence of recurrent warming, are minimized. Thus, being hardening, the aftermath and most of the autumn vegetative herbaceous plants stay green until late autumn and go under the snow in this state. These plants, most often hemicryptophytes ones, occupy the so-called intermediate position between the typical winter-green and summer-green species. The survivability under the snow for such summer-green and winter-green plants' photosynthetic organs (leaves and green shoots) can vary widely: from a few millimeters to a dozen centimeters, depending on the hibernation type and conditions, with the life duration of each leaf less than one year [4].

According to the current approaches, the oxygen containing carotenoids play a primary role in green pigments protection from breakdown, caused by the adverse environmental factors. In addition, at the genetic level, the green color preservation can also be determined by a mutation in the SGR gene, which encodes senescence- inducible chloroplast stay-green protein (SGR), which is involved in the destruction of chlorophyll in chloroplasts during the leaf aging and seed ripening. This leads to the fact that such leaves do not turn yellow at the appropriate time, but stay green. The normally working SGR gene provides the yellow leaves and seeds' coloring, destroying the green pigment chlorophyll, making the yellow pigments of carotenoids visible. Thus, it is assumed that the leaves yellowing is a normal phenomenon, whereas the green colour retaining is a deviation of this state with a certain adaptive effect. Winter-green plants (in a broad sense) are nutritious subniveal winter food for various herbivores. In particular, the Central Yakutia fodder plants study showed a high level of protein, carbohydrate, as well as the main components of the plants redox processes, namely, the ascorbic acid and carotene. It is interesting, but the winter season conditions have less effect on the vegetation characteristic (for example, winter in tundra Arctic is warmer than in Central Yakutia taiga). The summer season, meaning growing period, is defining. Thus, tundra begins when the sum of the positive temperatures is above 100 °C that corresponds to 60 °C–70 °C degrees per day. Forest tundra and northern taiga, light forest have 70 °C–120 °C, taiga (Central Yakutia) – 120 °C–160 °C, mixed and deciduous forests have 160 °C – 220 °C degrees per day. Since meteorological indicators change, ranging from daily and annual variations to short, medium and long periods, the soils temperature regime, as well as the general cryogenic and landscape conditions, undergo the same changes. Thus, 300-200 million years ago, the climate of Yakutia was almost tropical. The average annual air temperature was in the 22–24 °C range; the rainfalls amount was up to 1200–2000 mm/yr. The landscape was performed by the wetlands, evenly wet rainforests and lake lands. There was neither congelation, nor even seasonal soil freezing. From the Jurassic period cold snap started. For the first 170 million years the climate was temperate, the average annual temperature equaled 12-15 °C, the precipitation comprised 1000-1500 mm/yr. Moisture-loving, broad-leaved and heat-loving coniferous forests (sequoia, taxiodium, umbrella pine, etc.) prevailed. There were no congelation and seasonal soil freezing yet. The climate of Yakutia began to change noticeably 30 million years ago. The average annual air temperature dropped from 12–15°C in the Eocene to 4–5°C and lower in the Late Pliocene; the precipitation decreased to 600–800 mm. The congelation has not formed yet, as the average annual temperatures remained positive. 10-12 million years ago, i.e. in the Late Miocene, seasonal rocks freezing appeared. The average air temperature in the coldest month at this time in the north of Yakutia was -2°C, in the Central Yakutia it was -1°C, in the South it comprised -0.5°C. In the Late Pliocene, the temperatures in these months decreased respectively to -18°C, -12°C, and -7°C. It is characteristic that the average temperature during the warmest months in these epochs dropped to 16–20°C, i.e. it was equal to the current one. But the average annual temperature still remained positive. The heat temperate climate was subsequently replaced by a temperate one, and then it became even cooler. In the Neogene (30-10 million years ago) snow cover appears, and the climate continentality and seasonality increases. Evergreen and deciduous forests disappear being replaced by the coniferous taiga. The most difficult climatic changes occurred in the last 1-2 million years. This time is distinguished by high speed and contrast: the climatic epochs have become shorter, and amplitudes in them have become greater. Covering glaciers were

also caused by the cold snap. Air temperatures dropped in winter to -30-45°C, and the average annual temperatures dropped to 6-13°C. The permafrost appeared in Yakutia exactly in the Quaternary time: in the north it happened 2 million years ago, in Central Yakutia - 1 million ago, in the south - 500 thousand years ago.

Although, all sorts of periodic and aperiodic fluctuations and climate change occur in our times. The Yakut people still remember the warming of the 20-30s of the last century in the Arctic and the drought of the 40s in Central Yakutia [13]. The study of North environmental conditions influence on living organisms is becoming more and more acute every year. This is connected not only with the human economic activity intensification (diamond mining, coal, oil, etc.), but primarily with the goal of human health preserving in the North, the need to ensure vital activity with a healthy environmental situation and full-fledged food from local raw materials, which would contribute to the successful adaptation of the organism to the environmental and climatic conditions [14].

The study of the living dependence on the environment is an inexhaustible research problem, which is closely connected to the organisms' adaptation to the variable living conditions. A living organism can exist only in a rather narrow range of the internal environment parameters. The concept of "homeostasis" extends mainly to animal and human organisms, and means their relative dynamic constancy. In plants, due to the absence of the strict prohibition of the activation and repression of genes in terms of the living conditions change, there is a rearrangement both at the anatomomorphological and physiological and biochemical levels not only within the ontogenesis period, but also within a single phenological phase. At the same time, the main characteristic features of the plants, including the metabolism, remain unchanged [14]. It has been established that the mechanism of the internal environment constancy maintaining is based on automatic self-regulation caused by the adaptive activity improvement in the process of evolution. For the normal functioning of all the organs and body systems, it is necessary to maintain the relative dynamic constancy of the internal environment. This status is supported by the adaptive reactions of the organism through the regulatory systems functioning. It is known that the adaptation to the variable ecological environmental conditions causes the of biologically active antioxidant substances accumulation in the plant tissues. The level of the latter in the cell normal physiological systems determines the intensity degree of free radical oxidation processes, including lipid peroxidation. Distinctive features of the free radical oxidation processes in humans and plants in Yakutia are associated with such specific environmental factors as hypothermia, natural increased radiation background, specific photoperiodism, hypoxia, chronic hypovitaminosis, some micro-element deficiencies, such as iodine and selenium, which are directly related to the antioxidant defense system regulation [15]. For hundreds of years the population of the North has adapted to the extreme natural and climatic conditions of life. During the entire time, the peoples of the North associated their traditional way of life with the environment bioresourses use. The indigenous people of Yakutia have long used the infusions and decoctions of various plants as drinks, partially satisfying their need for biologically active additives. The most important plant properties, namely yield, drought, winter and diseases resistance, etc., are largely determined by the purposefulness and specific metabolism type of the body. The liveliness of the external surrounding factors, the climatic and ecological conditions also affect the metabolic processes. Any abrupt changes in environmental conditions increase free radical reactions in plants that intensify the lipid peroxidation [15]. Each of the stimuli, acting on the body, is characterized by quantity and quality. Although, as the study of the biochemical basis of the plants and human body adaptation shows, the quality (specificity) of the stimulus cannot be the basis for a standard adaptive response. This is explained by the fact that each stimulus has its own quality [14].

The peculiarity and uniqueness of Yakutia is determined by its extreme climate. The winter is long and cold with little snow, and the summer is hot, with a relative lack of moisture. The temperature difference is more than 100 °C. In winter the temperature declines to -60 °C, and in summer it rises up to 40 °C.

All these climatic conditions have a huge impact on living organisms and plants. The specific nature of the extreme natural conditions of Yakutia influences the local plants mineral and microelement composition. The trace elements level in some plants largely depends on the mineral composition of water and soil. In this regard, three landscape biogeochemical provinces are distinguished in the territory of Yakutia. Namely:

1) the taiga lake alas province, characterized with a high content of sodium, potassium, magnesium and chlorine
2) small-valley marshy taiga river province, which is very poor in chlorine and sodium
3) large valley province, lying along the floodplains of the rivers Lena, Vilyui, Amga, and others, rich in calcium and silica, adjoined by some separate taiga meadow-bog sites [10].

Unlike plants of other natural zones of Russia, the grass, horsetail and sedge plants of Yakutia are more enriched with iron, manganese, copper, iodine, partly molybdenum and zinc. Moreover, plants of lowlands and closed depressions of the relief, as a rule, accumulate much more microelements than plants of the up and dry lands (meadow steppes). [19]. Thus, studies of the plants chemistry in Yakutia clearly showed that they have noticeable increasing deviations from the latitudinal-zonal norms in the synthesis and accumulation of basic metabolism substances (proteins, fats, some forms of carbohydrates). Alongside with it, trace element composition specificity of the local plants has been established, caused by the acceleration of the useful substances accumulation in the extreme climatic conditions [19]. The first biochemical studies of about 70 medicinal plants species in Yakutia, conducted in 1954 by Yegorov, showed a large amount of ascorbic acid and carotenoids in their leaves and other organs. Thus, in central Yakutia the ripe black currant berries contain 3.9 mg/g of ascorbic acid wet weight, in Khakassia up to 2.0 mg/g, in the valley of the River Yenisei up to 2.5mg/g, in Western Siberia up to 1.1-1.2 mg/g. In addition, according to Yegorov's research, the amount of ascorbic acid in the plants leaves increases with their move closer to the Far North, i.e., with extreme factor influence increase [19]. In this regard, Yakutia is a unique example of the stress factors joint influence on the plants and animal organisms. The most striking climatic features of Yakutia are: the combination of a harsh long and little snowy winter with a short but relatively warm and arid summer. Snow melts quickly, most of the moisture evaporates (sublimates) on a sunny warm day and a cold night, due to freezing with a sharp increase in the wind. The heat-protective role of snow cover, despite of its low height, is very significant, which is of high importance for the wintering plants [19]. In terms of the intensity of solar radiation, Yakutsk is equal to Tashkent and Feodosia, that means that the radiation balance is generally favorable for the plants' normal development. However, a fast increase of the solar radiation at the beginning of the plants growing season (May) leads to a negative effect due to an imbalance between the amount of water necessary for plants transpiration and its slow flow to the roots at soil lower temperatures [19]. The sufficient amount of moisture is necessary for the successful plants growth. In the aspect of the precipitation amount Yakutia can be compared with steppe and semi-desert regions.

The annual amount of the solid precipitation in the republic comprises from 25% in the south to 50% on the islands; liquid precipitation equals from 30% on the islands to 70% in the south; mixed precipitation comprises from 5-6% in the central regions to 16-17% on the islands. Due to the insignificant precipitation amount in winter, the snow cover in the vast territory is not thick enough. The number of days with snow cover in the territory ranges from 200-210 in the south of Yakutia to 250 in the tundra zone [16]. In addition, Yakutia is situated in the area of long-standing permafrost soils dspread. In Central Yakutia the underground ice is widespread; their upper roof depth varies from 1.5 to 3.5 m. The estimated age of the permafrost in Yakutia is millions years. Permafrost has a strong influence on the soil climate, the plants growth and development, also it creates a very peculiar dynamics of the partial seasonal defrost of water regime. The seasonal defrost layer is in the range of 1.5 - 2 meters. The plant root system is located exactly in this layer [17]. During millions of years in the layer above the permafrost, which is a natural aquiclude, a number of processes occurs, namely the humus, rich in trace elements, appear. In their turn, these trace elements nourish the plants, growing in Central Yakutia, which allows them to accumulate beneficial substances.

In summer, when the upper soil layer melts, the plants get enough moisture, which helps their growth, and the permafrost helps to prevent moisture flowing down to the deeper soil layers. As a mechanical obstacle, the permafrost blocks the tree roots development in depth, that causes the lateral and horizontal root system development. Due to low temperatures the horizontal development of roots starts slightly above the permafrost layer, as the plant roots cannot absorb cold water in sufficient quantities. With a lateral and horizontal root system, the tree has low stability; strong winds cause a varied slope of the trees or twist their roots out (the so-called "drunk" forest appear, which, however, may occur due to the swelling of the soil or, on the contrary, its subsidence). There are al-

ways a lot of wind-broken and wind-fallen trees in the permafrost taiga regions. Moreover the shallow permafrost contributes to the swamp vegetation development. On the other hand, there is no doubt about the reverse effect of vegetation on the depth of summer thawing. The thawing is weaker under the mosses, thick bedding and in dense shady thickets, and as a result, the permafrost lies closer to the surface. The thawing is deeper in sparse forests. Being a powerful moisture conservant in dry areas, the permafrost is considered to be a positive natural factor, influencing positively on the agriculture, since there is a supply of thawed and rainwater in the frozen layer. As a result of the progressing summer thawing, new moisture funds enter the soil, ensuring the growing season permanence [18]. Thus, the natural and climatic features of Yakutia are those stress factors that influence plants diversity and spread, and allow them to accumulate a large amount of useful substances during the growing season. The nutrients accumulated in plants are important for animals and humans' development, and provide organisms with biologically active substances, such as vitamins, minerals and other substances of regulatory action. Taking into account Yakutia natural resources, its climate peculiarities, alongside with its flora and fauna, it is possible to create a new biotechnological infrastructure, which would lead to the research areas extension and socio-economic development indicators improvement, the population health strengthening, real income and employment growth in new economic areas [19].

Currently, there are practically no biopharmaceutical and biotechnological productions in the republic, so the medicines, biologically active additives and mineral waters are imported from other regions of Russia. Thus biotechnology industry of Yakutia plays a small part in the economy of the republic. The national joint-stock reindeer company "Taba", is the only regional enterprise that has entered the market with the biotech products. Today, on a contract basis, the company produces two types of biologically active additives, one type of the associated product and 14 types of the cosmetic products. In 2015 "Taba" was ranked among the top 25 Russian exporters in the "Products of Animal Origin" group and was awarded with the International Certificate "EXPORTER OF THE YEAR - 2015".

With the support of the Arctic Innovation Center of M.K. Ammosov North-Eastern Federal University, Small Innovative Enterprise LLC "Mehanohimicheskie Biotehnologii" and LLC "Dary Yakutii" were founded. The enterprises are only preparing to enter the market with their products. Currently, regional authorities are interacting with the federal development institutions with the help of State Autonomous Institution "Technopark" Yakutia", M.K. Ammosov North-Eastern Federal University, also by means of the regional organizations foundation, such as the Venture Company "Yakutia", which are responsible for the innovative projects investment. Thus, in 2015 3 biotechnological companies became the residents of the "Skolkovo" Innovation Fund, namely: the Research and Development Center LLC "Hotou-bak", LLC "Zelenaya Laboratoriya" and LLC "Dary Yakutii".

But it should be noted that a regional state program should be developed for the biotechnological enterprises creation and operation. In addition, the enterprises themselves should be combined into a biotechnology cluster, which will expand the number of the innovative developments and introduce them to the market by means of the resources and economic activities unity. The state policy in this area, that is clear for producers and investors, contributes to the new projects development in the field of biotechnology [20]. Government policy should formulate clearly the rules and means of support for small and medium enterprises, stimulate science to implement new developments. All these measures will create a new economy in the region, that is bioeconomy. The logistics center should be established on the basis of the existing infrastructure, where the necessary raw materials from all the regions of the Republic will be delivered and stored. Inside the cluster, the existing enterprises, namely, NC "Taba", LLC "Mehanohimicheskie Biotehnologii", LLC "Daryi Yakutii" and others, should enable the contract based manufacturing of biotechnological products for the new enterprises, using the existing equipment. That means that the production itself, or some stages of the technological process, will be customized for a specified fee at the facilities of the specified enterprises in accordance with the technological cycle and final product quality control, meeting the requirements of the customers

The customer and the manufacturer will be interested in mutually beneficial cooperation for the project implementation.

Table1. The benefits of the contract manufacturing for the client enterprise

№	Benefits
1	The ideas refinement by the production specialists if there are no adequate resources at the client's enterprise.
2	The equipment purchase, rent, electricity, water, etc. savings.
3	Time savings. The acceleration of the products to the market introduction and the transference to the mass production.
4	Cost reduction and permanent yearlong production cost in accordance with the terms of the contract.
5	Releasing time for the goods promotion, partners and customers search.
6	The experience in new products to the market introduction

The resource: Developed by the authors

Table2. The benefits of the contract manufacturing for the manufacturer

№	Benefits
1	Guaranteed income from products manufacturing without the distribution expenses
2	Access to new research and technological development (R & D) that may be used in the future for own products...
3	New customers acquisition and the reputation development.

The resource: Developed by the authors

For example, the production of the biologically active additive in the amount of 1,000 packs (100 capsules per pack) by the manufacturer will cost approximately 90 thousand rubles for the client enterprise.

Table3. The cost of the biologically active additive contract manufacturing production

№	Title	Cost per unit, rub	Quantity, pieces	Total, rub
1	Encapsulation	0.5	100,000	50,000
2	Raw materials decontamination	30	50	1,500
3	Packaging in cans	2	1000	2,000
4	Sealing	1	1000	1000
5	Label stickering	0.7	1000	700
6	Drawing series and date of production	0.7	1000	700
7	Transport packaging	07	1000	700
8	Mix weighing	20	50	1000
9	Grinding	50	20	1000
10	Corrugated box	0.8	1000	800
11	Cans buying	6.29	1000	6,290
12	Covers buing	4.21	1000	4,210
13	Label production	20	1000	20,000
	Total			89,900

The final cost of products (BAA) in pharmacies should not exceed 350 rubles per package, which indicates the profitability of the innovative projects.

5. Conclusion

Innovative production is the integral part of the modern economy. Today, biotechnology influences the global economy in a great extend, and can significantly improve the living quality of the population. The research of the climatic factors influence on the plant world of Yakutia, as well as the new biotechnological production implementation will diversify the economy of the region, preserve the unique ecosystem, increase production efficiency and create the background for persistent economic growth for decades. The biotechnological projects implementation will contribute to the growth of the high-tech products proportion in the economic structure of the Republic of Sakha (Yakutia), and will lead to the population employment growth. Over the longer term, the products will be exported to other regions of the country and abroad.

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