３-１-２遺伝資源関連勉強会（タジキスタン）

発表資料　２－１：Study of the Biodiversity of the Flora of Tajikistan
スライド1

Study of the Biodiversity of the Flora of Tajikistan

Bobozoda Bakokhodja

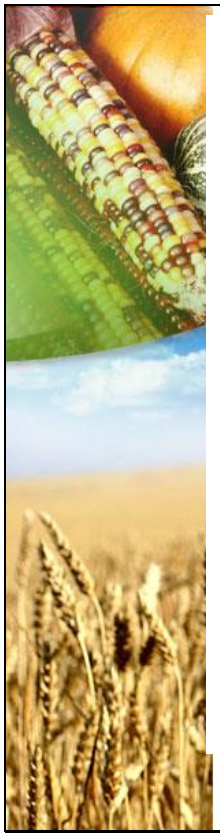
Director of the Institute of Botany, Physiology and Plant Genetics of the National Academy of Sciences of Tajikistan, Candidate of Biological Sciences

スライド2

"The totality of all genes of the species ... I called the gene pool to emphasize the idea that in the person of the gene pool we have the same national wealth as in the face of oil reserves, gold reserves, coal hidden in our depths."

A. S. Serebrovsky (1926)

スライド3



"It is better to show excessive frugality at the present time than to expose to destruction that which has been created by nature for thousands and millions of years."

N. I. VAVILOV

スライド4

Convention on Biological Diversity (CBD)

Article 1

The objective of the CBD is to conserve biodiversity, use its components sustainably and share the fair and equitable benefits associated with the use of genetic resources, including through the provision of necessary access to genetic resources.

スライド5

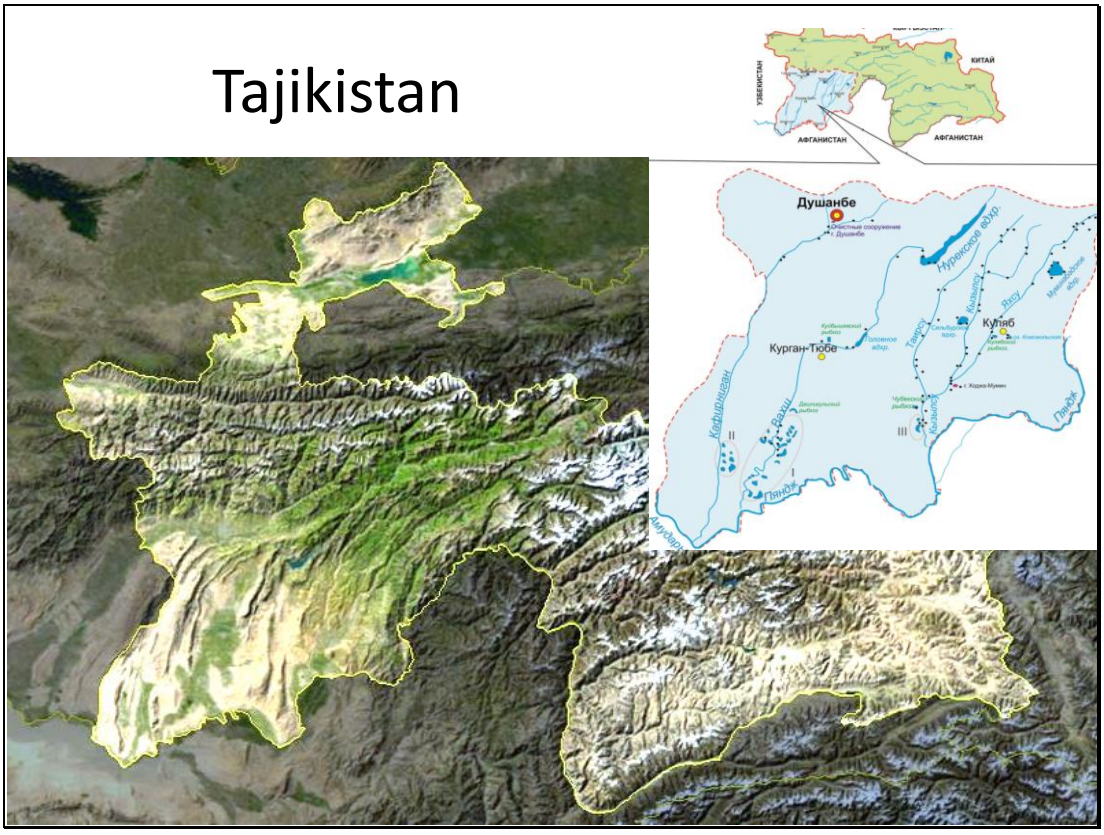
Strategic significance

plant genetic resources

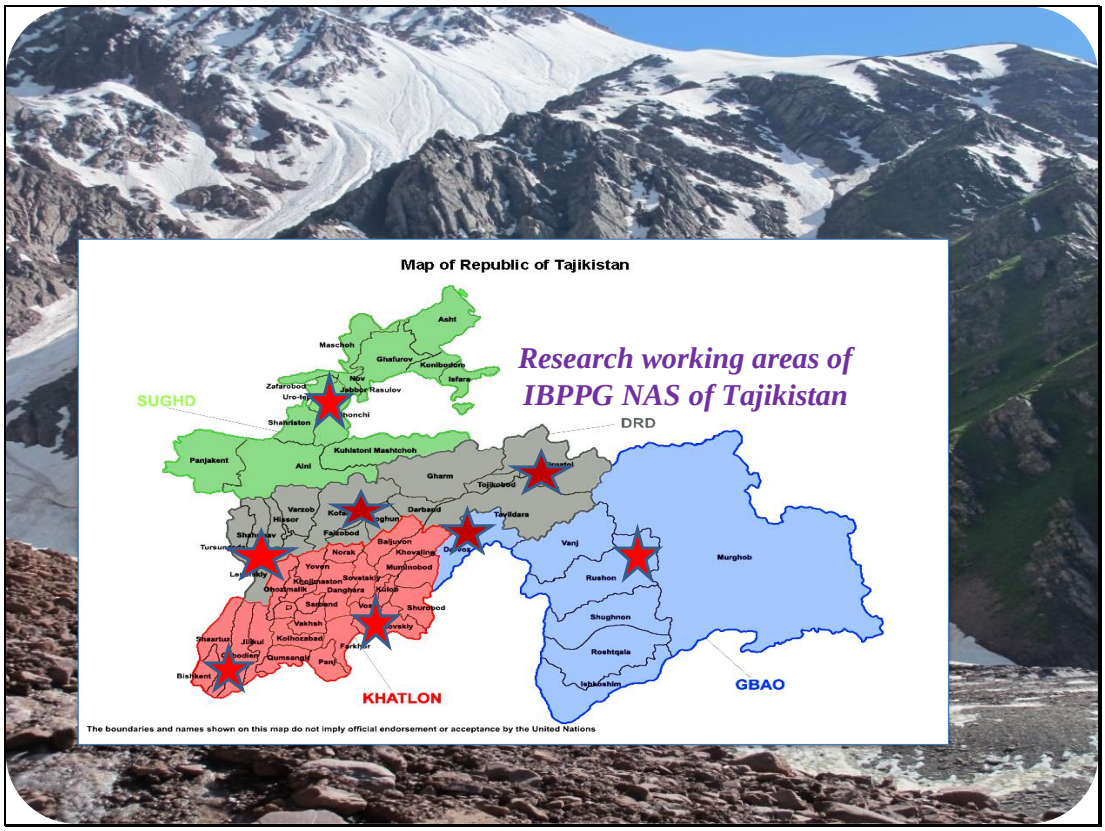
lies in the fact that they are the most valuable source material for the present and future agricultural and economic development, the basis for the biological and food security of the world, as well as the national sovereignty of the country.

スライド6

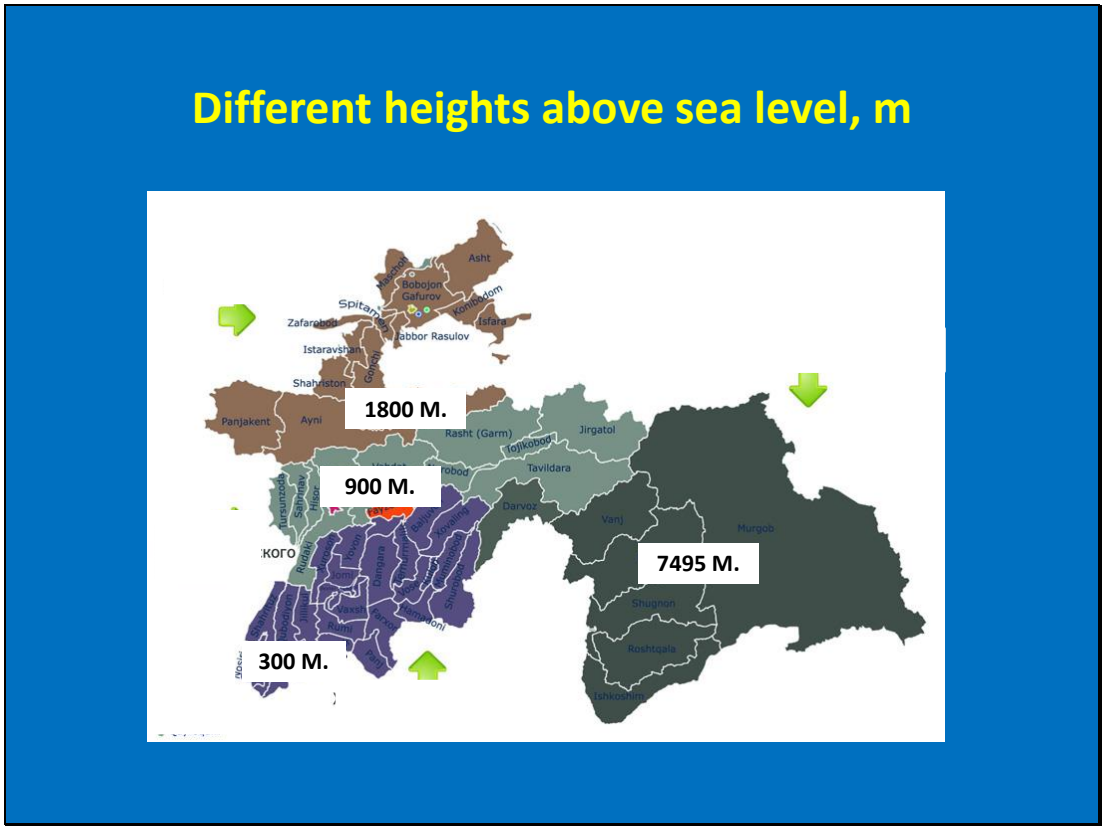
Tajikistan



スライド7


Map of Republic of Tajikistan
Research working areas of
IBPPG NAS of Tajikistan
SUGHD
DRD
KHATLON
GBAO
The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations

スライド8


Different heights above sea level, m
1800 M.
900 M.
7495 M.
300 M.

スライド9

TAJIKISTAN - A COUNTRY OF AGROBIODIVERSITY

- Tajikistan is one of the most ancient centers of agriculture development in Central Asia,
- The inhabitants of this mountainous country from immemorial time have been busy with farming and developing agriculture,
- Agroecological conditions, especially in the mountainous zone, are important factors for changing a number of morphological and genetic traits of representatives of flora and fauna in Tajikistan.
- The territory of Tajikistan is considered the birthplace of origin of many agricultural crops, such as wheat, onions, garlic, legumes, melons, fruit, fodder and other crops,
- Many peoples of the world, such as India, China, Central Asian and European countries, are still using the achievements of the ancient Tajiks, the varieties and hybrids of agricultural crops and animal breeds they developed,

スライド10

•The biological diversity of Tajikistan today has more than 23,300 species of flora and fauna, and on average there are more than 164 species per thousand square kilometers of territory, which is ten times more than the world indicator.

• Due to anthropogenic and other types of impact on nature, 226 plant species and 162 animal species are included in the Red Data Book of Tajikistan, which have become rare and are under threat of extinction.

• The loss of agrobiodiversity in Tajikistan is especially negatively affected by the process of global climate change. Therefore, it is now necessary to take measures to preserve local agrobiodiversity and increase the adaptive capacity of communities to climate change.

スライド11

Institute of Botany, Physiology and Plant Genetics of the National Academy of Sciences of Tajikistan

The Institute of Botany, Physiology and Plant Genetics of the Academy of Sciences of the Republic of Tajikistan was created by the Decree of the Government of the Republic of Tajikistan No. 32 dated February 4, 2011 (as a successor) on the basis of the merger of the Institute of Botany of the Academy of Sciences of the Republic of Tatarstan and the Institute of Plant Physiology and Genetics of the Academy of Sciences of the Republic of Tajikistan. The Institute is part of the Department of Biological and Medical Sciences of the Academy of Sciences of the Republic of Tajikistan.

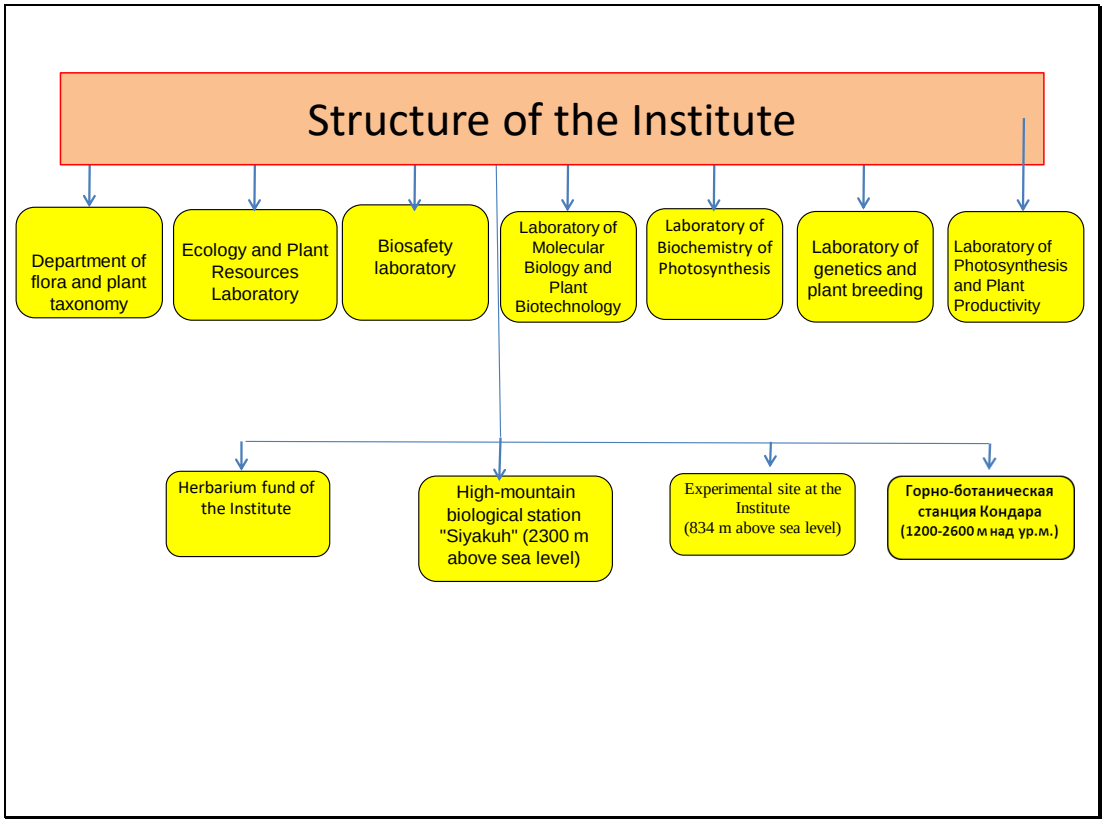
Currently, the Institute employs 57 researchers, 12 doctors of science (including 2 academicians of the RT Academy of Sciences, 5 corresponding members of the RT Academy of Sciences), 20 candidates of sciences and 2 doctors of specialties (PhD).

スライド12

The main directions of the Institute

The main directions of scientific research of the Institute are: studying the systematic composition of the flora of higher and lower plants, botanical resource science, geobotanical research, mapping the vegetation of Tajikistan, developing theoretical foundations and methods of using the achievements of plant physiology and biochemistry, genetics and molecular biology to increase the efficiency of photosynthesis, create high-yielding plants, varieties of agricultural crops resistant to the action of unfavorable factors and the improvement of technologies for their cultivation, the use of biotechnological techniques in crop production, ecological physiology and biochemistry of plants, the development and application of modern methods of analysis for the detection of biological agents and toxins, chemical pollutants in food and agricultural crops.

スライド13



スライド14

DEPARTMENT OF PLANT FLORA AND SYSTEMATICS Основные направления Research - the study of species and systematic diversity and taxonomy of vascular and spore plants of the natural flora of Tajikistan; ecological-geographical and geobotanical research, protection of flora and vegetation. To date, about 120 families, 994 genera and 4513 species of vascular plants have been identified on the territory of Tajikistan, more than 200 species new to science have been described and more than 600 endemic species have been recorded. "Flora of Tajikistan" in 10 volumes was published, which is included in the golden fund of world literature on plant biodiversity.

Along with the study of the flora of higher plants, much attention is paid to the flora of spore plants in Tajikistan (algae, lichens, bryophytes) and fungi.

An inventory and ecological-floristic study of algae in natural and artificial water bodies of Tajikistan is being carried out. 217 species (360 intraspecific taxa) are described, among which 9 genera and 87 species were new floristic finds for Central Asia.

The most important advances in research on lower plants of practical importance are work on bioindication, on the use of mosses, lichens, algae and fungi in monitoring and studying anthropogenic impact on the environment.

スライド15

Growth and development of Strigosella turkestanica in the Tereklitau mountains

(in the foreground is an endemic and rare plant Tulipa tubergeniana)

スライド16

However, hot weather, insufficient rainfall, as well as negative anthropogenic impact (regular grazing, the use of trees and shrubs as fuel by local residents, etc.) in recent years have led to a decrease and disappearance of not only

But also the disappearance of some unique natural ecosystems of southern Tajikistan (in this case, the natural landscape in the Childukhtaron reserve)..

スライド17

LABORATORY OF ECOLOGY AND PLANT RESOURCES

The main direction of the laboratory's research is the study of the composition and structure of the vegetation cover of southern Tajikistan and the patterns of its distribution in connection with vertical zoning.
Resources of medicinal and forage plants have been identified in the flora of southern Tajikistan, their biological and ecological characteristics, productivity and methods of their sustainable use have been studied.

It has been established that at least 1070 species of medicinal plants from 464 genera and 96 families, as well as more than 700 species of forage plants, which make up about 35% of the total biodiversity of plant species, grow in southern Tajikistan. Populations of high quality valuable forage plants are widespread here, which are of interest for introduction into culture and breeding work.

スライド18

HERBARIUM FUND

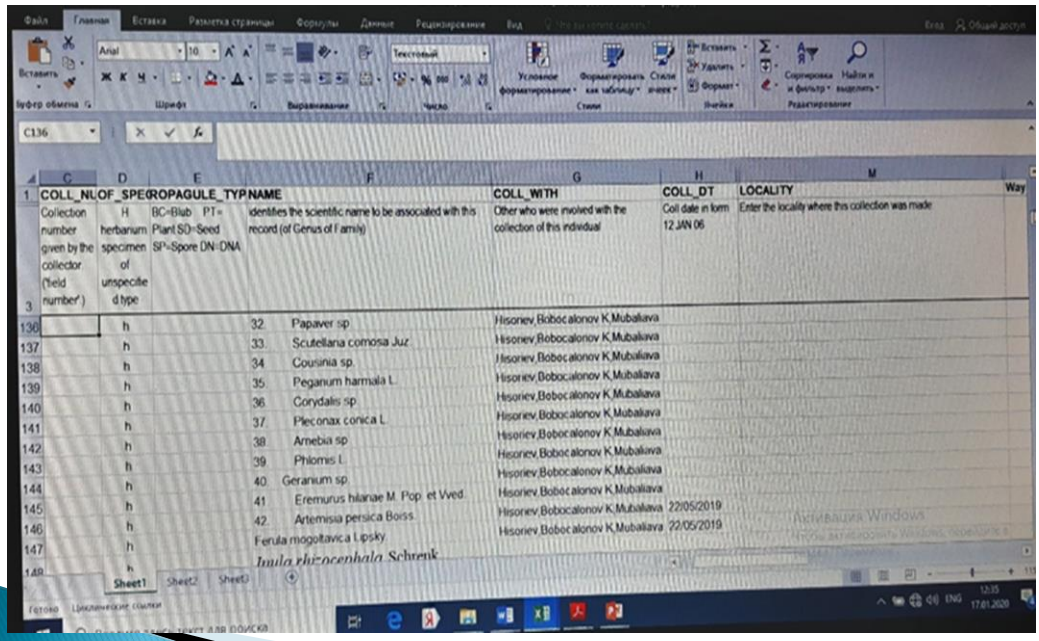
The Herbarium Fund was established in 1941 and is the richest specialized botanical museum in Tajikistan, where collections of plants from more than 200,000 dried herbarium specimens of vascular plants, 28,000 bryophyte leaves, 15,000 lichen specimens, more than 15,000 algological specimens and preparations collected in the mountain the Pamir-Alai system (Tajikistan, Uzbekistan, Turkmenistan, Kyrgyzstan, South Kazakhstan and North Afghanistan) by many generations of Russian and Tajik scientists, from 1876 to the present.

The number of herbarium specimens of only endemic species (species that grow only on the territory of Tajikistan and nowhere else) is more than 5800 specimens of herbarium sheets from more than 500 species of vascular plants.

Currently, the herbarium fund also contains a collection of herbarium specimens of the most interesting plants - the remains of the ancient relict flora of Central Asia, i.e..

スライド19

An electronic database of collection exhibits of the Herbarium Fund has been created and an update is being carried out from the number of freshly collected samples



スライド20

BIOSAFETY LABORATORY

The main direction is the development and application of modern methods of analysis for the detection of biological agents and toxins, chemical contaminants in food and agricultural crops, monitoring of the possible stage of infection in the food chain to further create a model for assessing ecosystems and risks in this area.

Tasks :

Control of biological agents and toxins that can pose a threat to crops and food, as well as the development of express methods for their determination;

Determination and monitoring of pathogenic agents in samples taken from soil and water in areas of growing crops;

Analysis of chemical contamination of food products: determination of nitrate and nitrite ions in meat products; determination of toxic elements Zn, Cd, Pb, Cu, Co, As, Fe, Al in food, water and air at the place of food production; determination of persistent organic pollutants (pesticides and dioxins) in food;

Analysis of biological contaminants in food: determination of mycotoxins, antibiotics, hormones and stimulants, as well as determination of allergens (immunoglobulin E);

Evaluation of foods derived from new technologies such as genetic modification.

It is planned to create a database and recommendations for the further creation of models for ecosystem and risk analysis.

スライド21

LABORATORY OF MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

The laboratory has developed a method for making potatoes tolerant to viruses and diseases. The method is based on the use of potato stolons in *in vitro* biotechnology. This method makes it possible to reduce the period of obtaining regenerant plants by 3 times in comparison with the traditional meristem method.

Based on the cell culture, a screening test for resistance to salinity, drought and high temperature has been developed, which made it possible to obtain new potato varieties that are simultaneously tolerant to two stressors: salinity and drought.

スライド22

Physiological and biochemical screening for resistance to salinity and high temperature

スライド23

Detailed information on tissue culture and minituber production facilities

スライド24

LABORATORY OF MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

Hybridization and receiving of new hybrid's combination

スライド25

LABORATORY OF MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY

In the mountainous regions of Tajikistan at heights of 2200, 2600, 2700, 3600 and 3860 m above sea level, as well as in the conditions of the Gissar valley, a study of productivity indicators of 10 new varieties of potatoes of the Institute's selection was carried out.

スライド26

New potato varieties obtained by combining traditional breeding methods and biotechnology methods

Leaf, flower and tubers of the variety Dustil

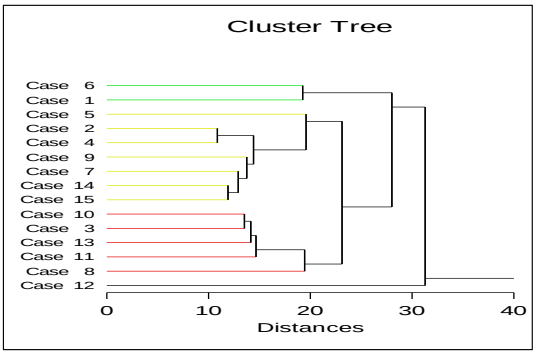
Leaf, flower and tubers of the variety Faizabal

Leaf, flower and tubers of the variety Tajikistan

Leaf, flower and tubers of the variety Rasht

スライド27

- Studies have shown that sweet potato plants were distinguished by a wide variety of leaf shape, leaf color, stems and vine length.

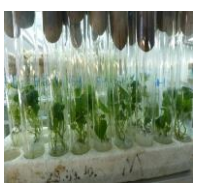


Cluster analysis (dendrogram) for morphological characteristics of 15 sweet potato genotypes

スライド28

In vitro and in vivo sweet potato culture

An accelerated method for obtaining planting material of sweet potatoes with a high content of β-carotene, antioxidants, microelements and vitamins has been developed.



スライド29

PLANT PHOTOSYNTHESIS AND PRODUCTIVITY LABORATORY

The main direction is genetics of signs of photosynthesis and other components of the production process, development of physiological tests and selective improvement of photosynthetic productivity of plants on a physiological-genetic basis in order to increase the productivity of agricultural crops. This line of research is widely recognized among plant physiologists, geneticists and breeders.

On the basis of theoretical studies using physiological and photosynthetic test traits, the laboratory developed new promising varieties of medium staple cotton Rohaty, Guliston, Guliston-2, Ravshan, Somoni and Shavkat-80.

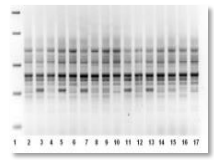
スライド30

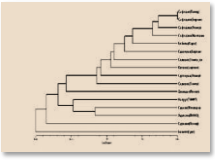
PHOTOSYNTHESIS BIOCHEMISTRY LABORATORY

The main direction is the study of photosynthesis and photosynthetic metabolism of carbon in higher plants. The photosynthesis and photosynthetic metabolism of CO2 in various types of plants are studied under various combinations of environmental conditions, including under extreme conditions, a variety of pathways for biosynthesis of photosynthetic products and adaptation of photosynthetic carbon metabolism to climatic conditions.

A set of methods for modeling the conditions of possible climate change (under different scenarios of the combination of the main climate-forming factors) in special cultivation facilities for growing wheat, in which the necessary microclimate regime was created, has been developed and tested.

スライド31





LABORATORIES OF GENETICS AND PLANT BREEDING

The Laboratory of Genetics and Plant Breeding conducts research in the field of genetics, breeding and biochemical evaluation of breeding material of varieties and forms of cereals. The laboratory has a large set of gene pool of indigenous and wild relatives of local wheat and Aegilops.

One of the directions of the laboratory's research is the creation of varieties of grain crops that are resistant to adverse environmental factors, the selection of adaptive genotypes based on physiological and biochemical test signs.

Within the framework of the ISTC project No. T-1105 "Genomic analysis of cereals and their relatives in Tajikistan" (2004-2008), genotyping of promising and aboriginal wheat varieties and all Aegilops species growing in Central, Northern and Southern Tajikistan was carried out using special molecular markers and electrophoretic analysis of gliadin proteins. The Catalog of wild Aegilops species growing in various ecological-geographical regions of Tajikistan has been published.

Another area of research in the laboratory is: Study of mechanical, biochemical parameters of the quality of grain and flour and local and introduced (imported) wheat varieties and the creation of a catalog of varieties and samples by morphological, physiological and biochemical characteristics.

スライド32

COPYRIGHT CERTIFICATES AND PATENTS

The employees of the Institute received 8 patents and 8 copyright certificates, 2 certificates of intellectual property rights.

スライド33

THANK YOU FOR YOUR ATTANTION