SUMMARY:

EU is the world's biggest producer of flowers, bulbs and potted plants (44% of the global production), with the highest density per hectare and the European ornamental sector employs approximately 650.000 people (2013/2100(INI)).

Horticulture represents 18% of the total value of agricultural production in the EU and uses only 3% of the EU's cultivated land. Horticulture can be defined as a branch of agriculture with high value fruit, herbs and vegetable. Moreover, **the plastic industry is a key sector in Europe and plastics play a substantial role in horticulture (plasticulture).** However, **plastic pollution** has become one of the most pressing environmental issues with a rapidly increasing production of disposable plastic products, which overwhelms the world's ability to deal with them. Besides, **the cost of recycled materials is 10 times over that of the new solutions, decreasing the demand for recycled materials**. In Europe for example, only 30% of the 25.8 million tonnes of plastic waste generated are being recycled.[1] In this scenario, **horticulture plastic waste also constitutes a serious environmental and economic problem** as it causes severe and diffused damages to landscape, environment, agricultural soil, air and oceans. Besides, this situation is not improving as global greenhouse horticulture market is expected to grow at a CAGR close to 11% during the 2017-2021[2] period.

The majority of plastic waste generated by horticulture activity comes from the disposal of **films of greenhouses, plastic flower pots for the transport and growth of plants and flowers** as well as **trays** to transport plant seedlings. These plastic solutions are made of fossil-based polymers such as polyethylene (PE), polypropylene (PP) and polystyrene (PS). Although a large portion of horticultural companies recycle unneeded materials, the recycling process varies for each material and firm. However, some horticulture plastic waste fractions cannot be properly recycled.

Therefore, it is of crucial importance in the environmental horticultural industry **that entities enhance the performance of End of Life (EoL)** processes with those products that are difficult to recycle. In addition, the **inefficiency of the existing few systems of horticulture plastic waste management** in Europe, and the **small amount of data** on the use for plastics in agriculture, difficult the correct horticulture plastic waste. In this sense, the **plastic industry offers a clear potential for circular systems and horticulture provides opportunities for circular production to use resources more efficiently**.

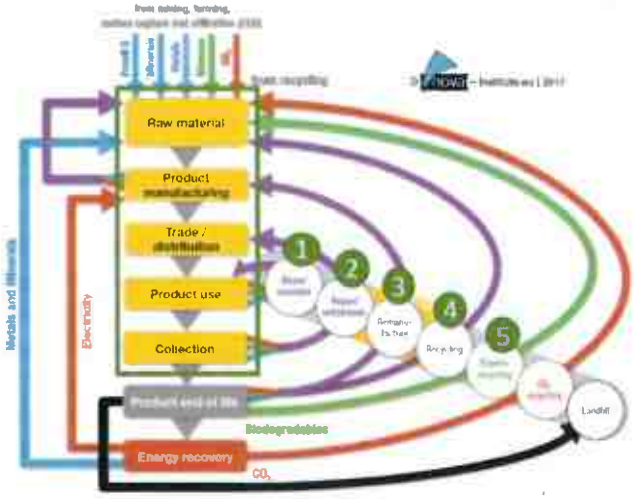
CIRCSYS project aims to become a turning point in the management of plastic waste for the European horticultural sector (international replication), accelerating the transition from a fossil-based linear economy to a low emission, low-carbon circular economy and sustainable bio-based economy, in line with the **European Green Deal, Paris Agreement (COP21) and the Social Development Goals (SDG) 6, 11, 12 and 13.** To this end, **the joint action through systemic innovation ecosystems** of the stakeholders involved in the plastic and horticultural value chains will define, qualify and demonstrate in relevant **circular** environments **for horticultural applications**.

The circular strategies will minimise the quantity of plastic waste generated in the horticulture sector that ends after-use in landfill or which is treated by costly EoL procedures such as mechanical recycling that has high environmental costs.

[1] A European Strategy for Plastics in a Circular Economy. European Commission. 2018.

[2] Global Greenhouse Horticulture Market 2017-2021: Key Geographies and Forecasts by Technavio

Through the implementation of an **industrial symbiosis methodology** supported by a **holistic assessment methodology** and an **open and scalable data-sharing platform,** the project will pursue the reduction of environmental impacts across the plastic value chain, increasing materials savings as well as elevate the rates of sharing **(1-Sh), reusing (2-Rs) and remanufacturing (3-Rm).** The CIRCSYS horticulture plastic applications **will be based on innovative recycled (4-Rc) and/or bio-based (5-Bb) plastic products, boosting the circularity from the very beginning of the eco-design process.**



PARTNERSHIP:

The project pursues that horticulture **plastic products increase their added value or retain it** by means of implementing innovative actions (eco-design, more eco-friendly manufacturing and EoL processes, migrations to greener materials, additive strategies, HAM based on LCA, LCC and sLCA analysis, new business models). In fact, the project will be focused on minimising the quantity of horticulture after-used solutions that end in landfill. This implies to optimise the added value of the targeted plastic solutions or, in its case, retain it due to the implementation of EoL strategies such as sharing or reusing. The resulting data and information exchange (diverse flows, quantities, businesses) will be implemented through a novel, open and scalable data-sharing platform.

Through the implementation of **3 "Systemic Innovation Ecosystems (SIEs)"** with their **3 real operational environments** (Spain, Italy and Netherlands), **relevant actors across** the value chains of:

(1) horticulture sector:

Horticulture cooperatives:

- **COR** (CORMA, a Spanish cooperative with a commercial surface of 12.000 m^2, 800 types of plants with 2000 different formats),
- **FLT** (Flora Toscana, an Italian cooperative that represents over 115 grower partners producing a wide assortment of cut flowers, foliage and pot plants, 320 hectares of cultivation land),
- **GRP** (Greenport West-Holland is a region in the province of South Holland, and contains leading horticultural municipalities such as Westland, Lansingerland, Pijnacker-Nootdorp and Barendrecht and three cities in the region: The Hague, Rotterdam and Delft);

Cooperatives associations:

- **FCAC** (Federació de Cooperatives Agràries de Catalunya, a Spanish cooperative association located in the Catalonian region with 204 cooperatives (31.500 farmers and 4.500 employees)
- **ANVE** (National Association of Nurserymen Exporters, an Italian association, representing more than 50 Italian nursery companies that also act as an Italian National Contact Point);

(2) plastic industry:

- **NOV** (Novamont with a bioeconomy model based on the efficient use of resources and on territorial regeneration. Starting from the local areas, we set up biorefineries integrated in the territories and dedicated to the production of bioplastics and bioproducts of renewable origins conceived to protect soil and water, by revitalising decommissioned or no longer competitive industrial sites, respecting local specificities and working together with all the players of the whole value chain.)
- **AIT** (AITIIP Technology Centre expert in plastic transformation processes),
- **TEC** (Tecnopackaging, a Spanish plastic transformer SME),

waste collection & management companies:

- **FCC** (Fomento de Construcciones y Contratas, operates in over 5,000 municipalities across the world where it improves the well-being of over 59 million citizens, collects 24 million tonnes of waste per year and hasmore than 300 treatment, recycling and disposal facilities)
- **INT** (Interseroh, the Italian recycling specialist provides a tailor-made integrated services to over 10,000 customers in all sectors of industry, with annual sales of around EUR 800 million, workforce of 2,000 people at 33 sites in 8 countries).

The consortium also includes:

- dissemination and diffusion entity: **APRE** (Agenzia per la Promozione della Ricerca Europea, Italian National Contact Point) and the support of some members of the Focus Group EIP-AGRI Circular Horticulture
- spin-off management corporation **IQ**U (InnovationQuarter).
- systemic innovation entity **XPRO** (SME specialised in innovation development)
- Industrial symbiosis entity **ZLC** (Zaragoza Logistic Centre is a Spanish RTD expert in value chain and logistics)
- Holistic assessment methodology **LEITAT** (Technological Institute to create economic, social and sustainable value by R&D+2i).