



CONTENTS

INTRODUCTION		9
1. MACHINERY AND EQUIPMENT		11
1.1. THE CONCEPT OF CONSTRUCTION OF A MOBILE AUTOMATIC DEVICE FOR FOREST REGENERATION TASKS AND AFFORESTATION OF FORMER FARMLAND AND RECLAIMED AREAS		13
Florian ADAMCZYK, Jacek WOJCIECHOWSKI, Paweł TYLEK, Janusz M. SOWA, Józef WALCZYK, Ryszard TADEUSIEWICZ		
1.2. SPRAYER SETUP AND FOLIAR APPLICATION EFFECT ON MAIZE GROWTH CHARACTERISTICS USING DIFFERENT UREA CONCENTRATIONS		19
Majid H. R. ALHEIDARY, Madyan Sh. R. ALSHAHEEN, Sundus A.M. AL ABDULLAH		
1.3. OIL SEED RAPE PLANT SPRAYING USING MULTIROTOR DRONE		25
Bogusława BERNER, Gerhard MOITZI, Aleksandra PACHUTA, Nachimuthu MAHESWARI, Helmut WAGENTRISTL, Jerzy CHOJNACKI		
1.4. INFLUENCE OF BALING PROCESS ON THE QUALITY OF FODDER - FIRST EVALUATION		31
Arrigo Salvatore GUERRIERI, Francesco SANTORO, Alexandros Sotirios ANIFANTIS, Simone PASCUZZI		
1.5. SELECTION METHOD OF AIRCRAFT TYPE FOR AERIAL SPRAYING OF FORESTS		37
Sławomir MAJEWSKI		
1.6. USING DRONES TO TRACK THE DEVELOPMENT OF MAIZE CULTIVATION		43
Radko MIHAYLOV		
1.7. SUGAR BEETS GROWN IN THE ONE AND TWO-STEP STRIP-TILLAGE SYSTEM AT DIFFERENT SOIL CULTIVATION DEPTHS		49
Natalia MIODUSZEWSKA, Juraj MAGA, Pavol FINDURA, Ofga URBANOVIČOVÁ, Krzysztof PILARSKI, Jacek PRZYBYŁ		
1.8. INFLUENCE OF SOIL TILLAGE AND LONG-TERM FERTILIZATION ON THE AGGREGATE SIZE DISTRIBUTION AND SEEDBED ROUGHNESS		55
Gerhard MOITZI, Peter RIEGLER-NURSCHE, Josef HUBER, Hans-Peter KAUL, Reinhard NEUGSCHWANDTNER, Helmut WAGENTRISTL		
1.9. THE DROP SIZE DISTRIBUTION AND SYMMETRY AROUND THE CENTRELINE OF THE SPRAY FAN		61
Stanisław PARAFINIUK, Marek MILANOWSKI, Alaa SUBR, Tomasz NOWAKOWSKI, Majid ALHEIDARY		
1.10. THE EFFECT OF PLOUGH MODIFICATION ON SOIL PENETRATION RESISTANCE		67
Maciej SPRAWKA, Mariusz SZYMANEK, Wojciech TANAS, Flaieh Hammed KASSAR		
2. EVALUATION, MONITORING AND MODELLING		73
2.1. PERFORMANCE EVALUATION OF A DEVELOPED LOW-COST FLOATING FISH CAGES FOR AQUACULTURE		75
Alex F. ADISA, Chiduzie O. ORAKWUE, Iyabo O. TAIWO, Ibukun A. OLA		
2.2. A SIMPLE METHOD TO PREDICT SPRAY DRIFT FROM SOME OF THE TECHNO-METEOROLOGICAL PARAMETERS		81
Majid H. R. ALHEIDARY, Jean-Paul DOUZALS, Carole SINFORT		
2.3. UAV IMAGES 3D MODELLING TECHNIQUES FOR QUANTIFY TREE ROW VOLUME		87
Alexandros Sotirios ANIFANTIS, Cristina DI GREGORIO, Francesco SANTORO, Simone PASCUZZI, Giacomo SCARASCIA MUGNOZZA		
2.4. THE USE OF POLYNOMIAL TRANSITION CURVES FOR TRAJECTORY OF MOTION PLANNING		91
Marek BORYGA, Krzysztof GOŁACKI, Paweł KOŁODZIEJ		
2.5. THEORETICAL SUBSTANTIATION OF THE PARAMETERS OF A COMBINED COULTER OF THE GRAIN DRILL		96
Volodymyr BULGAKOV, Semjons IVANOV, Simone PASCUZZI, Francesco SANTORO, Alexandros Sotirios ANIFANTIS, Valerii ADAMCHUK, Vasył GOROBEY		
2.6. SPATIAL VARIABILITY OF HYPERSPECTRAL INDICATORS IN RELATION TO CULTIVATION METHODS - STUDY WITH THE USE OF A GYROCOPTER-MOUNTED REMOTE SENSING SYSTEM		103
Małgorzata BZOWSKA-BAKALARZ, Rafał DĄBROWSKI, Przemysław TUROS, Karl-Heinz DAMMER, Maciej SPRAWKA, Anna KRAWCZUK		
2.7. SPRAY MONITOR - A CONCEPT OF SPRAYING PARAMETERS OPTIMIZATION TAKING INTO ACCOUNT APPLICATION CONDITIONS		109
Zbigniew CZACZYK, Jerzy PIETRZYK, Dariusz LODWIK		
2.8. SENSOR-BASED DETECTION OF DISEASES IN FIELD CROPS		115
Karl-Heinz DAMMER, Andreas GARZ, Michael SCHIRRMANN		
2.9. COMPUTER COLOUR ANALYSIS OF CONVECTIVE DRIED CARROT		121
Ewa GOLISZ, Arkadiusz RATAJSKI, Małgorzata JAROS, Weronika GAS		
2.10. RESEARCHES OF THE DISTRIBUTOR OF THE COMBINED TILL-PLANT OUTFIT FOR SOWING OF THE SMALL-SEED CROPS		127
Volodymyr KRAVCHUK, Tetyana HAYDAY		
2.11. THE USE OF ELECTRICAL CONDUCTIVITY SENSOR ON THE GO TO PREDICT CLAY CONTENT IN THE SOIL OF BELGIUM		133
Quentin LIMBOURG, Fabienne RABIER, Gaetan DUBOIS, Marc DEGEYTER, Bastien NOTREDAME		

2.12. A NEW SYSTEM FOR AERIAL TREATMENT AGAINST EUROPEAN CORN BORER: ASSESSING THE QUALITY OF APPLICATION OF A BIOLOGICAL PLANT PROTECTION PRODUCT	139
Dariusz MARSZAŁEK, Małgorzata BZOWSKA-BAKALARZ, Agata CZARNIGOWSKA, Jacek CZARNIGOWSKI	
2.13. WINTER OIL SEED RAPE MONITORING WITH UNMANNED AERIAL VEHICLES	145
Piotr MAZUR, Gerhard MOITZI, Helmut WAGENTRISTL, Agnieszka ZDANOWICZ	
2.14. DEVELOPEMENT OF AN EXPLANATORY AND PREDICTIVE MODEL OF THE INTRA-PLOT VARIABILITY OF YIELD IN WALLOON WHEAT	151
Bastienne NOTREDAME, Fabienne RABIER, Quentin LIMBOURG	
2.15. OSCILLATION THEORY OF THE FREE ENDS OF THE SPIRAL SEPARATOR FOR A POTATO HEAP	157
Janusz NOWAK, Volodymyr BULGAKOV, Ivan HOLOVACH, Juri OLT, Margus ARAK, Zinoviy RUZHYLO, Andriy NESVIDOMIN	
2.16. <i>PISUM SATIVUM</i> L. (PEA) YIELD MODELLING USING SENTINEL-2 NDVI MAPS	163
Luis PAIXÃO, José Rafael MARQUES DA SILVA, Jose Maria TERRÓN, Francisco Jose DOMÍNGUEZ	
2.17. METHOD FOR TESTING RESISTANCE OF RYE TO ERGOT (<i>CLAVICEPS PURPUREA</i>) UNDER CONTROLLED INOCULATION	167
Kamila ROIK, Anna TRATWAL, Beata WIELKOPOLAN	
2.18. MEASUREMENT OF THE SPRAY ANGLE FOR FLAT FAN NOZZLE USING DIFFERENT METHODS	173
Alaa SUBR, Marek MILANOWSKI, Stanislaw PARAFINIUK, Ameer AL-AHMADI	
2.19. ONLINE PEST WARNING SYSTEM AS A TOOL SUPPORTING AGRICULTURAL PRACTICE IN THE INTEGRATED CONTROL REQUIREMENTS	179
Anna TRATWAL, Marcin BARAN, Magdalena JAKUBOWSKA	
2.20. STUDY ON THE HONEY PRODUCTIVE POTENTIAL OF THE BEE FORAGE SPECIES IN NORTHEAST PART OF BULGARIA IN SILISTRA REGION	183
Presiyan ZHELJAZKOV, Atanas ATANASOV, Ivaylo HRISTAKOV	
3. ENERGY	189
3.1. ENERGETIC AND ECONOMIC COMPARISON BETWEEN BIOGAS PLANT SUPPLIED BY VEGETABLE AND SLAUGHTER BASED SUBSTRATES	191
Jacek DACH, Jakub MAZURKIEWICZ, Damian JANCZAK, Natalia MODUSZEWSKA, Alina KOWALCZYK-JUŠKO	
3.2. POSSIBILITIES OF USING HERBACEOUS BIOMASS FOR ENERGY PURPOSES IN THE SUSTAINABLE DEVELOPMENT CONCEPT	197
Artur KRASZKIEWICZ, Małgorzata DULA	
3.3. SELECTED PHYSICAL AND MECHANICAL PROPERTIES OF PELLETS MADE FROM THE MIXTURE OF PEAT AND BARK BEECH	203
Grzegorz MAJ	
3.4. WASTE CO-SUBSTRATES AND SEWAGE SLUDGE AS BIOMASS FOR BIOGAS PLANTS	209
Jakub MAZURKIEWICZ, Damian JANCZAK, Artur BUGAŁA	
3.5. ENERGETIC VALUE OF CORN COBS	2015
Jacek PRZYBYŁ, Dawid WOJCIESZAK	
3.6. ASSESSMENT OF THE ENERGY POTENTIAL OF THE VIRGINIA MALLOW (<i>SIDA HERMAPHRODITA</i> R.)	219
Joanna SZYSZLAK-BARGŁOWICZ, Grzegorz ZAJĄC, Andrzej KURANC, Tomasz SŁOWIK, Monika STOMA, Agnieszka DUDZIAK	
3.7. INFLUENCE QUALITY OF CORN STOVER SILAGE FOR METHANE YIELD	225
Dawid WOJCIESZAK, Jacek PRZYBYŁ	
4. PROCESSES	231
4.1. VERMICOMPOSTING OF PAPER WASTE AND CASSAVA PEELS RESIDUES: EFFECT OF DURATION AND FEEDSTOCK LOADING RATE	233
Oluyemi Johnson ADEOSUN, Olawale Usman DAIRO, Adewole Ayobami ADERINLEWO, Gbolabo Abidemi OGUNWANDE, Jadesola Mayowa OGUNYINKA, Babajide Adebowale ADEOSUN	
4.2. RESEARCH FOR IMPROVING STABILITY OF RYE WHEAT STEM RUST	241
Marcin BARAN, Anna TRATWAL, Kamila ROIK	
4.3. THE EFFECT OF THE FOAMING ADDITIVE ON THE POROUS STRUCTURE OF STARCH BASED FOAM MATERIALS	247
Maciej COMBRZYŃSKI, Agnieszka WÓJTOWICZ, Arkadiusz MATWIJCZUK, Marcin MITRUS, Magdalena SZYDŁOWSKA-TUTAJ	
4.4. INFLUENCE OF NATURAL ZEOLITE AND NPK FERTILIZERS ON HEAVY METAL UPTAKE BY RYEGRASS IN A CONTAMINATED SOIL	253
Fran GJOKA, Enkeleda SHKURTA, Marco CONTIN, Liri MIHO, Eljan KASA	
4.5. THE STUDY OF HARD WHEAT GRINDING BY USING KNIFE MILL	259
Waleed Hameed HASSOON	
4.6. COMPARISON BETWEEN CHAMBERS AND WINDROWS COMPOSTING SYSTEMS FOR MANURE TREATMENT	267
Damian JANCZAK, Jacek DACH, Jakub MAZURKIEWICZ, Dorota BUGAŁA, Patrycja POCHWATKA	
4.7. THE INFLUENCE OF METAL NANOCOLLOIDS ON SELECTED FACTORS OF THE QUALITY OF PUMPKIN LEAVES	273
Magdalena KACHEL	

4.8. THE EFFECT OF DIGESTATE FERTILIZATION ON QUALITY AND STRENGTH ON RAPESEEDS	279
Milan KOSZEL, Artur PRZYWARA, Alexandros Sotirios ANIFANTIS, Edmund LORENCOWICZ	
4.9. TEXTURE CHANGES IN PEAR CULTIVARS DURING STORAGE	285
Rafał NADULSKI, Marian PANASIEWICZ, Katarzyna WRÓBLEWSKA-BARWIŃSKA, Tomasz GUZ	
4.10. THE EFFECT OF CARROT STORAGE ON THE PROPERTIES OF CARROT-APPLE JUICE	291
Arkadiusz RATAJSKI, Ewa GOLISZ, Emilia GAIK, Malwina TRZCIŃSKA	
4.11. THE EFFECT OF ORGANIC FARMING ON CARROT JUICE PROPERTIES	297
Arkadiusz RATAJSKI, Jędrzej TRAJER, Monika JANASZEK-MANKOWSKA, Katarzyna DEMIANIUK, Izabella KOSTEWICZ	
4.12. THE IMPACT OF TWO YEARS OF PLANT PROTECTION IN THE GERANIUM WITH SPECIAL EMPHASIS ON GREENHOUSE WHITEFLY (<i>Trialeurodes vaporariorum</i>) AND THE WESTERN FLOWER THRIPS (<i>Frankliniella occidentalis</i>)	303
Viktor József VOJNICH, Adrienn SZARVAS	
4.13. STEM RUST RETURNS, OLD – NEW RYE PATHOGEN	307
Beata WIELKOPOLAN, Marcin BARAN, Magdalena JAKUBOWSKA	
4.14. APPLICATION OF HERBAL ADDITIVES TO DEVELOP NEW TYPES OF NATURAL SNACKS: PROCESSING ASPECTS	311
Agnieszka WÓJTOWICZ, Katarzyna LISIECKA, Marcin MITRUS, Tomasz ONISZCZUK, Maciej COMBRZYŃSKI, Karol KUPRYANIUK, Abdallah BOUASLA, Kamila KASPRZAK, Anna ONISZCZUK	
4.15. USE OF SELECTED CEREAL BRAN DEPENDING ON THE CONTENT OF SELECTED ELEMENTS	317
Wioletta ŻUKIEWICZ-SOBCZAK, Paweł SOBCZAK, Anna ROGÓZ-MATYSZCZAK, Daniel TOKARSKI, Klaudia WOŁYŃCZUK, Marcin WEINER	
5. MANAGEMENT AND ECONOMICS	321
5.1. PERFORMANCE OF A CHESTNUT VACUUM HARVESTER – FIRST RESULTS	323
Arlindo ALMEIDA, Ângela MONTEIRO	
5.2. EFFECTIVE BIOMASS SUPPLY MANAGEMENT AS A FACTOR OF SUSTAINABILITY OF ECOSYSTEMS	329
Waldemar BOJAR	
5.3. UNIFICATION OF TECHNOLOGICAL PARAMETERS OF GRAIN LOGISTICS IN CORPORATIONS	335
Volodymyr BULGAKOV, Valerii ADAMCHUK, Natalia SERGEEVA, Volodymyr KOLODICHUK, Vasyli DMYTRIV, Semjons IVANOV	
5.4. REPLACEMENT OF THE MACHINERY PARK IN SELECTED FARMS OF MAŁOPOLSKA REGION	341
Michał CUPIAŁ, Marcin KOBUSZEWSKI	
5.5. BELCAM - A COLLABORATIVE AND INNOVATIVE WEBPLATFORM SERVING FARMERS NEEDS	347
Yannick CURNEL, Dimitri GOFFART, Jean-Pierre GOFFART, Cindy DELLOYE, Pierre DEFOURNY, Viviane PLANÇON	
5.6. CONSUMER ATTITUDES AND BEHAVIOUR ON THE MARKET OF REGIONAL AND TRADITIONAL FOOD PRODUCTS	353
Agnieszka DUDZIAK, Monika STOMA, Grzegorz ZAJĄC, Andrzej KURANC, Tomasz SŁOWIK, Joanna SZYSZLAK-BARGŁOWICZ	
5.7. APPLICATION OF RADIO FREQUENCY IDENTIFICATION IN SUSTAINABLE AGRICULTURE	359
Sławomir JUŚCIŃSKI	
5.8. EFFICIENCY OF MATERIAL AND ENERGY EXPENDITURE AND THE DIRECTION OF FARMS PRODUCTION	365
Sławomir KOCIRA, Kamil DEPO, Agnieszka SZPARAGA, Pavol FINDURA	
5.9. SELECTED QUALITY IMPROVEMENT INSTRUMENTS USED IN THE AREA OF PRODUCTION SERVICES FOR AGRICULTURE	371
Anna KRAWCZUK, Sławomir KOCIRA, Katarzyna Kozłowicz	
5.10. PRECISION AGRICULTURE EFFECT ON FARMERS' INFORMATION NEEDS	377
Edmund LORENCOWICZ, Jacek UZIAK	
5.11. THE ROLE OF PRODUCTION GROUPS IN UPGRADING THE MACHINE PARK IN FARMS	383
Anna SZELĄG-SIKORA, Zofia GRÓDEK-SZOSTAK, Joanna STUGLIK, Marcin NIEMIEC, Sylwester TABOR, Radosław KOWALSKI	
5.12. THE INFLUENCE OF ENERGETIC AND MATERIAL INPUTS ON THE SUSTAINABILITY OF AGRICULTURAL PRODUCTION	389
Zbigniew WASĄG	
6. ENVIRONMENT AND ERGONOMICS	393
6.1. IMPACT OF AGRO-ECOLOGICAL SERVICE CROPS AND THEIR TERMINATION STRATEGIES ON SOIL MINERAL NITROGEN AVAILABILITY, SOIL HUMIDITY, WEEDS DEVELOPMENT AND CABBAGE HARVEST	395
Donatienne ARLOTTI, Hanne LAKKENBORG KRISTENSEN, Stefano CANALI, Stefaan DE NEVE, F. Xavier SANS SERRA, Gilles SAN MARTIN, Bruno HUYGHEBAERT, Didier STILMANT	
6.2. ASSESSMENT OF DIFFERENT MEANS TO REDUCE THE POTENTIAL EXPOSURE TO PESTICIDES OF RESIDENTS LIVING IN THE VICINITY OF TREATED FIELDS	401
Bruno HUYGHEBAERT, Suzanne REMY, Christophe FRIPPIAT, Mathieu VESCHKENS, Jean-Luc HERMAN, Nathalie DUCAT, Olivier PIGEON, Bruno SCHIFFERS, Ingrid RUTHY	
6.3. THE SUSCEPTIBILITY OF SUGAR BEET VARIETIES TO THE PRESENCE OF SPIDER MITES (ACARI: TETRANYCHIDAE) IN RELATIONSHIP TO ENVIRONMENTAL CONDITIONS	407
Magdalena JAKUBOWSKA, Jan BOCIANOWSKI, Beata WIELKOPOLAN, Kamila ROIK, Jolanta KOWALSKA	

6.4. HAZARDS AND PREVENTION METHODS IN JUICE PRODUCTION ON SMALL FARMS	413
Zbigniew KOBUS	
6.5. EVALUATION OF HYGIENE CONDITIONS DURING MILKING AND MILK PROCESSING AT THE FARM LEVEL	419
Jolanta KRÓL, Aneta BRODZIAK, Anna JAŃCZUK	
6.6. EXPOSURE TO DUST DURING WORK ON A SUSTAINABLE FARM	425
Bożena NOWAKOWICZ-DEBEK, Łukasz WLAZŁO, Mateusz OSSOWSKI, Anna CHMIELOWIEC-KORZENIOWSKA, Dorota CHMIELEWSKA-MUCIEK	
6.7. SPRAYER INSPECTION IN LUXEMBOURG	429
Pascal PELT	
6.8. ELECTROCUTION RISK EVALUATION INSIDE STABLES	435
Francesco SANTORO, Alexandros Sotirios ANIFANTIS, Simone PASCUZZI, Giacomo SCARASCIA MUGNOZZA	
6.9. NOISE HAZARDS DURING WORK ON A PIG FARM	441
Łukasz WLAZŁO, Bożena NOWAKOWICZ-DEBEK, Mateusz OSSOWSKI, Hanna BIS-WENCEL, Piotr MAKSYM	
6.10. EVALUATING AN ALTERNATIVE COOLING SYSTEM FOR THE TRACTOR CABIN	445
Naseer KADHIM, Jaber HASSAN, Ahmed ALI, Alaa SUBR	
KEYWORDS INDEX	451