



MAGIC
Marginal lands for Growing Industrial Crops

D2.5 – Final MAGIC Maps

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Type

R Document, report

DEM Demonstrator, pilot, prototype

DEC Websites, patent fillings, videos, etc.

OTHER

Dissemination Level

PU Public

CO Confidential, only for members of the consortium (including the Commission Services)



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1 Publishable executive summary

MAGIC Deliverable D2.5 – The third and last version of the MAGIC-Maps tool aims to provide users interactive access to the mapped marginal land information at the highest possible spatial resolution. The MAGIC-Maps provides to the user of this tool understanding of the and the different layers of information making up the marginal lands at the spatial resolution of LAU1 and 2 regions (=municipality or parish level). What is new in this last version as compared to the former version is the spatial detail at which the marginal land data area is displayed, the inclusion of Ukraine, the inclusion of characteristics of the marginal lands in terms of likelihood for abandonment, crop suitability, crop yield reduction levels influenced by marginal conditions.

The MAGIC-Maps (together with the MAGIC-Crops and the DSS) is accessible via <http://magic-h2020.eu/>.

2 Introduction

The MAGIC-MAPS has been developed to address the information needs of the MAGIC stakeholders (i.e. industry and farmers). The MAGIC-MAPS accesses the spatially explicit database of marginal lands (Task 2.4) which also includes information on crop climate suitability and crop yield reduction factors (generated in WP1) .

With the final version of the MAGIC-MAPS, users can explore marginal land at the LAU-2 level, along with potential associated crops taking account of areas delineated by specific bio-physical characteristics typical for marginal lands. A user needs assessment (for farmers and industry) was the first step in the tool set-up determining its design. The final versions of the MAGIC-MAPS, MAGIC-CROPS and MAGIC-DSS are now available on the MAGIC website (Figure 1), along with the Bio2Match Tool.

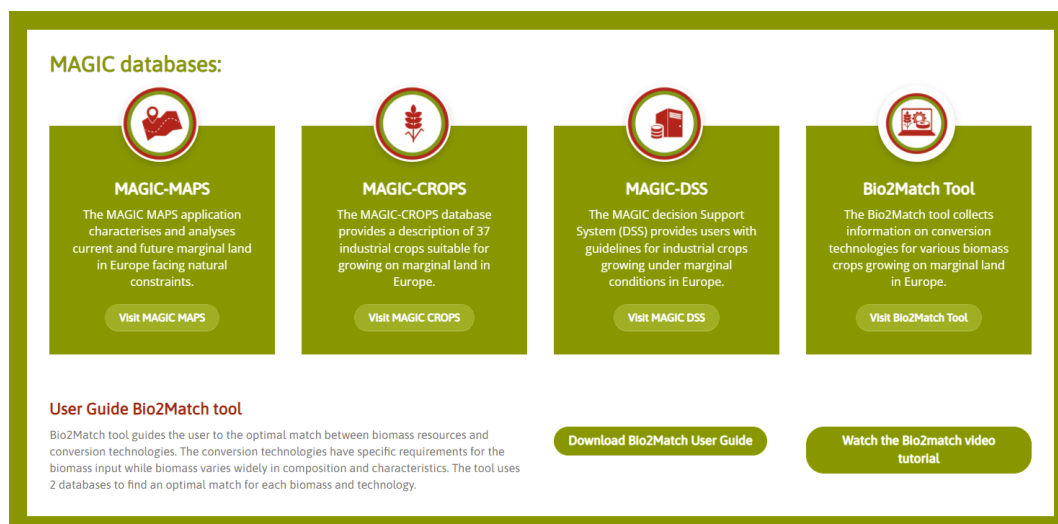


Figure 1: Magic Maps, Crops and DSS on the MAGIC website (along with the Bio2Match Tool).

3 Methods

The MAGIC DSS brings together a variety of maps and databases being developed across the MAGIC Project (Figure 2). This includes the MAGIC-MAPS and MAGIC-CROPS. Furthermore, a variety of additional datasets were ingested or queried within MAGIC and contribute to the final DSS. The following schematic diagram outlines the connection of the various spatial datasets within MAGIC, ultimately feeding into the MAGIC-DSS.

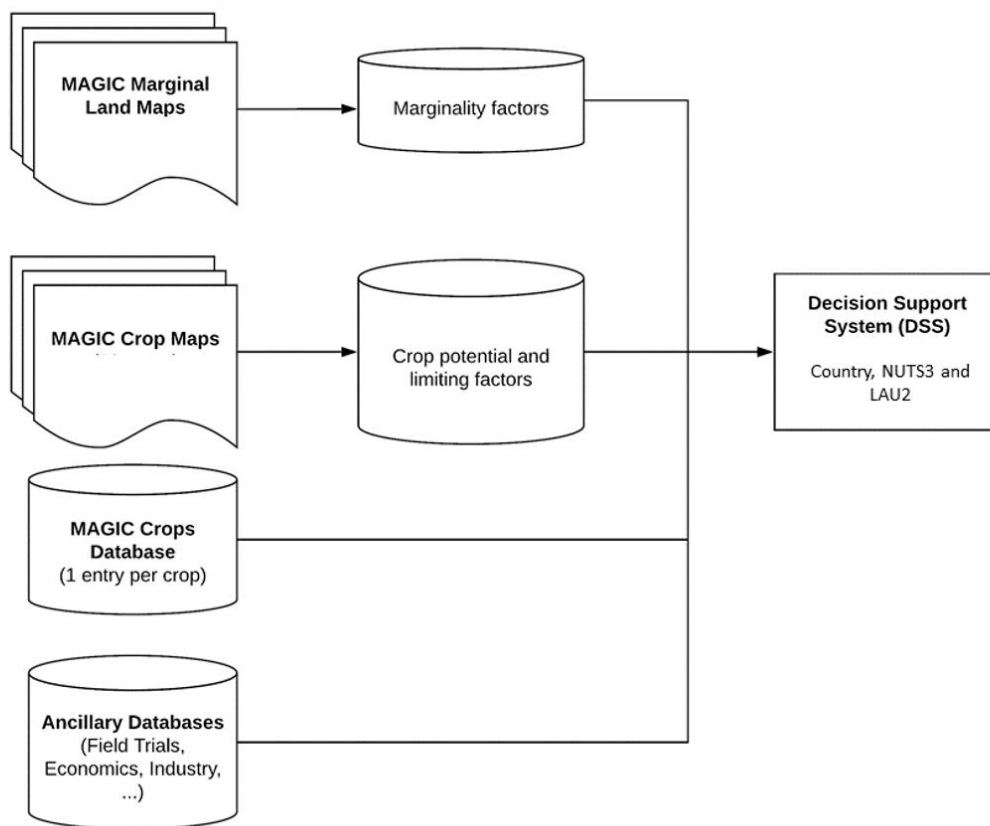


Figure 2 The design of the MAGIC-DSS and related data.

4 Results

4.1 MAGIC Maps

The purpose of MAGIC-MAPS is to characterize and analyse projections for current and future marginal lands in Europe facing natural constraints. The elements that were considered in building the classification include biophysical limitations clustered in six main groups. In addition, the resulting marginal land map was further classified according to, land use management, socio-economic limitations, ecosystem services and drivers and pressures influencing the ecosystem functions present. As a result, in total 29% of the agricultural land (i.e. land classified as agricultural by Corine Land Cover since 1992) in the European Union are classified as marginal. The most common limitations are rooting limitations, over 12% of the agricultural area. This is followed by adverse climate and excessive soil moisture occurring in respectively 11% and 8% of the agricultural land.

Further assessments are now made to identify more precisely the current status of land management and abandonment in these marginal lands. This is important information to have as it provides a better understanding of the opportunities to use these marginal lands for industrial crops without competing with food production on these lands. MAGIC-MAPS provide the basic marginal land mapping by marginal land type. The data has now been updated in terms of spatial resolution, going from the previous NUTS-3 level to the Local Administrative Units (LAU-2) level.

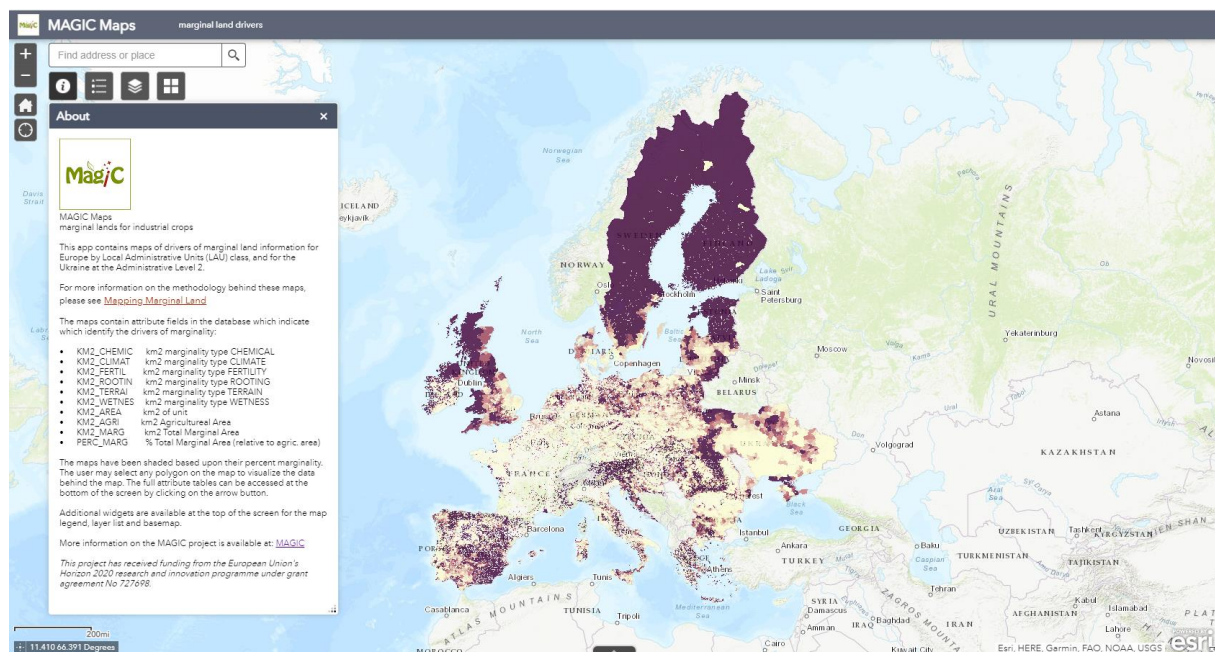


Figure 3 The MAGIC-MAPS platform.



Figure 4 The MAGIC-MAPS platform, showing attribute information for one selected LAU II region in Spain on type of marginal conditions present and area share.

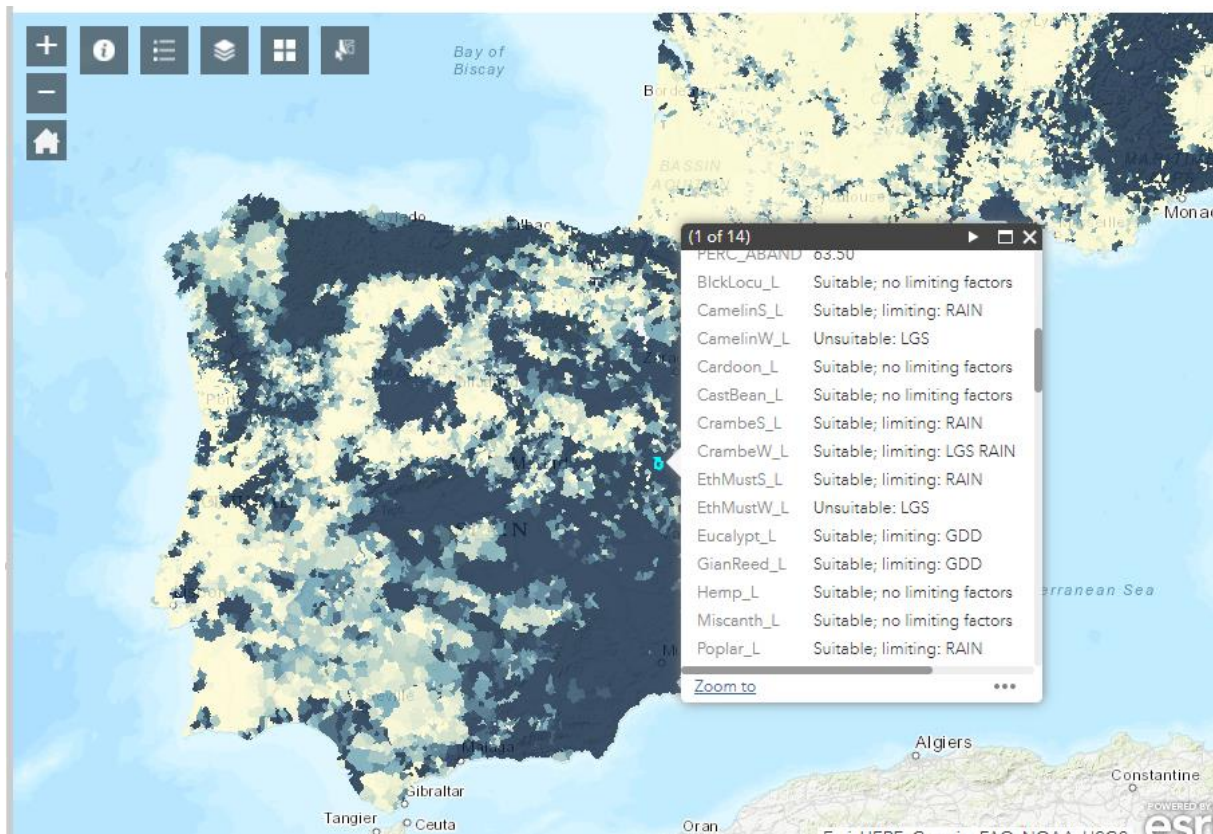


Figure 5 The MAGIC-MAPS platform, showing attribute information for one selected LAU II region in Spain on type of crops suitable (or not suitable) to be grown in the location.

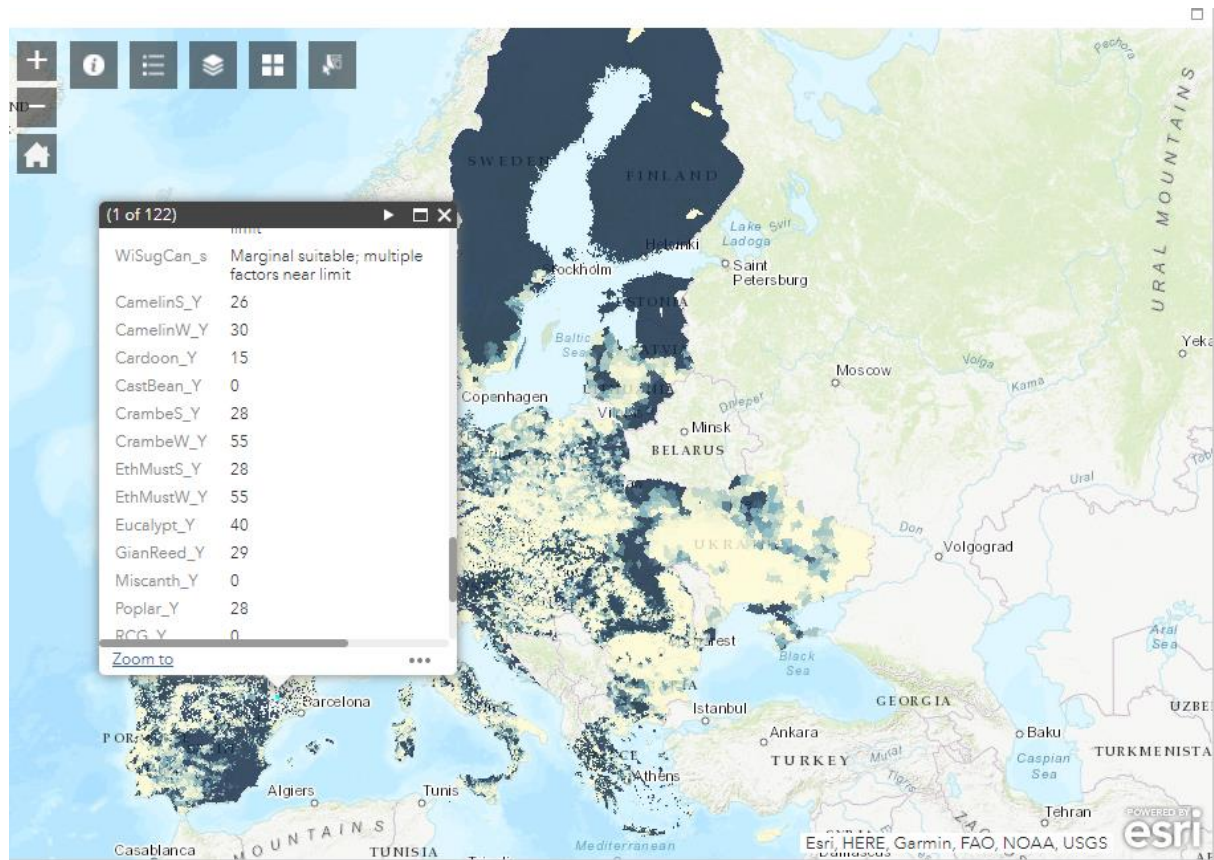


Figure 6 The MAGIC-MAPS platform, showing attribute information for one selected LAU II region on level of yield reduction effect per crops caused by marginal conditions present in selected location.

When the user enters the MAGIC-MAPS he obtains the following explanations:

This app contains maps of drivers of marginal land information for Europe by Local Administrative Units (LAU) class, and for the Ukraine at the Administrative Level 2. In addition, the climate variables used to create the marginality factors are provided, along with future scenario outputs on marginal land from the GLOBIOM model. For more information on the methodology behind these maps, please download Mapping Marginal Land D2.6.

The maps contain attribute fields in the database which indicate which identify the drivers of marginality:

- KM2_CHEMIC km2 marginality type adverse CHEMICAL conditions
- KM2_CLIMAT km2 marginality type adverse CLIMATE conditions (dryness & low temp)
- KM2_FERTIL km2 marginality type low soil FERTILITY
- KM2_ROOTIN km2 marginality type poor ROOTING conditions
- KM2_TERRAI km2 marginality type adverse TERRAIN conditions
- KM2_WETNES km2 marginality type excessive WETNESS
- KM2_AREA Total surface in km2 of spatial unit
- KM2_AGRI Total surface km2 of Agricultural Area in spatial unit

- KM2_MARG Total surface km2 of Marginal Area for total 6 clustered limitations
- PERC_MARG % Total Marginal Area (relative to Agricultural area)
- PERC_ABAND The % of marginal land having a high likelihood for becoming abandoned

Per LAU there is also attribute information on crop climate suitability. Suitability is indicated per crop in 2 ways:

1) CamelinS_L: Indicates suitability and unsuitability together with the factors that are limiting for that crop in that location. These factors can be:

- a. RAIN: too little precipitation for the crop – too dry
- b. LGS: too short growing season for the crop
- c. GDD: Too short Growing degree days according to the temperature sum the crop requires (so this temperature varies per crop)

2) CamelinS_s: indicating the suitability class the crop has in this LAU which can be:

- a. Suitable
- b. Suitable, one factor near limit
- c. Not suitable, one limiting factor
- d. Not suitable, multiple limiting factors

3) The following short names are used:

- BlckLocu Black locust
- CamelinS_L Camelina – summer annual
- CamelinW_L Camelina – winter annual
- Cardoon_L Cardoon
- CastBean_L Castor bean
- CrambeS_L Crambe – summer annual
- CrambeW_L Crambe -winter annual
- EthMustS_L Ethiopian mustard – summer annuals
- EthMustW_L Ethiopian mustard – winter annual
- Eucalypt_L Eucalyptus
- GiantReed_L Giant reed
- Hemp_L Industrial hemp
- Miscanth_L Miscanthus
- Poplar_L Poplar
- RCG_L Reed canary grass
- SiberElm_L Siberian elm
- SorgBiom_L Biomass Sorghum
- SunnHemp_L Sunn hemp
- SwiGrasL_L Switchgrass – lowland varieties
- SwiGrasU_L Switchgrass – upland varieties
- TaWhGras_L Tall wheat grass
- Willow_L Willow
- WiSugCan_L Wild sugarcane

The maps have been shaded based upon their percent marginality in relation to agricultural area. This agricultural area includes all land that was classified in an agricultural land cover class in at least one of the four Corine Land Cover versions (1990, 2000, 2006, 2012). The user may select any polygon on the map to visualize the data behind the map. The full attribute tables can be accessed at the bottom of the screen by clicking on the arrow button.

Additional widgets are available at the top of the screen for the map legend, layer list and basemap.

4.2 Update and Testing

The MAGIC-MAPS and related data has been online for over one year and has been widely shared and advertised via MAGIC's partners and stakeholders. In addition, the Project has generated press releases and advertised the results online via a variety of channels including via conferences, webinars and online newsgroups. Based on this variety of feedback, a number of suggestions were received for improvements to the various online portals. These include but are not limited to: adding download capabilities for all datasets (including spatial data), high-quality photos to accompany the various marginal crops, improved meta-data to accompany the MAGIC Crops database online, yield information to accompany both the MAGIC Crops data and the spatial maps and more.