Marginal lands for Growing Industrial Crops

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DEC	Websites, patent fillings, videos, etc.	☐			
OTHER		☐			

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Publishable executive summary

The report on the scientific publication activities of the MAGIC project deals with the dissemination of studies carried out during the lifetime of the project. All publications were closely related with the general aim of the MAGIC project to support the development of resource-efficient and economically profitable industrial crops to be grown on marginal land, so to foster the sustainable development of the EU bio-based economy and contribute to achieving EU energy and climate targets. The main target of such publications were industrial crops (oil, lignocellulosic, carbohydrate and specialty crops) which could provide feedstocks for industrial applications, thereby fostering the bio-economy (covering its increasing needs) and climate-change mitigation (low-carbon energy and production of less fossil-dependent materials) while diversifying farmers' income.

A total of 12 Book chapters, 27 scientific articles in peer reviewed journal, and 13 conference / workshop presentations were published. In general, publications were mostly focused on agronomic techniques, phytoremediation issues (including contaminated soils), water stress adaptation/performance of industrial/bioenergy crops, assessment of cropping systems and harvesting logistics, development of technological tools and alternative end-uses, decarbonization potential, and evaluation of several value chains for bio-economy. Scientific papers were also focused on the sustainability aspects of industrial/bioenergy cropping systems and related productivity chains, and the role of such crops at research, educational, economical, and environmental levels in Europe.

1 Introduction

This deliverable aims at the dissemination of studies dealing with the development of resource-efficient and economically profitable industrial crops to be grown on marginal lands, so to foster the sustainable development of the EU bio-based economy and contribute to achieving EU energy and climate targets. Industrial crops (oil, lignocellulosic, carbohydrate and specialty crops) provide feedstocks for industrial applications, thereby fostering the bio economy (covering its increasing needs) and climate-change mitigation (low carbon energy and production of less fossil-dependent materials) while diversifying farmers' income. In the MAGIC project the cultivation of selected industrial crops on marginal land was addressed in order to avoid land-use competition with food on higher value land with emphasis on the development of resource-efficient varieties that can grow on marginal land areas facing natural constraints (such as low soil productivity or extreme climatic conditions).

In the framework of Task 9.4 - Editorial and Dissemination Board, a specific aim was designed within the project activities, related to MAGIC publications, including peer reviewed scientific ones. In this task the Editorial Board was named as the responsible body for the MAGIC publications (scientific and promotional ones). The Editorial Board was led by UNIBO. UNIBO with the contribution of CRES & NOVA was responsible for the scientific articles, special issues, book chapters, open access journals, etc. that were published in the project, while CRES with the contribution of NOVA & Spanish Co-ops was responsible for the promotional materials (posters, leaflets, procures, booklets, fact sheets, newsletters, etc.). This deliverable presents the scientific publications that were produced during the project lifetime, which focused on the cultivation of new and common industrial crops under several conditions of marginality (e.g. water stress, contaminated lands, soil types and quality, etc.). Most of the publications targeted the scientific and non-scientific community so to aid in the production of resource-efficient feedstocks, with low indirect land-use change, for a growing bio-based industry, and to aid to increase farmers' incomes through access to new markets and the revalorization of marginal lands.

2 Methodology

In the framework of Task 9.4 - Editorial and Dissemination Board, the designed activities within the project related to publications, including the scientific ones lead to 12 Book chapters, 27 scientific articles in peer reviewed journal, and 13 conference / workshop presentations, as described below. Each publication (electronic copy) has been deposited in a free access repository for scientific publications so to widen its dissemination impact and accessibility.

2.1 Scientific papers

A large body of scientific papers were produced within the framework of the MAGIC project. These papers are published in scientific peer reviewed journals, and they are freely accessible, following the open access politics of the EU. The published papers focused on the agronomy of perennial and annual industrial/bioenergy crops, sustainability aspects, biotic and abiotic responses at genetic and crop performance level to environmental stresses (i.e. water stress, cold stress), cropping systems, decarbonization potential, and also to bioeconomy issues. Following there is a list with the publication grouped in function of the main targeted industrial crops in the MAGIC project.

2.1.1 Oil crops

1. 2020. Luigi Pari, Alessandro Suardi, Walter Stefanoni, Francesco Latterini and Nadia Palmieri. Environmental and Economic Assessment of Castor Oil Supply Chain: A Case Study. https://zenodo.org/record/5060286#.Ycmrti9XaRs
   - Using a case study approach, the environmental impact assessment and economic feasibility of the production of castor oil from two different castor hybrids comparing four by-products management scenarios and two harvesting systems (manual vs. mechanical) is presented.
2. 2020. Luigi Pari, Francesco Latterini and Walter Stefanoni. Herbaceous Oil Crops, a Review on Mechanical Harvesting State of the Art. https://zenodo.org/record/5060371#.Ycmr8S9XaRs.
   - A comprehensive overview on the state of the art of mechanical harvesting in seven herbaceous oil crops, namely: sunflower (Heliantus annuus L.), canola (Brassica napus L.), cardoon (Cynara cardunculus L.), camelina (Camelina sativa (L.) Crantz), safflower (Carthamus tinctorius L.), crambe (Crambe abyssinica R. E. Fr.), and castor bean (Ricinus communis L.) is presented.
3. 2020. Eleni G. Papazoglou, Efthymia Alexopoulou, George K. Papadopoulos, Garifalia Economou-Antonaka. Tolerance to drought and water stress resistance mechanism of castor bean. https://zenodo.org/record/4269600#.YcmsJi9XaRs
   - Castor bean tolerance to drought and its possession of a water stress resistance mechanism by applying three different water regimes in a glasshouse pot experiment conducted for two years was evaluated.
4. 2020. Latterini Francesco; Stefanoni Walter; Sebastiano Simone; Baldi Gian M.; Pari Luigi. Evaluating the Suitability of a Combine Harvester Equipped with the Sunflower

Header to Harvest Cardoon Seeds: A Case Study in Central Italy. https://zenodo.org/record/5052866#.YcmtGi9Xbq0

- The study presents data supporting the idea that cardoon seeds can be harvested using a conventional combine harvester equipped with the sunflower header.

5. 2021. Federica Zanetti, Barbara Alberghini, Ana Marjanović Jeromela, Nada Grahovac, Dragana Rajković, Biljana Kiprovski, Andrea Monti. Camelina, an ancient oilseed crop actively contributing to the rural renaissance in Europe. A review. https://zenodo.org/record/5785259#.YcmtrC9Xbq0

   A comprehensive and critical review of research carried out in Europe (compared with the rest of the world) on camelina in the last three decades, including genetics and breeding, agronomy and cropping systems, and end-uses, with the aim of making camelina an attractive new candidate crop for European farming systems is presented.

6. 2022. Przemysław Baraniecki, Francesco Latterini, Walter Stefanoni, Jakub Frankowski, Katarzyna Wielgusz, and Luigi Pari. Assessment of the Working Performance of an Innovative Prototype to Harvest Hemp Seed in Two Different Conditions of Terrain Slope. https://www.mdpi.com/2073-4395/12/1/185
   - The test on new prototype equipment for harvesting hemp seeds have been tested in Poland.
7. 2022. Latterini Francesco, Walter Stefanoni, Chris Cavalaris, Christos Karamoutis, Luigi Pari, Efthymia Alexopoulou. Effectiveness of Three Terminating Products on Reducing the Residual Moisture in Dwarf Castor Plants: A Preliminary Study of Direct Mechanical Harvesting in Central Greece. https://www.mdpi.com/2073-4395/12/1/146
   - The test of different chemical termination products has been carried out in marginal soil in Greece to allow castor to dry down easily for a good harvesting.

2.1.2 Lignocellulosic crops

1. 2019. Angelo Sicilia, Giorgio Testa, Danilo Fabrizio Santoro, Salvatore Luciano Cosentino & Angela Roberta Lo Piero. RNASeq analysis of giant cane reveals the leaf transcriptome dynamics under long-term salt stress. https://zenodo.org/record/5669620#.Ycmo-y9XaRs
   - To compensate for the lack of information about the molecular mechanism involved in *Arundo donax* L. response to salt stress, de novo sequence was carried out, assembled and analyzed of A. donax leaves subjected to two levels of long-term salt stress (namely, S3 severe and S4 extreme).
2. 2019. Luigi Pari, Antonio Scarfone, Vincenzo Alfano, Simone Bergonzoli, Alessandro Suardi, Sandu Lazar, Renzo Gobbo, Stefano Vecchi, Alessandro Zatta. Harvesting of fiber hemp: experience in Emilia Romagna with Billeter prototype. http://www.gruppo-panacea.it/home/en/special-magazines/file/42-ricerca-e-. https://zenodo.org/record/4030422#.X5AioS1XbOQ
3. 2019. Moritz von Cossel, Yasir Iqbal, Iris Lewandowski. Improving the Ecological Performance of Miscanthus (Miscanthus × giganteus Greef et Deuter) through

Intercropping with Woad (Isatis tinctoria L.) and Yellow Melilot (Melilotus officinalis L.). https://zenodo.org/record/4032322#.X5AnBS1XbOQ

- This study discusses whether miscanthus could be intercropped with flower-rich biennial wild plants to further enhance its ecological functioning.

4. 2020. Francesco Pancaldi, Luisa M. Trindade. Marginal Lands to Grow Novel Bio-based Crops: a Plant Breeding Perspective. https://zenodo.org/record/3750986#.X5Aq8i1XbOQ
   - A review of the advantages of cultivating novel perennial biomass crops on marginal lands is presented together with the preeminent breeding targets to improve the yield and quality of the biomass obtainable from these crops, as well as the stability of biomass production under marginal lands conditions. Then the available tools to breed novel perennial biomass crops are discussed.
5. 2020. Efthymia Alexopoulou , Federica Zanetti , Eleni G. Papazoglou, Konstantinos Iordanoglou and Andrea Monti. Long-Term Productivity of Thirteen Lowland and Upland Switchgrass Ecotypes in the Mediterranean Region. https://zenodo.org/record/4030935#.X5Ar0S1XbOQ
   - The study identify the most suitable ecotype within each environment and, possibly, the best performing variety.
6. 2020. C.S. Ciria; R. Barro; M. Sanz; P. Ciria. Long-Term Yield and Quality Performance of Perennial Energy Grasses (Agropyron spp.) on Marginal Land. https://zenodo.org/record/4032399#.X5A65S1XbOR
   - The aim of this study was to assess the performance of three cool-season grasses (Agropyron spp.) from an agronomic and energetic point of view by comparing the dry matter (DM) yields, rain use eciency, chemical composition, and biomass quality over an eight-year period in Spain under marginal rainfed conditions.
7. 2020. Danilio Scordia; Calcagno, S.; Piccitto, A.; Cristina Patanè. The Impact of Soil Water Content on Yield, Composition, Energy, and Water Indicators of the Bioenergy Grass Saccharum spontaneum ssp. aegyptiacum under Three-Growing Seasons. https://zenodo.org/record/4032379#.X5BBQy1XbOR
   - soil water content effects on a long-term plantation of Saccharum (Saccharum spontaneumssp.aegyptiacum), in a Mediterranean area was investigated.
8. 2021. Moritz von Cossel, Lorena Agra Pereira, Iris Lewandowski. Deciphering substrate-specific methane yields of perennial herbaceous wild plant species. https://zenodo.org/record/4749255#.Ycmtci9Xbq0
   - This study investigated the potential substrate-specific methane yield of relevant perennial wild plant species and compare them with relevant annual and perennial alternative biogas co-substrates.
9. 2020. Moritz von Cossel, Heike Ludwig, Jedrzej Cichocki, Sofia Fesani, Ronja Guenther, Magnus Thormaehlen, Jule Angenendt, Isabell Braunstein,Marie-Luise Buck,Maria Kunle, Magnus Bihlmeier, David Cutura, AnnSophie Bernhard, Felicitas Ow-Wachendorf, Federico Erpenbach, SimoneMelder,Meike Boob, BastianWinkler. Adapting syntropic permaculture for renaturation of a former quarry area in the temperate zone. https://zenodo.org/record/4746284#.YcmykS9Xbq0

- The aim of this study is to share, communicate and may subsequently discuss the concept of developing a syntropic agroforestry approach for restoring a stone quarry in temperate zones based on a preliminary field study conducted in Southwest Germany with the wider scientific community

10. 2020. Bastian Winkler, Anja Mangold, Moritz von Cossel, John Clifton-Brown, Marta Pogrzeba, Iris Lewandowski, Yasir Iqbal, Andreas Kiesel. Implementing miscanthus into farming systems: A review of agronomic practices, capital and labour demand. https://zenodo.org/record/4749029#.Ycmyti9Xbq0
    - This study reviews current best practices and suitable land areas for miscanthus cultivation. Biomass production costs and labour requirements are evaluated over the whole 20- year cultivation cycle of four utilisation pathways: combustion, animal bedding, and both conventional and organic biogas production. The assessment was performed for two field sizes (1 and 10 ha), two average annual yield levels (15 and 25 t dry matter ha-1), and both green and brown harvest regimes.
11. 2020. Moritz von Cossel, Bastian Winkler, Anja Mangold, Jan Lask, Moritz Wagner, Iris Lewandowski, Berien Elbersen, Michiel van Eupen, Stephan Mantel, Andreas Kiesel. Bridging the gap between biofuels and biodiversity through monetizing environmental services of miscanthus cultivation. https://zenodo.org/record/4749161#.YcmzRi9Xbq0
    - This study provides a value-chain approach to the decarbonization of the transport sector in Europe by making Miscanthus cultivation more attractive for use as a biofuel feed-stock and at the same time enhancing ecosystem functions.
12. 2021. Jana Reinhardt, Pia Hilgert, Moritz von Cossel. Biomass yield of selected herbaceous and woody industrial crops across marginal agricultural sites with shallow soil. https://zenodo.org/record/5783249#.YcmzsC9Xbq0
    - The yield performance of industrial crops at low root depth conditions is reviewed. Twelve relevant industrial crops were identified for Europe

2.1.3 Carbohydrate crops

1. 2019. Moritz von Cossel, Anja Mangold, Yasir Iqbal, Jens Hartung, Iris Lewandowski, Andreas Kiesel. How to Generate Yield in the First Year—A Three-Year Experiment on Miscanthus (Miscanthus x giganteus (Greef et Deuter)) Establishment under Maize (Zea mays L.). https://zenodo.org/record/3553599#.X5AjAS1XbOQ
    - Miscanthus and maize were intercropped to produce feedstock for biogas production under the hypothesis that the establishment of miscanthus under maize would lead to higher accumulated biomass yields over a three-year cultivation period than for the miscanthus mono-cultivation reference.
2. 2019. Moritz von Cossel, Anja Mangold, Yasir Iqbal and Iris Lewandowski. Methane Yield Potential of Miscanthus (Miscanthus × giganteus (Greef et Deuter)) Established under Maize (Zea mays L.). https://zenodo.org/record/4032304#.X5AmdC1XbOQ
    - This study reports on the effects of two rhizome-based establishment procedures ‘miscanthus under maize’ and ‘reference’ on the methane yield per hectare of miscanthus in a field trial in southwest Germany.

3. 2019. Carlos S. Ciria, Marina Sanz, Juan Carrasco and Pilar Ciria. Identification of arable marginal lands under rainfed conditions for bioenergy purpose in Spain. Sustainability 11, 1833; https://doi.org/10.3390/su11071833 https://zenodo.org/record/4030453#.X5AjUC1XbOQ
    - The specific purposes of the study were the identification and map marginal rainfed arable lands in Spain, based on the profitability of the principal winter cereals cultivated, and determine the existing biophysical constraints. Additionally, other lands with similar biophysical constraints of marginality are also identified.

2.1.4 Miscellaneous Crops

1. 2019. Moritz von Cossel, Moritz Wagner, Jan Lask, Elena Magenau, Andrea Bauerle, Viktoria von Cossel, Kirsten Warrach-Sagi, Berien Elbersen, Igor Staritsky, Michiel van Eupen, Yasir Iqbal, Nicolai D. Jablonowski, Stefan Happe, Ana L. Fernando, Danilo Scordia, Salvatore L. Cosentino, Volker Wulfmeyer, Iris Lewandowski, Bastian Winkler. Prospects of Bioenergy Cropping Systems for A More Social-Ecologically Sound Bioeconomy. https://zenodo.org/record/3629525#.X5An7i1XbOQ
    - This study investigates how bioenergy cropping systems can become more social-ecologically sustainable in future.
2. 2019. Moritz Von Cossel, Iris Lewandowski , Berien Elbersen, Igor Staritsky, Michiel Van Eupen, Yasir Iqbal, Stefan Mantel, Danilo Scordia, Giorgio Testa, Salvatore Luciano Cosentino, Oksana Maliarenko, Ioannis Eleftheriadis, Federica Zanetti, Andrea Monti, Dagnija Lazdina, Santa Neimane, Isabelle Lamy, Lisa Ciadamidaro, Marina Sanz, Juan Esteban Carrasco, Pilar Ciria, Ian McCallum, Luisa M. Trindade, Eibertus N. Van Loo, Wolter Elbersen, Ana Luisa Fernando, Eleni G. Papazoglou and Efthymia Alexopoulou. Marginal Agricultural Land Low-Input Systems for Biomass Production. https://zenodo.org/record/3372093#.X5Alfi1XbOQ
    - This study deals with approaches for a social-ecological friendly European bioeconomy based on biomass from industrial crops cultivated on marginal agricultural land. The selected crop to be investigated are: Biomass sorghum, camelina, cardoon, castor, crambe, Ethiopian mustard, giant reed, hemp, lupin, miscanthus, pennycress, poplar, reed canary grass, saower, Siberian elm, switchgrass, tall wheatgrass, wild sugarcane, and willow. The research question focused on the overall crop growth suitability under low-input management.
3. 2021. Pablo Fernández. El proyecto MAGIC proporciona herramientas para la identificación de los cultivos industriales más adecuados en condiciones de marginalidad. https://zenodo.org/record/5785462#.YcmyBS9Xbq0
4. 2021. Jana Reinhardt, Pia Hilgert, Moritz von Cossel. Yield performance of dedicated industrial crops on low-temperature characterized marginal agricultural land in Europe – a review. https://zenodo.org/record/5783461#.Ycmy6i9Xbq0
    - This study compiles the available data and discusses them in the context of remaining uncertainties. Overall, 12 industrial crops were identified as relevant for Europe: giant reed (Arundo donax L.), camelina (Camelina sativa L. Crantz), cardoon (Cynara cardunculus L.), crambe (Crambe abyssinica Hochst ex R.E.Fr.), cup plant (Silphium perfoliatum L.), hemp (Cannabis sativa L.), miscanthus

(Miscanthus spp.), poplar (PopulusL.), reed canary grass (Phalaris arundinacea L.), sorghum (Sorghum bicolor L. Moench), switchgrass (Panicum virgatum L.), and willow (Salix L.).

5. 2021. Jana Reinhardt, Pia Hilgert, Moritz von Cossel. A review of industrial crop yield performances on unfavorable soil types. https://zenodo.org/record/5783305#.Ycmzfy9Xbq0
    - This review compiles results from 91 published crop-specific field trial datasets spanning 12 relevant industrial crops and discusses their suitability for cultivation on unfavorable soil types.

2.2 Book chapters

The Book chapters dealt with industrial crops (i.e. perennial crops/grasses, woody species) under agroforestry and short rotation forestry systems in abandoned/marginal lands. The studies address mostly phytoremediation issues; waters stress adaptation/performances; harvesting logistics; development of technological tools and alternative end uses. The following is a list of the book chapters' publications with MAGIC partners acting as main authors and co-authors. The following is a list with the publication grouped in function of the main targeted industrial crops in the MAGIC project.

2.2.1 Lignocellulosic crops

A set of book chapters were produced within the Magic project related to dedicated perennial lignocellulosic crops (grass and woody species).

1. 2017 Andis Lazdiņš, Dagnija Lazdiņa. Plantaciju mežu augšanas gaita, produktivitāte un ietekme uz vidi" Plantation forest - productivity and impact on environment. Mudrite Daugaviete, baiba Bambe, https://zenodo.org/record/2636498#.Ycm4NS9Xbq0
    - The book summarizes the research data, amassed over a period of 20 years, on cultivating forest crops in abandoned farmlands. Clarified is the course of growth and productivity of different tree species in the local climatic conditions in a variety of agricultural soils. The research results will help the farmer choose the most appropriate tree species for short-rotation or special end-use monoculture or mixed plantations.
2. 2017 Fernando AL. Combining Harvest Date and Cutting Height to Optimize the Sustainability of Miscanthus Production for Energy in the Mediterranean Region. https://zenodo.org/record/2586655#.YcnQ_C9XaRs
    - The influence of harvest date and cutting height on the yields and biomass quality of Miscanthus for energy purposes is discussed.
3. 2018 Fernando AL, Barbosa B, Boléo S, Duarte MP, Sidella S, Costa J, Cosentino SL. Phytoremediation Potential of Heavy Metal Contaminated Soils by the Perennial Energy Crops Miscanthus Spp. and Arundo Donax L. under Low Irrigation. https://zenodo.org/record/2586679#.YcmnRi9XaRs
    - The potentiality of two perennial grasses Miscanthus spp. and Arundo donax. in heavy metal contaminated soils as a means to avoid land completion is evaluated.

4. 2018 Gomes L, Fernando AL, Santos F. A toolbox to tackle the technological and environmental constraints associated with the use of biomass for energy from marginal land. https://zenodo.org/record/2586807#.Ycmncy9XaRs
    - The environmental and technological obstacles and challenges associated with the exploitation of biomass obtained from marginal land through thermochemical processes was explored. The ultimate goal was to provide an informative guide, based on a decision tree, to help the sector on pathways to follow.
5. 2018 Pires JRA, Souza VGL, Fernando AL. Production of nanocellulose from lignocellulosic biomass wastes: Prospects and Limitations. https://link.springer.com/chapter/10.1007/978-3-319-91334-6_98
    - A recent view on emerging nanomaterial, focusing on lignocellulosic biomass wastes extraction procedures, and its application in new technological developments is given. The challenges and future opportunities of bionanocomposites reinforced with NC is discussed, as well as the remaining obstacles to its valorization and use.
6. 2018 Costa J, Barbosa B, Fernando AL. Environmental and socio-economic impact assessment of the production of perennial crops when irrigated with treated wastewaters. https://zenodo.org/record/2586781#.Ycmn-S9XaRs
    - The environmental and socio-economic impact of *Arundo donax* and Miscanthus x giganteu production was evaluated when irrigated with wastewaters, in order to integrate them into a sustainable agriculture development in the Mediterranean region.
7. 2018 Barbosa B, Fernando AL. Aided Phytostabilization of Mine Waste.
    - Aided phytostabilization is being proposed as a suitable strategy to decrease environmental risks by integrating application of adequate amendments with revegetation.
8. 2018 Barbosa B, Costa J, Fernando AL. Production of Energy Crops in Heavy Metals Contaminated Land: Opportunities and Risks. https://link.springer.com/chapter/10.1007/978-3-319-74536-7_5
    - Aspects related to the sustainability to produce energy crops in contaminated land are analyses.
9. 2019 Nudrute Daugaviete, Dagnija Lazdina, Baiba Bambe, Andis Lazdins, Kristaps Makovskis and Uldis Daugavietis. Plantation forests- guarantee of sustainable management of abandoned and marginal farmlands. https://zenodo.org/record/4030825#.X5Akfi1XbOQ
    - The chapter summarises the research data on cultivating forest crops in abandoned and marginal farmlands (AL). The course of growth and productivity of different tree species in the local climatic conditions is clarified in a variety of agricultural soils.
10. 2019 Šēnhofa; S.; Lazdiņa; D.; Jansons; A. PAPEĻU (POPULUS SPP.)STADĪJUMU IERĪKOŠANA UN APSAIMNIEKOŠANA. https://zenodo.org/record/3567767#.X5A2ri1XbOR
    - It summarize the results obtained in the second decade of 21st century in Latvia and provides practical recommendations for establishment of poplar plantations.

Specifics of establishment and management of poplar plantations, quality and potential productivity of the reproductive material, as well as the main environmental interactions are presented

11. 2019 Lewandowski I., Von Cossel M. Plants suitable for biomass production in a sustainable bioeconomy.. https://zenodo.org/record/5806083#.YcmrAy9XaRs
    - This contribution focuses on the production of biomass from crops cultivated as energy crops and on ecosystem services that go beyond the production function.
12. 2022 H. Keller, H. Fehrenbach, N. Rettenmaier, M. Hemmen. Extending LCA Methodology for Assessing Liquid Biofuels by Phosphate Resource Depletion and Attributional Land Use/Land Use Change. https://zenodo.org/record/5806126#.YcmvSy9Xbq0
    - It focus on the aspects land use/land use change (LUC) and phosphate resources. Limitations of current state-of-the-art LCA methods are discussed, and two new methods are proposed as solutions: (1) attributional land use and land use (aLU-LUC) change as new alternative to dLUC/iLUC and (2) phosphate rock demand as new stand-alone resource indicator

2.3 Scientific proceedings

A set of scientific conference/workshop presentations related to the development of resource-efficient and economically profitable industrial crops to be grown on marginal lands were produced within the framework of the MAGIC project. The contents of such presentations are freely accessible on the corresponding repository, following the open access politics of the EU. Following there is a list with the publication grouped in function of the main targeted industrial crops in the MAGIC project.

2.3.1 Oil crops

1. 2018. Cristina Patanè, Silvio Calcagno, Giancarlo Patanè, Andrea Corinzia, Laura Siracusa, Luana Pulvirenti, Salvatore L. Cosentino. Natural Colorants From Safflower Florets In Response To Sowing Time And Plant Density. https://zenodo.org/record/2629588#.YcnVJC9XZmA
2. 2018. Federica Zanetti, Terry A. Isbell, Efthymia Alexopoulou, Roque Evangelista, Russ W. Gesch, Bryan Moser, Andrea Monti. Pennycress (thlaspi arvense) a new non-food crop for oil-based biofuel production in Europe and USA. https://zenodo.org/record/5806055#.YcnUDC9XaRs
3. 2018. Federica Zanetti, Terry Isbell, Russ W. Gesch, Roque Evangelista, Angela Vecchi, Andrea Monti. Effect of seeding rate on pennycress agronomic performances across contrasting environments. https://zenodo.org/record/2595078#.YcnSMC9XaRs
4. 2019. Federica Zanetti, Angela Vecchi, Efthymia Alexopoulou, Arianna Borghesi, Barbara Alberghini, Terry Isbelc, Myrsini Christou, Andrea Monti. How much is sole-cropping system sustainable for camelina and crambe? https://zenodo.org/record/4030893#.X5Alvy1XbOQ

5. 2021. Walter Stefanoni, Alessandro Suardi, Nadia Palmieri, Simone Bergonzoli, Vincenzo Alfano, Sandu Lazar, Luigi Pari. Castor bean cultivation in romania: a case of study. https://doi.org/10.5281/zenodo.5710682
6. 2021. Stefanoni W., Bergonzoli S., Latterini F., Alfano V., Suardi A., Palmieri N., Lazar S., Pari R. Camelina seeds harvesting: evaluation of work performance of a combine harvester in two experimental fields in Italy and Spain. https://doi.org/10.5281/zenodo.5710718

2.3.2 Lignocellulosic crops

7. 2018. Danilo Scordia, Giorgio Testa, Venera Copani, Silvio Calcagno, Andrea Corinzia, Giovanni Scalici, Giancarlo Patanè, Sebastiano Scandurra, Cristina Patanè, Salvatore L. Cosentino. Nitrogen Use Efficiency Of Long-Term Plantations Of Arundo donax And Miscanthus x giganteus. https://zenodo.org/badge/DOI/10.5281/zenodo.2586835.svg
8. 2018. Giorgio Testa, Alessandra Piccitto, Danilo Scordia, Sebastiano Andrea Corinzia, Silvio Calcagno, Salvatore Luciano Cosentino. Evaluation Of The Methanogenic Potential Of Two Lignocellulosic Crops. https://zenodo.org/record/2586932#.YcnWGC9XZmA
9. 2020. Luigi Pari, Vincenzo Alfano, Giammaria Magagnini, Gianpaolo Grassi. Seed Losses Evaluation During Hemp Harvesting With A Modified Combine Header. https://doi.org/10.5281/zenodo.5710666
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3 Conclusions

The MAGIC project aimed at ensuring that the publications were easily accessible, readable and downloadable by the wide scientific and non-scientific audience in order to maximize its contribution to the development of resource-efficient and economically profitable industrial

crops on marginal land, and to foster the sustainable development of the EU bio-based economy in Europe.

This document presents the scientific publications that were produced during the project lifetime (12 Book chapters, 27 scientific peer-reviewed articles, and 13 conference / workshop presentations). These publications were focused on agronomy, phytoremediation, waters stress adaptation/performance, harvesting logistics in marginal land, development of technological tools, alternative end uses of feedstocks, decarbonization potential and evaluation of several value chains for bio-economy. A set of several scientific papers were also focused on the sustainability aspects of selected industrial bio-based/biorefinery value chains, and their role at research, educational, economical, and environmental levels in Europe. In addition to the aforementioned publications, other papers and dissemination activities will take body after the end of the MAGIC project to support the exploitation of results.