

**EXPERIMENTAL AND RESEARCH WORKS ON SOME OF
VACCINIUM TAXA IN BELARUS
DAŽU VACCINIUM ĢINTS SUGU EKSPERIMENTĀLIE UN IZPĒTES DARBI
BALTKRIEVIJĀ**

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Abstract

Carrying out of the experimental and research works on the study of plants of genus *Vaccinium* in Belarus can be divided into several stages. The first stage is the study of biological and resource potential of wild-growing berry plants: cranberry (*V. oxycoccus* L.), bog blueberries (*V. uliginosum* L.), lingonberry (*V. vitis-idaea* L.), bilberries (*V. myrtillus* L.).

The second stage is the introduction of the cultivars of large cranberry (*V. macrocarpon* Ait.), of highbush blueberry (*V. corymbosum* L.), of lingonberry under the conditions of Belarus to built the first experimental and industrial plantations.

The third stage is the preparation of scientific manpower, the formation of scientific school, the development of production schedules of the estate berry culture.

The fourth stage is the dilating of the assortment of *Vaccinium* taxa used in the culture and the augmentation of the areas of plantings under berrylike cultures.

Kopsavilkums

Eksperimentālos un izpētes darbus par *Vaccinium* ģints augiem Baltkrievijā var iedalīt vairākos posmos. Pirmais posms ir bioloģiskie pētījumi, kur tiek apsekoti potenciālie savvaļā sastopamie ogaugļaugi: dzērvenes (*V. oxycoccus* L.), zilenes (*V. uliginosum* L.), brūklenes (*V. vitis-idaea* L.) un mellenes (*V. myrtillus* L.).

Otrais posms ir Baltkrievijas audzēšanas apstākļiem piemērotu lieloģu dzērveņu šķirņu (*V. macrocarpon* Ait.), krūmmelleņu (*V. corymbosum* L.) un brūkleņu ieviešana. Tiek ierīkoti eksperimentālie un rūpnieciskie stādījumi.

Trešais posms – tiek sagatavots zinātniskais personāls, veidojot zinātniskās skolas, izstrādājot ražošanas tehnoloģijas katrai ogaugļu sugai.

Ceturtais posms ir *Vaccinium* ģints augu sortimenta un izmantoto augu stādījumu paplašināšana.

Key words: berry plants, natural resources, Belarus, *Vaccinium*

Introduction

There are 5 kinds from berry plants of *Vaccinium* L. genus, such as *V. oxycoccus* L., *V. microcarpon* Ait., *V. uliginosum* L., *V. myrtillus* L., *V. vitis-idaea* L. in natural flora of Belarus. All of them are rich with biologically active substances, possessing by capillary tonic action, by anti-inflammatory, bactericidal, hematopoietic and antitumoral kinds of action. Berries of a cranberry, a bilberry, a blueberry, a cowberry differ also by high level of anti-oxidative activity. Berries promote the deducing of radioactive nuclides from an organism and in certain degree make positive impact on strengthening of immune system of the person.

Requirements of a national economy for wood berry plants are only partially satisfied at the expense of operation of natural resources which feel now the powerful man-caused and anthropogenic influence. There is a necessity for working out of actions for protection, rational use and intensive reproduction of wood berry plants.

The first stage of rational use of plants of *Vaccinium* L. genus in Belarus is the inventory of wild-growing bush and it is basically solved. So, according to researches of the Belarus research institute of forestry with the use of forest regulation materials, it is established that the areas occupied under a cranberry in republic are made by 84514 hectares, and average long-term productivity is 260 kg per hectare (Sautin, etc., 1975). On the data of Ministries of statistics and the analysis of the Republic of Belarus, the possible purchases of a cranberry at average productivity make 8.7 thousand tons taking into account losses. V.I. Parfyonov etc. (1996) cite a little different data that

the total area under a cranberry makes 552.2 thousand hectares, bacciferous is 364.5 thousand hectares; the general biological stock of berry plants is estimated in 198.9 thousand tons, at average productivity of 364.5 kg per hectare.

Researches on studying of distribution of a bog bilberry bush and the account of their resources have been conducted also. So, according to V.E. Volchkov etc. (1982), in Belarus blueberry plantations occupy the space of 11.8 thousand hectares with a biological stock of berries of 9.7 thousand tons. V.I. Sautin (1980) notices that blueberry resources on all territory of Republic of Belarus make approximately about 10 thousand tons, productivity is about 20 – 235 kg per hectare, depending on ecotope. Possible purchases of a blueberry in woods of Belarus at average productivity of 120 kg per hectare can make about 1.7 thousand tons taking into account losses (Karas, 1983).

Despite on considerable resources of wild-growing berry plants of *Vacciniaceae* family, volumes of industrial purchases of berries tend to decrease. They do not satisfy of growing requirements of the population for them, as well as they do not satisfy of valuable raw materials in pharmaceutical and the food-processing industry. So, mid-annual preparations of a cranberry in 1961-1965 made about 9 thousand tons, in 1966 – 1970 – 5.8 thousand tons, in 1971 – 1975 – 2.3 thousand tons, and in 1980 – 1985 – did not exceed 1.5 thousand tons (Marsh cranberry, 1987). Last years, owing to the radionuclide pollution of the large territories caused by failure on the Chernobyl atomic power station, volumes of berries purchases have considerably decreased, especially in southern and central areas of the Republic, and now make no more than 1 thousand tons (Environment, 2000).

Industrial purchases of a blueberry last 25 years are not spent at all. It is connected with many reasons, mainly, with reasons of anthropogenic character. The general tendency to decrease in resources of natural berry-field is revealed as because of drying land improvement and of working out of peatbogs, and as a result of forest fires and deforestation (including clearings of care by wood) in the period of vegetation of berry-fields. Besides, the biological efficiency of wild-growing berry plants rather low and considerably fluctuates on years that also causes decrease in volumes of their purchases (Evtuhova, 1991).

For today the maximum resources of fruit-berry plants are located on territory of Minsk (28 %) and Gomel (26 %) regions. The greatest stocks as a whole on the Republic are marked a bilberry and a cranberry (about 33.0 thousand tons or 66 % and 11.2 thousand tons or 22.5 %, accordingly). By the least stocks are marked a mountain ash (1.1 thousand tons, or 2.2 %) and a blueberry (1.3 thousand tons, or 2.6 % from a biological stock of all principal kinds).

On purchases volumes on the first place there are a bilberry (up to 5 thousand tons annually) and a cranberry (about 1 thousand tons). The cowberry last years is prepared by the population basically for own needs; blueberry preparations are rather insignificant.

A principal cause of low level of use of natural stocks of berries is imperfection of technologies and systems of the organization of their purchases. Purchases of wild-growing berries are carried out till now by their purchase at local population that always bears in itself the elements of chance. To provide the greatest efficiency of the organized gathering of berries, the service of the account of resources and the forecast of terms as well as a crop of berry production is necessary.

Thus, all-round studying of biology of wild-growing berry-fields, their distribution, efficiency and stocks has allowed to develop scientific bases of rational use, protection, reproduction, introduction, breeding, technologies of cultivation, storage and production processing. Became obvious that stocks of berry-fields should increase not only at the expense of protection, rational and careful use of natural thickets, but also by the organization of industrial culture of berry plants, including a cranberry and a blueberry.

Rational use of berry plants can be conducted in three directions: 1 – gathering of berries in the most productive grounds; 2 – the same, but with application of a complex agrotechnical and forestry actions; 3 – introduction of useful berry plants in culture by crops and landing, both in a natural area, and in new areas for the species.

The elementary way of increase of productivity of wild-growing berry-fields is regular care of natural bush. In the Republic were created the semi-cultures of a cranberry and works on its restoration in a natural cover of bogs were conducted.

Actions for creation of semi-cultures are developed for increase of biological efficiency of natural bush of a blueberry with annual affordability of 22 rubbles per hectare (in the prices of the end of

1980th) (Grimashevich, 1986). The average increase of productivity thus makes 180 kg per hectare. In necessity of carrying out of actions for increase of efficiency of natural bush specified by E.I. Proskurjakov (1937) in due time. However the creation of semi-cultures does not answer in the full measure to problems of a forestry intensification. It is because difficult to mechanize processes of cultivation of a cranberry and a blueberry (application of fertilizers, harvesting, rejuvenescence of bushes etc.) under natural conditions therefore the expected effect is not always reached.

The beginning of introductional works in the Republic is connected with occurrence in the seventies of XX century of the generalizing data about achievements of foreign countries. Since the same time in the scientific institutions of Belarus it was studied the possibility of marsh cranberry cultivation (*Vaccinium macrocarpon* Ait). Long-term ecological and biological researches had been proved advantage of cultivation in culture of the North American alien cultivars in comparison with a European cranberry.

The first research-and-production plantation on the area of 10 hectares has been put in 1980-1983 of "Glavpolesyevodstroy" of MWE of the USSR in Gantsevichi district of the Brest region (nowadays it is the experimental base of CBG of NAS of Belarus). Small skilled plantations of a marsh cranberry (of 2-3 hectares) are created at the same years in skilled timber enterprises of Institute of wood of NAS of Belarus. Successful cultivation of a marsh cranberry on skilled plantations was the concrete proof of high prospects of industrial culture of this species.

On the basis of theoretical and practical elaborations in 1986 by the Council of Ministers of Belarus it was accepted Decision "About the organization in the Belarus Soviet Socialist Republic of marsh cranberry manufacture" therefore the first industrial plantation of a North American cranberry has been created in Pinsk district of the Brest region on the area about 60 hectares by concern "Polesyevodstroy" in 1985 – 1990. By this time the first domestic technologies of industrial cultivation of marsh cranberry is accepted for reception of a planting stocks and on berry production. In effect, each of technologies represents the complex of actions directed on reception of the maximum productivity of plants. The basic operations on cultivation of a cranberry with maintenance of conditions of probably full use of fertility of soils, their optimization of water-air and nutritious modes, with application of reliable measures of protection from extreme biotic and abiotic factors, all of these operations are working out.

The successful decision of many put questions has created a necessary basis for adjustment of wide industrial production of a marsh cranberry. By this time in the Republic functions about 70 hectares of skilled and skilled-industrial plantations where 11 perspective varieties of the American breeding are tested. Average productivity of berries has made 12-15 tons per hectare over the last 5 years depending on a variety and a growth place.

The considerable attention in the works devoted to a marsh cranberry has been given for research of biochemical structure of its berries in connection with the optimization of a mode of a mineral food, of definition of optimum terms of berries harvesting for a putting on storage and for an establishment of optimum modes of the storage.

In 1980 there were begun tests of 11 varieties of high-bush blueberry (*Vaccinium corymbosum* L.) of American breeding, received of the Main Botanical Garden of Academy of sciences of the USSR (nowadays MBG of the Russian Academy of Sciences). The culture of this alien crop has proved to be as perspective under the conditions of Belarus, and collection replenishment by new varieties of early term of maturing has allowed to advance it in more northern areas of Belarus. Economic advisability of cultivation *Vaccinium corymbosum* L. as crop made active the works on creation of plantations in economy with a various pattern of ownership. Today more than 50 hectares of farmlands in the Republic of Belarus have been taken away under skilled landings of this North American alien crop.

The bog bilberry, unlike of high-bush blueberry, neither in industrial crop abroad, nor in all territory of the CIS countries is not cultivated. At the same time for areas with the short vegetative period, with insufficient quantity of heat in the summer and with the severe winter it is enough perspective species for introduction. Besides, this species is characterized by wide ecological amplitude (it grows on sphagnous bogs, in boggy woods, on sandy and stony soils), by high winter hardiness, by stability to fungus pathogens and by the expressed polymorphism (habitus of plants, the form of berries and other features).

Skilled works on development of the bog bilberry culture are realized from the end of 70th years at Institute of wood of NAS of Belarus. By this time the working out of technology of plantation cultivation of a bog bilberry on peat-bog soils has been already almost complete. The results received under skilled conditions testify to high profitability of the cultivation of the species mentioned above. Without considerable expenses on care of plants it is possible to receive annually about 5 and more tons of berries from 1 hectare of plantations (Evtuhova, 1991). However now there are only skilled landings of a bog bilberry, created by Institute of wood of NAS of Belarus in the Gomel and Vitebsk regions (it is near 1.5 hectares).

The multi-plan researches on a cowberry are conducted in the Republic. In various agro-climatic zones of Belarus on the basis of studying of a shaped variety it is created the gene pool representing the necessary base for practical breeding. Approbation as the crop (cultivation) is spent basically for the purpose of revealing of the most valuable forms and development of the general strategy of agro-technical actions. On a plot of sorts trial there are tested such Swedish cultivars as 'Sussi', 'Sanna'; such German cultivars as 'Ammerland', 'Erntedank', 'Erntecrone', 'Erntesege'; such Polish cultivar as 'Masovia'; such Dutch cultivars as 'Koralle', 'Red Pearl'; and Russian cultivar 'Rubin'.

Positive results of introduction and prospects of intensive development in our republic of culture of wood berry plants put forward the variety of problems on research of ways and of control facilities by its efficiency. A special urgency thus find researches of physiological features of development of plants, and knowledge of character of their changes at a various combination of natural and anthropogenic influences. It has allowed during the period of 1985 throw 2000 to prepare highly skilled experts in area of natural resource, of introduction and rational use of berry plants of *Vaccinium* L. species. The 9 dissertations for a candidate of science's degree of biological and agricultural sciences were prepared and protected this time; 1 thesis for a Doctor's degree. The next 7 years there were the 2 more dissertations for a Doctor's degree of biological sciences and 1 dissertation for a candidate of science's degree. It allows to tell us about the formation of the Belarus school in area of the unconventional berry plants cultivation which work results are widely used so in the country and as far behind abroad.

Last years the collection fund of Central botanical garden of NAS of Belarus has replenished with new cultivars and forms of marsh cranberry, of European cranberry, of high-bush blueberry, of low-bush blueberry and of their inter-specific hybrids. It also has replenished with new varieties and forms of a cowberries of American, Canadian and Russian breeding. It gives additional possibilities for expansion of assortment of the cultivars and forms offered for division into districts and for breeding, on the basis of revealing of the most perspective of them by results of a complex estimation not only of crop production and of bio-productive parameters, but also of nutritious and vitamin value of berries.

At the same time, it is necessary to use the more rationally of earlier received own results, of the advanced foreign experience and of qualification of the prepared experts for more active works on creation of industrial plantations of non-traditional berry plants of *Vaccinium* L. species under soil-environmental conditions of Belarus. At the introduction of skilled plants as crops it is also important that they can be grown up on invaluable in the agricultural relation areas such as the developed peat deposits, the boggy earths, sandy uncultivated plots and other kinds of uncomfortable areas. Thus, wide cultivation of berry plants on the developed peat-bogs can not only help with the decision of a problem of providing of the population by berries, but also promote rational use of the "waste" areas in such plough-land deficiency region as Belarus.

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