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СЕЛЬСКОХОЗЯЙСТВЕННЫЕ НАУКИ

THE USE ENERGY CROPS IN ORDER TO IMPROVE MARGINAL LANDS

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Introductions. On a global environmental scale, there are two main problems: the ever-increasing area of contaminated land and the increasing demands on bioenergy. In this case, it is best to use energy crops for growing. These crops are switchgrass, miscanthus, sugar sorghum, perennial sorghum, sida, paulownia, willow, poplar and others. To address these issues, it is necessary to use biological methods of soil and water purification. Phytoremediation – cleaning the polluted environment with the help of plants. The list of such plants should be supplemented by perennial energy crops, taking into account the absorption capacity of their root system.

Today cleaning of contaminated soils from heavy metals, pesticide residues is very important and relevant problem for Ukraine. Soil pollution is considered to be the result of the functioning of metallurgical and chemical industrial enterprises, as well as the irrational application of chemical plant protection means in the agricultural sector.

Scientists are studying the peculiarities of the accumulation of heavy metals by energy crops. Currently researches aimed at theoretical and experimental substantiation and development of technologies for biological improvement of disturbed lands with the use of plants are becoming especially relevant. In Ukraine source material of energy crops for breeding is being studied [1], agrobiological

features of yield formation and quality of switchgrass seed are being investigated [2], biomass potential is being examined [3], ways of using energy crop biomass for production of biofuels are being substantiated, methods of their production and energy conversion are being developed [4, 5]. Along with the rapid development of alternative energy sources in the world, Ukraine remains a country that only partially meets its own needs with traditional types of energy resources and is forced to import about 65% of energy [6, 7].

In order to create artificial phytocenoses, the features of natural undisturbed landscapes should be studied, followed by the selection of promising plant species, in order to use them as components for phytomelioration. There is a need to clean the soil from contaminants [8]. The experiments Kulyk M., at all [9] have shown that plants of the family *Poaceae*, which grow in natural phytocenoses, on radiation-contaminated soils, have phytoremediation properties.

To solve this problem of soil contamination, an innovative way of cleaning them with the help of switchgrass in co-cultivation with lupine is proposed [10].

Thus, research on environmental issues is gaining relevance. This is especially important in terms of rational use of energy crops.

Aim. It is necessary to solve the problems of soil, water and air pollution from industrial emissions. It is also important to reduce the anthropogenic impact on soils. This is due to the fact that large areas of agricultural land are contaminated with pesticide residues, heavy metals and others. Currently, the topical issue for Ukraine is the ecology of the environment. Determine the impact of energy crops on environmental factors. It is necessary to substantiate the positive flow of switchgrass and miscanthus on the ground.

Materials and methods. In view of the above, the authors conducted multi-year research with energy crops in the Central Forest Steppe of Ukraine. The experiment combined the study of energy crops varieties included in the Register of plant varieties suitable for distribution in Ukraine [11, 12]. Material for the study - energy crops (switchgrass and miscanthus).

Results and discussion. Currently, the topical issue for Ukraine is the ecology of the environment. Ukraine has all the necessary opportunities, especially soil and climate, which contribute to obtaining high-yield energy-intensive biomass of energy crops. And the presence of large areas unsuitable for growing crops (marginal lands) enables to grow energy crops. This will reduce competition with food production.

Switchgrass and Miscanthus are perennial herbs with a C 4 – scheme of photosynthesis. These energy crops are excellent soil cleaners. At the same time, switchgrass and miscanthus are valuable raw materials for biofuel production (Fig.).

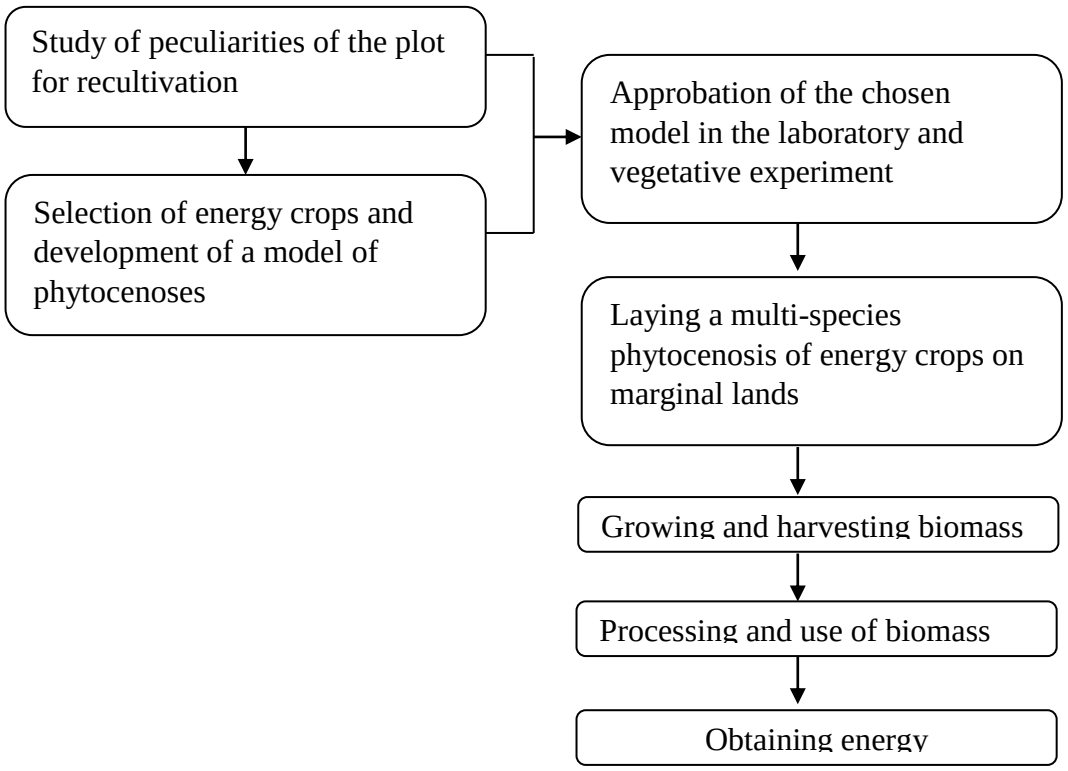

Fig. The scheme of artificial phytocenoses creation and reclamation of lands by using energy crops

The scheme of artificial phytocenoses creation and recultivation of lands by using energy crops a provides for the implementation of the above measures:

- to study thoroughly the features of the plot for recultivation: landscape, agrochemical parameters of the soil, natural vegetation, etc.

- to select plants taking into account the compatibility of their cultivation in grass mixtures on the basis of laboratory and vegetation experiments,

- to place energy crops in strips together with legumes according to the developed model of phytocenoses,

- to place woody and herbaceous crops along the perimeter of the energy plantation. They will perform the functions of protection of the main crops against the wind.

Biomass obtained from energy plantations can be successfully used for biofuel production. Liquid, solid and gaseous types of biofuels are made from the above-ground vegetative mass of these crops, which can be converted into thermal, mechanical and electrical energy. And perennial root system and plant remains contribute to the accumulation of organic matter in the soil. Scientists have also found that energy crops are carbon-neutral plants. They reduce the greenhouse effect.

Conclusions. So, as conclusions we can say the following.

The use of degraded or contaminated land contributes to a partial solution to the problem of using agricultural land to obtain vegetable raw materials for energy purposes.

The maximum phytoremediation effect on contaminated lands is observed in fast-growing plant species.

The available diversity of energy crops contributes to the production of biofuels and cleaning of contaminated areas.

Restoration of functional and ecosystem properties of contaminated lands will return them to agricultural use.

In the future, energy crops can solve both energy and environmental problems.

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