Нетрадиционные виды растений для биоэнергентики

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Non-traditional Plant Species for Bioenergetics

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Experts from V4 group and other partner institutions participating in the international project *FarmersEduca*

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Mendel University in Brno, Faculty of Horticulture in Lednice, Czech Republic

Sarvas Association of Farmers 'National Traditionalists',Sarvas, Hungary

M.M. Gryshko National Botanical Garden of Ukraine
National Academy of Sciences, Kyiv, Ukraine

Association of Farmers and Private Landowners in the Transcarpathian Region, Ukraine

Center of Organic Production, Selenca, Republic of Serbia

Textbook presents the results of research and educational institutions and experts involved in the international network **AgroBio*Net*** oriented for the realization of international research, education and development program entitled "Agrobiodiversity for improving nutrition, health, and life quality" which solves the problems of preservation, assessment and use of traditional, less known, less-used and forgotten kinds of plants.

In this textbook are also presented results from the solution of research projects that are supported by the Operational Programme Research and Development of the European Regional Development Fund:

AgroBioTech ITMS 26220220180 Building Research Centre

TRIVE ITMS 26110230085 Development of International Cooperation for Purpose of the Transfer and Implementation of Research and Development in Educational Programs

ITEBIO ITMS 26220220115 Support of technologies innovation for special bio-food products for human healthy nutrition

BioFood ITMS 26220220115

RESUME

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Non-traditional Plant Species for Bioenergetics

Among urgent problems of humankind the foreground lays in is the provision with reference to alternative sources of energy. The problem of searching for efficient alternative sources of renewable energy is becoming more and more urgent along with other methods of energy supply. First of all, we should note the conversion via photosynthesis of solar energy to useful energy for the production of various types of biofuel (bioethanol, biodiesel, biogas, solid biofuel etc.). In ancient times, this type of fuel was the main source of energy for humanity. Today, its role is growing again, given the living conditions on the Earth and the development of effective methods for converting energy of green plants to the necessary energy for human use. A lot has been done already in this direction in different world countries.

Today, in the structure of the world's alternative energy, biomass energy is about 13 %. According to scientific surveys by 2040 the share of renewable energy sources will reach 47.7 %, and the contribution of biomass will increase to 23.8 %.

Scientists from M.M. Gryshko National Botanical Garden of the NAS of Ukraine were among the first in Ukraine which began the studying of renewable plant bio-resources for energy use. Since the beginning of the 1990s, complex researches have been carried out to mobilize, evaluate and use plant resources for this purpose. It should be noted that a gene pool of energy plants of different uses has been created and for today includes 550 species, varieties and plant forms (127 for bioethanol production, 180 for biodiesel production, 243 for raw biofuel and biogas). Collection of energy plants of M.M. Gryshko National Botanical Garden is included in the list of scientific objects that make up the National Treasure of Ukraine. Along with introducted and less widely distributed cultures, an important place in this list belongs to own forms, hybrids and varieties of energy plants, created on the basis of breeding and biotechnological methods. A wide variety of energy crops makes it possible to produce a certain type of biofuel not at the expense of 1–2 crops, the cultivation of which leads to significant disruptions in crop rotations and ecological balance in agrocenosis, but with the use of wide range of them.

For cultivation a set of cultures is proposed that is representatives of different botanical families and the use of which in crop rotations or outside of them does not pose a threat to the environment. Preference is given to perennial plants with a period of productive longevity of 10-20 (and more) years, capable of growing not only on fertile crop rotation fields, but also on lands unsuitable for growing most traditional, especially food and crops. The selected crops are environmentally safe, energy efficient and economically highly cost-effective, able to improve the agronomic and biological parameters of the soil, and help to reduce the level of CO_2 in the air.

These plants are preventing erosion, protecting soil surface from overheating under sunlight for a long period when traditional cultures are not able to vegetate with high photosynthetic capacity. Most of the proposed crops are characterized by exceptional drought and winter resilience, adaptability, resistance to diseases, pests and weeds. This makes it possible to reduce the pesticide load on agrocenosis, to ensure ecological balance in the environment, and also to reduce the cost of produced biofuel.

In the presented work, more than 30 types of energy plants, their systematic position, origin, distribution and invasiveness were characterized. Also, the data on the number of chromosomes, biochemical composition, productivity and energy productivity of plants are given. Information is presented on the life form, morphological and biological characteristics, and the main periods of development and peculiarities of plant reproduction. The main elements of the technology of cultivation, the optimal methods and timing of harvesting of plant raw material are given. The most important directions for the use of plants in the energy, agrarian, pharmaceutical, food and other industries are specified.

СОДЕРЖАНИЕ