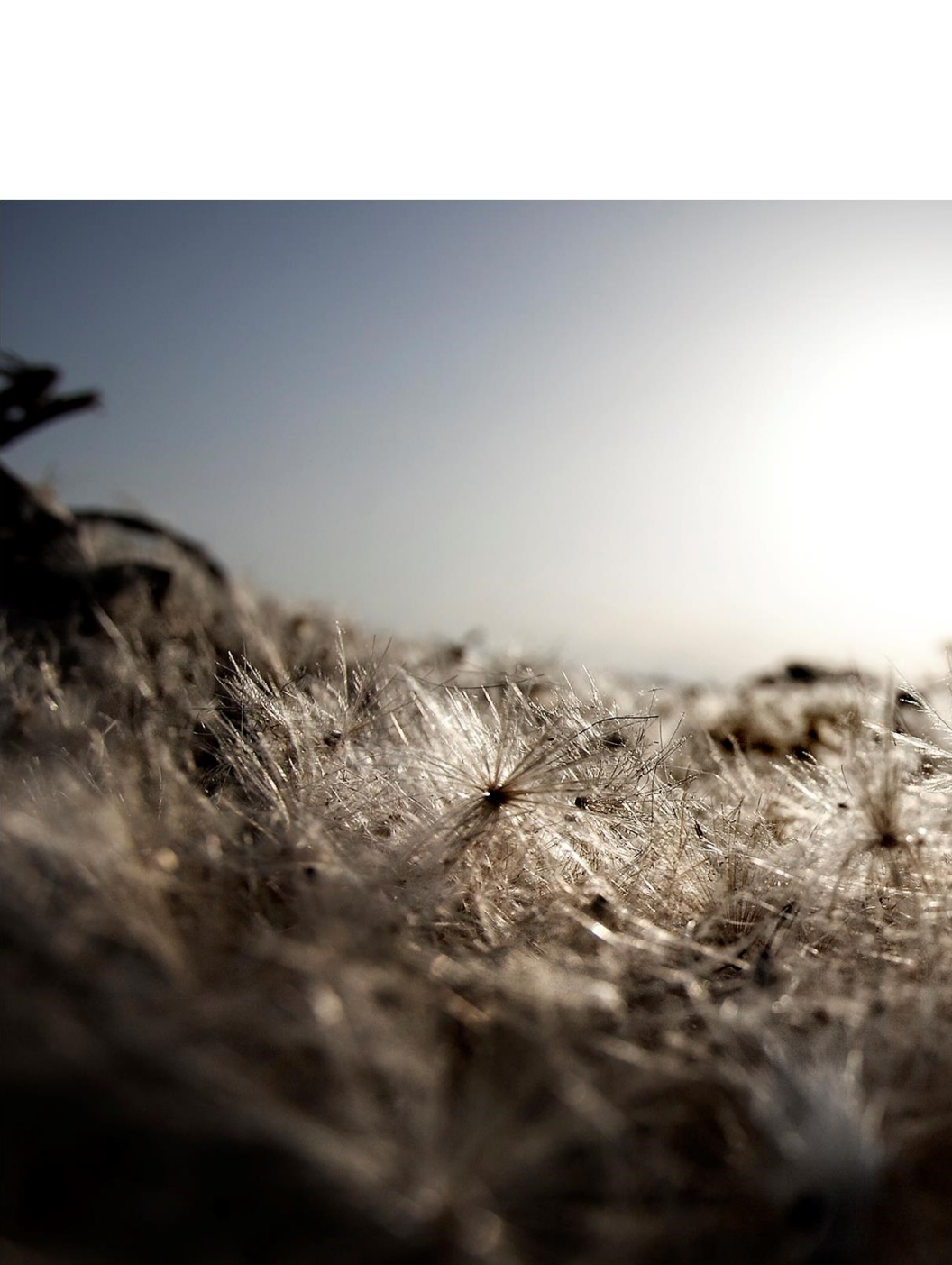




PRODUCING BIOPOLYMERS FOR THE AGRICULTURE SECTOR

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Zaragoza



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OUR DNA

NOVAMONT: A GROUP WITH A TRIPLE VOCATION

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INDUSTRIAL STRUCTURE

- Turnover: **>230 mln/€**
- **>600** people
- **4** production plants
- **8** compounding lines
- **4** discontinuous and 2 continuous polymerization lines



RESEARCH & DEVELOPMENT

- **6%** of investments compared to turnover
- **24%** of people dedicated to research, development and innovation activities
- **5** world-first technologies
- **~1.800 patents/patent applications**



TRAINING CENTER

- **400** training activities since 1996 for young researchers and experts
- multidisciplinary training paths activated on complex projects



THE PILLARS OF OUR DEVELOPMENT MODEL

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BIOECONOMY AS TERRITORIAL REGENERATION

NOVAMONT is the international leader in the **bioplastics** sector and in the development of **biochemicals** and **bioproducts** obtained from the integration of chemistry, agriculture and the environment.

It promotes a **model of the bioeconomy** as a factor of **territorial regeneration**, based on three pillars:



REGENERATION OF DEINDUSTRIALISED SITES

Reindustrialisation of no longer competitive sites thanks to **proprietary technologies first in the world** in order to create "**bioeconomy infrastructure**", integrated with the territory and interconnected



INTEGRATED AGRICULTURAL VALUE CHAIN

Development of **low impact value chains** through the valorisation of marginal land not in competition with food production, integrated in local areas and connected with the bioeconomy infrastructure



PRODUCTS CONCEIVED AS SOLUTIONS

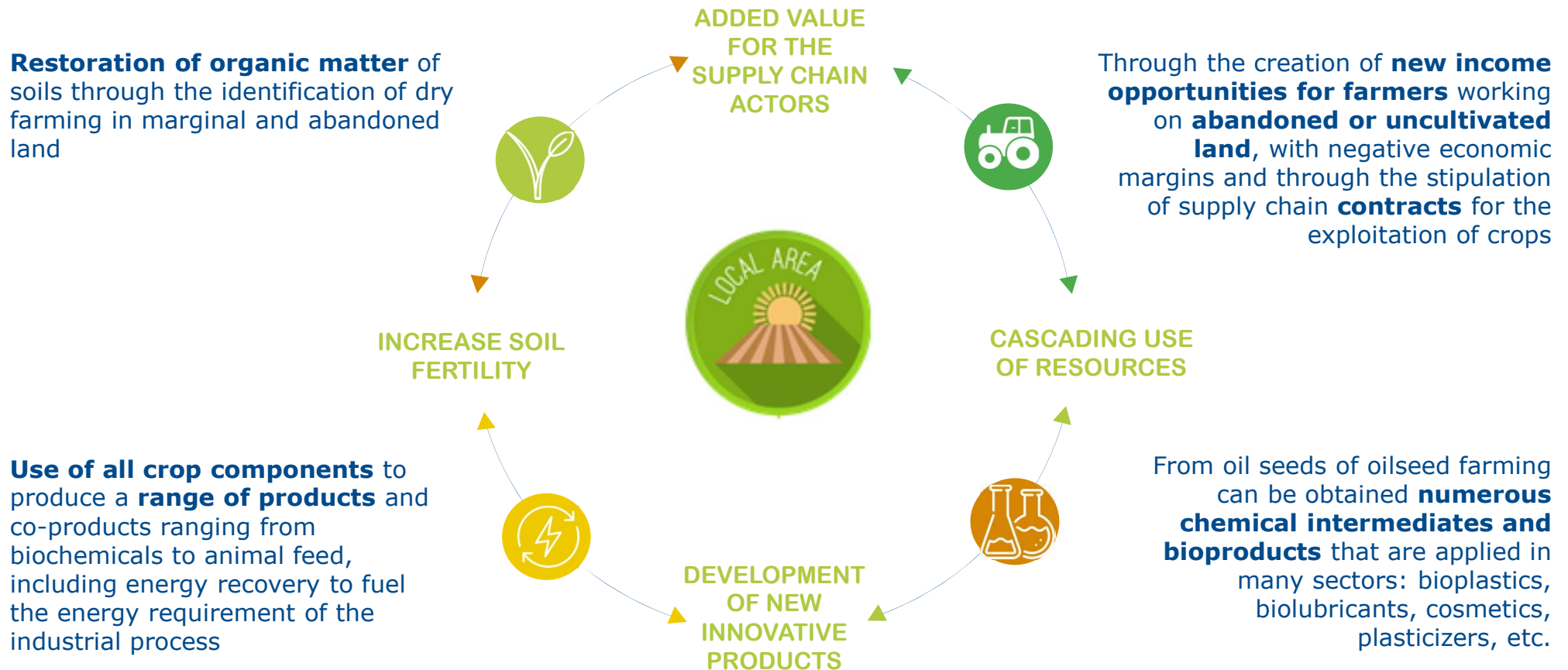
Products and value chains are conceived and designed to provide **unique** and **sustainable solutions** for specific environmental and social problems.
Elements of a system with broader impacts of the single product



BENEFITS FOR THE WHOLE SYSTEM

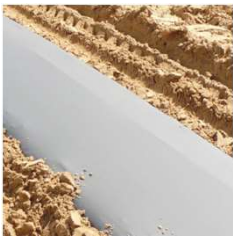
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THE INTEGRATED AGRICULTURAL VALUE CHAIN INTERCONNECTED WITH THE BIOECONOMY INFRASTRUCTURES



 MATER-BI IN AGRICULTURE
INNOVATIVE SOLUTIONS DIRECTLY BIODEGRADABLE IN SOIL

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PLASTICS IN AGRICULTURE

MARKET ATO & TRENDS

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- World consumption of plastics for agricultural applications: **4 million tons** *
- On total films: 20 % mulch films, 30 % greenhouse films and 50 % silage films*
- In Europe the volume of plastics in agriculture is around **674KT**, representing 1,2% of the total volume sales of plastics in the European market (**56MT**), **500.000 ton of which are films for agriculture****
- In Italy the annual consumption of plastic **mulch films** is over **40.000 ton****



Sources:* Agricultural Film 2014, AMI International, ** CPA, CIPA, APE, Plasticulture,2016, n°135; fonte interna Novamont

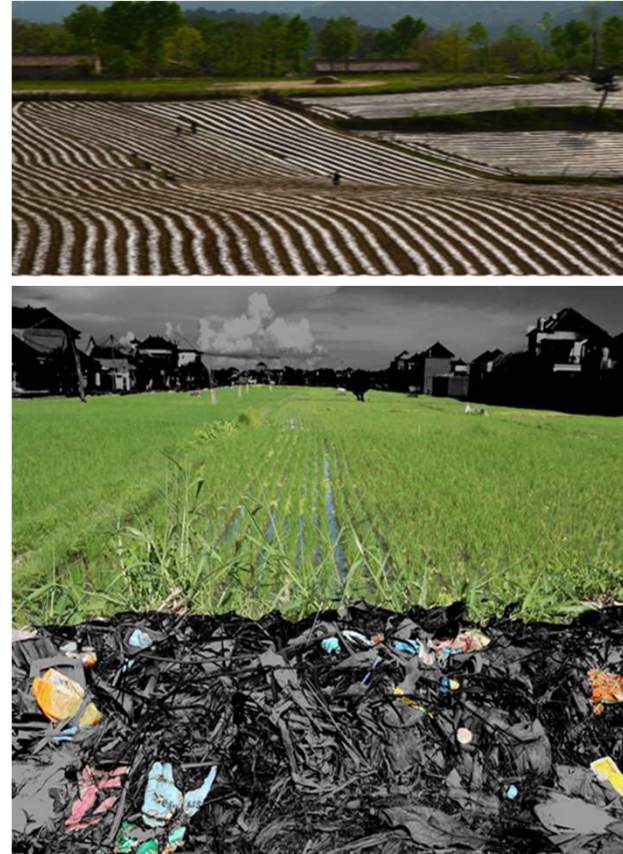


END OF LIFE OF AGRICULTURAL PLASTICS

ENVIRONMENTAL IMPACTS

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- Agriculture plastic waste: **5 % of total** plastic waste*
- Some types of plastic wastes (e.g. mulch and silage films) have a high level of impurities when collected from the field: from **50 to 80 % of the initial weight of the film****
- Mulch films are not easy to recycle (especially thin films) and the raw materials obtained not high in quality
- Potential negative impacts on the soil when not properly disposed of:
  - **White pollution** phenomena
  - Plastic wastes in soil have a negative impact on crops growth and development, **reducing their yield up to 15%*****
- Every year **15 000 tons** of polyethylene mulch film (<25 µm) are released in European soils****
- In Europe still **50 % of agricultural plastic** is **landfilled**



Sources: *European Commission, A European Strategy for Plastics in a Circular Economy, 2018; **Sorema (2008) Recycling schemes for thin mulching agricultural film analysis of the process and application examples. International Congress Plastic & Agriculture MACPLAS 2008. Bari, Italy 21–22 Feb 2008; *** Liu EK, He WQ, Yan CR (2014) 'White revolution' to 'white pollution'—agricultural plastic film mulch in China. Environ Res Lett 9(9):091001; ****EUPB, Revision of the Fertilisers Regulation – benefits of biodegradable mulch films, 2016; *****European Commission, 2016, Commission Staff Working Document, SWD(2016) 64 final, 2016



BIODEGRADABILITY AS AN OPPORTUNITY

BIODEGRADABLE MULCHING

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NO REMOVAL, NO LANDFILL, MANPOWER REDUCTION

At the end of the crop cycle **biodegradable mulch film** must not be removed, but should be worked into the soil, in order to properly biodegrade (through the mineralizing action of soil microorganisms) into CO₂, water and feedstock

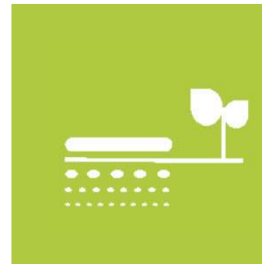
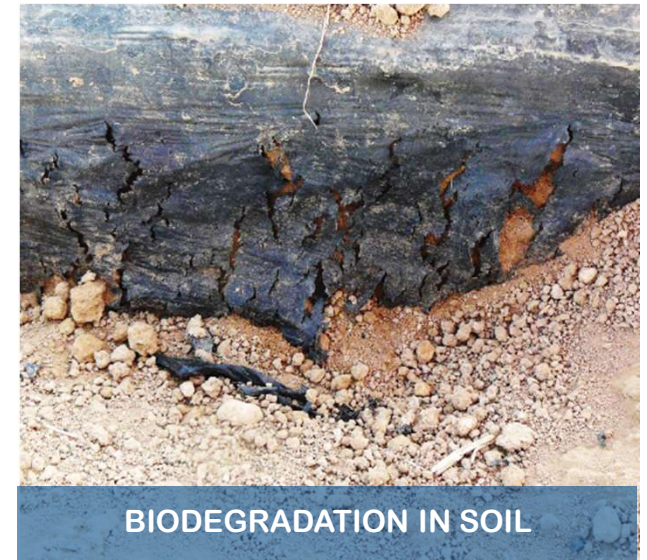
- **COST REDUCTION**

in terms of manpower (removal, dispose of, transport)

- **NET REDUCTION OF PLASTIC WASTE**

- **REDUCTION OF POTENTIALLY NEGATIVE IMPACTS**

on the environment when the plastic films are not properly removed and disposed of





MATER-BI BIODEGRADABLE MULCH FILMS

MAIN FEATURES

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- Same field performance as conventional black plastic films
- **Specifically used for the main vegetable crops in open field and greenhouse**
- Possibility of use on crops not normally mulched with plastic non-biodegradable mulches: e.g. processing tomato, rice, vine
- **Thin films: from 15 to 10 μm**
- Black mulch film completely biodegradable in soil ("**OK Biodegradable Soil**" logo for the mulch film, in compliance with EN 17033 standard)



BIODEGRADABILITY IN SOIL

CERTIFICATES AND STANDARDS IN AGRICULTURE

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OK bio-degradable SOIL is a certificate assigned to those materials resulting **totally biodegradable in soil without any negative impact (toxicity) on the biodegradation substratum** (soil)

CRITERIA

- **Biodegradation (CO₂ conversion):** 90 % within 24 months
- Biodegradation in soil and at ambient temperature
- Ecotoxicology: growth test on plants (in compliance with OECD 208 method)
- Heavy metal content below the threshold defined by standard



**SINCE BEGINNING 2018:
EUROPEAN STANDARD FOR
BIODEGRADABLE MULCH FILM
EN 17033**



Issued by **AIB Vinçotte**
(Belgium)
Tested in compliance with
the international
standards:

- ISO 11266
- ASTM D 5988-96



BIODEGRADATION IN SOIL

TEST: LDPE A 15 μm , MATER-BI 15 μm , MATER-BI 12 μm

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15 DD AFTER LAYING

60 DD

75 DD

120 DD

150 DD



LDPE a15 μm



MATER-BI A 15 μM



MATER-BI A 12 μM





USAGE OF WATER-BI MULCH FILM

EXAMPLES OF CROPS

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BIOPLASTIC PHEROMONE DISPENSERS

CERTIFICATES AND STANDARDS IN AGRICULTURE

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To control the main insects pathogens in orchards, vineyards and greenhouses using **low environmental impact techniques**



The use of pheromones **strongly reduces** the insecticide treatments



The dispenser **biodegrades in soil** at the end of the use and does not need to be removed



ISAGRO

ISAGRO introduced in the market the new **pheromone dispenser Ecodian**, produced with Mater-Bi biodegradable and compostable material.

The Ecodian system makes it unnecessary to remove and dispose of the dispenser at the end of the season, as it should be done in case of non biodegradable dispensers





BIOPLASTIC PHEROMONE DISPENSERS

ESTIMATES IN ITALY

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ITALY – areas in which
pheromones are used (ha):

- ✓ **Apple and Pear trees:** 33.000 ha
- ✓ **Peach trees:** 22.000 ha
- ✓ **Vineyards:** 18.000 ha

TOTAL AREA: 73.000 ha

Average weight of a plastic pheromone dispenser: **2,74 g**

Maximum number of dispenser per hectare: 1000

MEANING:

Plastic material usage/ha = **2,74 kg/ha**

**TOTAL QUANTITY (IN TONNES) OF PLASTIC THAT
COULD BE LEFT IN FIELD PER YEAR IN THE CASE OF
NON REMOVAL OF PLASTIC DISPENSER**

200 tons



"The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them"

UMBERTO COLOMBO



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THANK YOU FOR YOUR ATTENTION

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