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PLANT ENERGY RESOURCES: AGROECOLOGICAL, ECONOMIC AND ENERGY ASPECTS

Monograph

Poltava
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The monograph offers the basic theoretical and practical aspects of the use of plant materials of agricultural and energy crops for the biofuels production. The potential of energy resource for bioenergy has been determined, the issues of botanical and biological features, agroecological sound technology for growing energy crops on marginal lands have been revealed. The publication also focuses on the creation of new agrophytocenoses based on varietal crops and "nootera", which allows improving the functioning of self-regulation mechanisms in the cereal-bean crop system. Information has been provided on the efficiency of energy crops cultivation for biofuel production: economic and energy assessments have been carried out. Determining the efficiency of energy crops cultivation as an additional source of energy resources is valuable for the use by population of territorial communities and reduction of their energy dependence.

The monograph is a part of the research topic of the Poltava State Agrarian Academy "Development of optimal energy systems taking into account the existing potential of renewable energy sources in the conditions of the Forest-steppe zone of Ukraine" (state registration number 0117U000397 dated February 10, 2017).

The monograph is developed for scientists, applicants for higher education, teachers, specialists in the field of energy efficiency and energy saving of various forms and directions of economic activity.

The publication will also be useful in the implementation of diploma and dissertations works by applicants for higher education.

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CONTENT

PREFACE

Reducing the energy dependence of the population of territorial communities for the use of plant materials as an alternative energy source, especially with the justified use of plant agricultural resources and growing energy crops on marginal lands, is an important research area. In the conditions of the Forest-steppe of Ukraine, winter wheat, corn, sunflower and soybeans, the plant residues of which can be used for energy needs, occupy the largest areas. Energy crops are promising and adapted to the growing conditions: giant miscanthus *(Miscanthus giganteus)* and switchgrass *(Panicum virgatum L.)*, their biomass is used as raw material for the biofuels production. However, the productivity level, production volumes and quality of plant biomass are insufficient to ensure domestic energy needs. The currently developed elements of the cultivation technology for miscanthus and switchgrass as well as logistical supply chains – from producer to consumer – is high-cost. In the modern economic conditions, logistic operations are not always justified – mainly seed of energy crops are laid on high-yielding soils of research stations, little attention is paid to the elements of biologization when using plant biomass in the Forest-steppe zone of Ukraine.

The monograph contains the following Chapters:

1. Agroecological features of the use of plant energy resource.
2. Influence of agro-cultivation measures on the yield of biomass and energy crops seeds.
3. Production of biofuels and bioplastic from plant materials.
4. Economic and energy efficiency of growing energy crops.

The monograph presents a theoretical assessment of the opportunities of agrobiomass agricultural crops and phytomass of energy crops in Ukraine, environmental aspects of their integrated use for the biofuels production. The monograph contains information on the agroecological justification and use of plant energy resources: agricultural and energy crops. The attention is focused on the study of the influence of winter agro-cultivation measures on the yield of biomass and seed of energy crops and biofuel production opportunities. The issues of the production of polymer materials from plant materials are solved. The economic calculations of economic feasibility and energy efficiency of the energy crops biomass production are presented.

The monograph is part of the research topic of the Poltava State Agrarian Academy “Development of optimal energy systems taking into account the existing potential of renewable energy sources in the conditions of the Forest-steppe zone of Ukraine” (state registration number 0117U000397 dated February 10, 2017).

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