



MAGIC
Marginal lands for Growing Industrial Crops

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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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Demo days

In MAGIC a number of demo days had been organised for selected industrial crops growing on marginal lands in order to: a) to improve the harvesting for some industrial crops by proposing and applying innovative solutions and b) to show the relevant stakeholders the innovative harvesting approaches.

The demo days had been initially scheduled to involve as many as many stakeholders as possible by including including farmers, technicians, and academics. Due to the Covid-19 pandemic situations, the involvement of people has been subjected to the local and international regulations that prevented crowded events. Below listed the organised demo days:

- ➔ October 2019, Romania, organised by CREA in collaboration with ECORICINUS and the targeted crop was castor bean
- ➔ June 2020, Spain, organised by CREA in collaboration with CCE and the targeted crop was camelina
- ➔ June 2021, Italy, organised by CREA in collaboration with UNIBO and the targeted crop was camelina
- ➔ September 2021, Greece, two demo days organised by CREA in collaboration with UTH, BIOS and CRES and the targeted crop was castor bean
- ➔ October 2021, Spain, organised by CIEMAT as joined event of two EU projects (MAGIC & BECOOL) and the targeted crops were perennial crops (grasses and woody species).

1st Demo day (October 2019), Romania

In October 2019, CREA conducted field activities and a demoday in Transylvania County (Romania, EU), concerning the mechanization involved in castor bean supply chain. The Romanian *Asociația Națională a Cultivatorilor de Ricin "ECORICINUS"* hosted the demo day and invited farmers, technicians, local vegetable oil traders and partners of the association. The demo day included a technical visit to the fields where farmers and Ecoricinus' associates cultivate castor beans for pharmaceutical purposes (Figure 1).



Figure 1. Visit of the fields (left) and castor bean husking machine (right)

CREA presented directly on field the bottlenecks that must be studied in order to permit the full mechanization of castor beans. Then the group moved to the warehouse to visit both a

dehuller used to separate seeds from the capsule and the press to extract oil from seeds. A round table was held in the meeting room of the laboratory and the stakeholders actively participate to the discussion proving interest in castor oil supply chain.

Although dwarf hybrids of *Ricinus* are suitable for mechanical harvesting of castor beans, conventional combine harvesters have to be improved and specific tests are required. Furthermore, the oil extraction can be negatively affected by seeds partially dehulled.

2nd Demo day (June 2020), Spain

CREA performed field test in the Municipality of Palencia (Castilla y Leon, Spain) during summer 2020. The field area was 3.82 ha, the altitude 912 m a.s.l. with a negligible slope value. The activities focused on scientifically evaluate performance, seed loss and harvesting cost related to camelina seeds mechanical harvesting. The contractor provided the combine harvester, a John Deere W650 equipped with a conventional cleaning shoe and a 6.7 m wide cereal header. During the field tests, CREA organized a demoday focusing on demonstrating the bottlenecks of this stage. In particular, the fine adjustments needed to the combine harvester in order to reduce seed loss as much as possible. The demo day was attended by "Camelina Company Espana" local farmers and contractors. The demoday was divided in two sections: firstly, the potentiality of camelina as oil crop for marginal lands was introduced along with the main problems associated with mechanical harvesting (e.i, seed loss); consequently, the group moved to the field where a contractor was hired to run the test and carry out the demonstration for the attendees (Figure 2).



Figure 2. Demoday in Spain regarding camelina seed mechanical harvesting

Results provide evidence on the suitability to use a conventional combine harvester equipped with a cereal header for the harvesting of camelina seeds, although some improvements are required to reduce both seed loss and impurities.

3rd Demo day, June 2021, Italy

The aim of the 3rd demo day was to demonstrate the possibility to anticipate camelina seed harvesting by applying swathing technique. In collaboration with Bologna University (UNIBO), CREA investigated the efficacy of swathing on anticipating the collection of seeds. An *ad-hoc* test was performed in Bologna on cultivar *Alba* in June 2021. The crop was firstly cut with cutting bar, then left naturally dry under the sun and eventually, harvested mechanically with a conventional combine harvester equipped with cereal header. During the activities,

technicians, academics and students were involved in the demoday to present the improvement of introducing such technique.

The advantageous aspect is represented by the possibility to anticipate approximately of 10 days the availability of the field for the sowing of the following cash crop.



Figure 3. Camelina seed harvesting after swathing and demoday

4th Demo Day (September 2021), Greece

In collaboration with CRES, University of Thessaly and BIOS Agrosystems company, two field tests (Figure 4) and a demo day were organized in September 2021. The objectives of the above-mentioned activities were: to assess performance and seed loss of mechanical harvesting, to investigate possible modifications to apply to the machinery to improve performance, and to demonstrate the overall feasibility of castor beans supply chain in Mediterranean region. Participants were showed the most common problems associated with the mechanical harvesting of tall herbaceous plants: loss of seeds due to the impact, possible clogging occurring in the cutting bar or in the threshing systems, damages to kernels. In the fields, CREA also compared the performance of two different combine headers (cereal vs sunflower header) and the possible modifications to apply in order to reduce impact seed loss.



Figure 4. Field activities and demonstration of the performance of different combine headers on castor bean mechanical harvesting

The high residual moisture content can significantly affect the performance of the machinery. Furthermore, a conventional combine harvester equipped with sunflower header provided encouraging hints for further investigating the whole supply chain of castor beans cultivated on marginal lands.

4th Demo Day (October 2021), Spain

The demo day in Spain had been organised in the view of two EU projects (MAGIC & BECOOL). The demo day was the second session of the Spanish national workshop took part the 26th of October 2021, at 9:30 h. This event was meant to comply with the demo day (as an extension of the previous webinar), and due to the COVID-19 pandemic, the field visits were displayed in a virtual format. This event was organised by CIEMAT in close collaboration with IMIDRA and Spanish Co-ops.

The aim was to demonstrate the mechanization of the energy crops, showing to farmers that the cultivation of these crops can be sustainable and profitable, as well as to illustrate innovative harvesting operations, such as harvest and biomass pre-treatments. During the conference, three videos were shown regarding the lines of collaboration between IMIDRA (Madrid Institute for Rural, Agricultural and Food Research and Development) and CIEMAT, the characteristics of the crops tested at the El Encín Farm in Alcalá de Henares, the resulting biomass and a demonstration of the process and machinery necessary for harvesting. One of the objectives was the optimization of woody crops and agriculture in the Community of Madrid. This was possible thanks to the BioBaler cutter-bagger machine, which aimed to make the cultivation process sustainable and economically profitable for farmers.

The last exhibition was performed by the Head of the Biomass Unit of CEDER-CIEMAT, who presented a prototype of machinery designed to harvest and bale the biomass in a single stage: the BioBaler WB 55. All the specifications and a life performance of this implement were exposed during this last video.

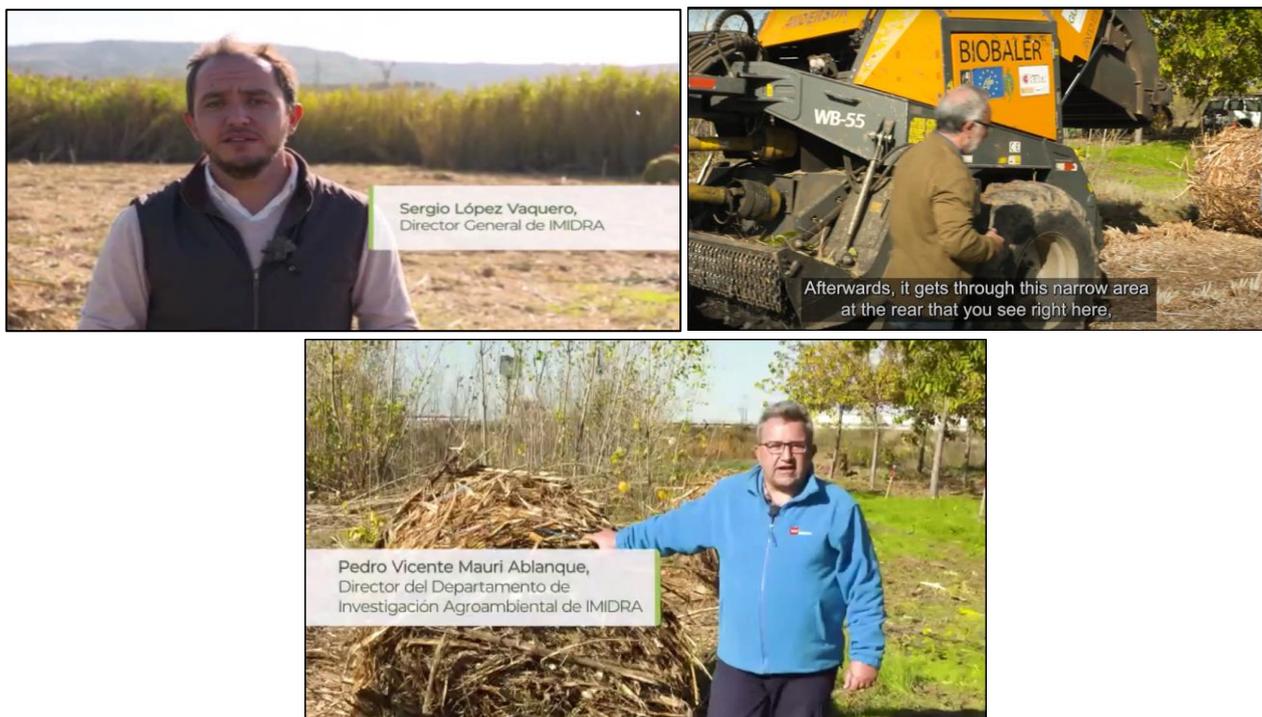


Figure 5. Demo day in Spain (October 2021)

Thirty-five participants were present at the event, actively participating at the debate session arranged at the end, asking about technical specifications of the machinery and performance parameters. The videos are available in [YouTube](#), and were also published at MAGIC project, CEDER-CIEMAT and Spanish Co-ops websites.