

CONTENTS

INTRODUCTION	7
1. CURRENT TRENDS IN THE DEVELOPMENT OF BIOFUEL PRODUCTION IN UKRAINE AND THE WORLD	10
1.1. Thermal energy aspects of biofuel use	12
1.2. Analysis of biomass processing methods	15
1.2.1. <i>Overview of modern biomass gasification technologies.</i>	16
1.2.2. <i>Gasification of biomass by the catalytic method.</i>	18
1.2.3. <i>Modern technologies of anaerobic fermentation.</i>	19
1.2.4. <i>Biomass waste burning technologies.</i>	21
1.2.5. <i>Technologies of pyrolysis.</i>	24
1.3. Raw material base of Ukraine	27
<i>References</i>	30
2. ECOLOGICAL ASSESSMENT OF THE POST-MINING LANDS	34
2.1. General characteristics of research areas	34
2.2. The main processes of reclamation of disturbed lands during mineral extraction	38
2.3. Physico-chemical and biological testing of phytomeliorated mining rocks of the Pokrov land reclamation station	41
2.4. Forecast of ground water level dynamics taking into account natural lateral spreading for reclaimed dump without drainage with irrigation	47
2.5. The study of the main water-physical properties of the black soil and rocks of the Nikopol manganese deposit	54

2.6. The impact of VAM fungus and bacterial fertilizer effect on the yield of crops in the pot and field experiment	70
2.7. Assessment of the suitability of reclaimed land for production of apple fruits	73
<i>References</i>	78

3. BIOFEEDSTOCK PRODUCTION ON THE RECLAIMED LANDS OF WESTERN DONBASS COAL MINING REGION **83**

3.1. Western Donbass coal mining region environmental problems	84
3.2. Analysis of soil profiles of reclamation of post-mining lands	91
3.3. Features of the water regime of the soil and the development of the root system of plants depending on the methods of reclamation	110
3.4. Growth and formation of productivity of agricultural crops depending on methods of land reclamation and fertilizers	120
3.4.1. <i>Productivity of winter wheat according to different predecessors</i>	120
3.4.2. <i>Yield of barley straw</i>	126
3.4.3. <i>Yield of corn straw depending on different predecessors</i>	128
3.4.4. <i>Changes in the yield of cereal crops straw under the influence of the technical soils fertility and fertilizers</i>	132
3.4.5. <i>Productivity of perennial legumes</i>	135
3.4.6. <i>Bioproductivity of agricultural crops on lands recultivated with meadow-black soil</i>	137
3.4.7. <i>Determination of the energy intensity of agricultural crops plant product</i>	138
3.5. Seeds treatment with bioinoculants for winter wheat cultivation in the reclaimed lands	139

3.6. Environmental feasibility of forest reclamation of post-mining lands in the Western Donbass	142
<i>References</i>	148
4. THE PROSPECTS OF GROWING SWITCHGRASS AND MISCANTUS ON MARGINAL LANDS FOR THE PRODUCTION OF BIOFUEL	153
4.1. Biological characteristics and technologies of growing switchgrass and miscanthus	154
4.2. Assessment of miscanthus and switchgrass productivity on different types of post-mining substrates	157
4.3. Soil amendments effect on growth, heavy metals uptake and thermal features of miscanthus and switchgrass	166
4.3.1. <i>Soil amendments effect on the growth of miscanthus and switchgrass</i>	167
4.3.2. <i>Soil amendments effect on heavy metals uptake by miscanthus and switchgrass biomass</i>	170
4.3.3. <i>Soil amendments effect on thermal features of miscanthus and switchgrass</i>	175
<i>References</i>	181
5. PRODUCTIVE AND ENERGETIC POTENTIAL OF THE WOODY PLANTS GROWN ON MARGINAL LANDS	186
5.1. Thermal characteristics of the biomass of herbaceous and woody plants	186
5.2. Productive potential of poplar on technosol	187
5.3. Thermolysis processes of poplar clones wood	195
5.4. The thermal characteristics of local and invasive trees wood	203
<i>References</i>	211

6. AGRICULTURAL CROP RESIDUES GASIFICATION	214
6.1. Dependency of the process operational parameters on main feedstock characteristics	214
6.2. The role of volatile components in the process of thermal destruction and ignition of the sunflower husk biomass	225
<i>References</i>	236
CONCLUSION	240