Innovative fully biodegradable mulching films & fruit protection bags for sustainable agricultural practices LIFE14 ENV/ES/000486

LIFE MULTIBIOSOL

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PROJECT REFERENCE	LIFE14 ENV/ES/000486
DURATION	01-SEP-2015 to 31-MAY - 2019
TOTAL BUDGET	2,036,680.00 €
EU CONTRIBUTION	1,222,002.00 €
PROJECT LOCATION	Vlaams Gewest(België - Belgique) Aragón(España) Midi-Pyrénées(France) Toscana(Italia)

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Co-funded by the European Union through the LIFE Programme

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MULCHING FILM

- ✓Retains H_20 and nutrients
- ✓Prevents the growth of weeds
- ✓Creates the appropriate micro-climate in the rhizosphere

FRUIT BAGS

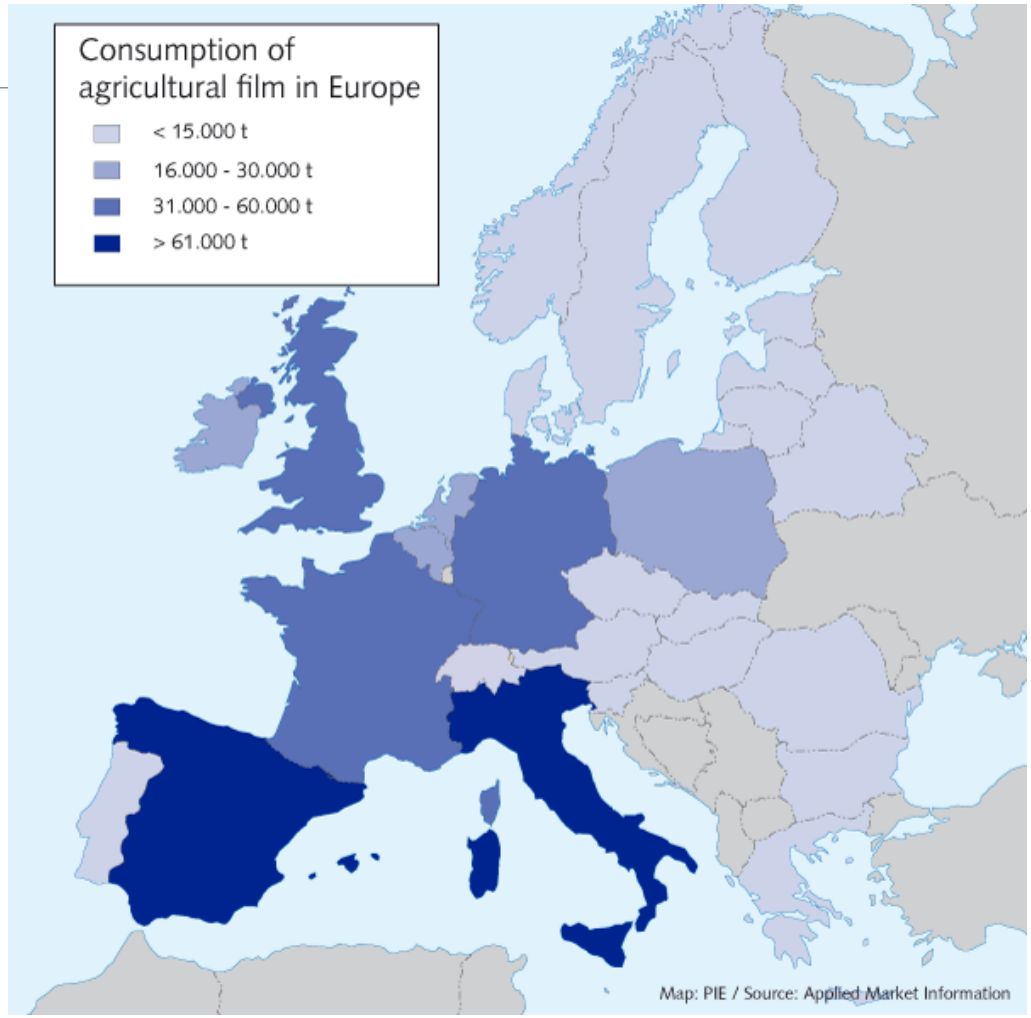
- ✓Protects from plagues
- ✓Isolates the fruit from coming into contact with phytosanitary products
- ✓Creates uniform color on the skin of the fruit

EU numbers


30%


51%


18%


Consumption of agricultural film in Europe
< 15.000 t
16.000 - 30.000 t
31.000 - 60.000 t
> 61.000 t
Map: PIE / Source: Applied Market Information

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Recollection

Transport - High volume, long distances

Recycle – Dirty, Humid, Low Quality

Collect – large quantity + dispersion

Recycle – Dirty, Humid, Low Quality

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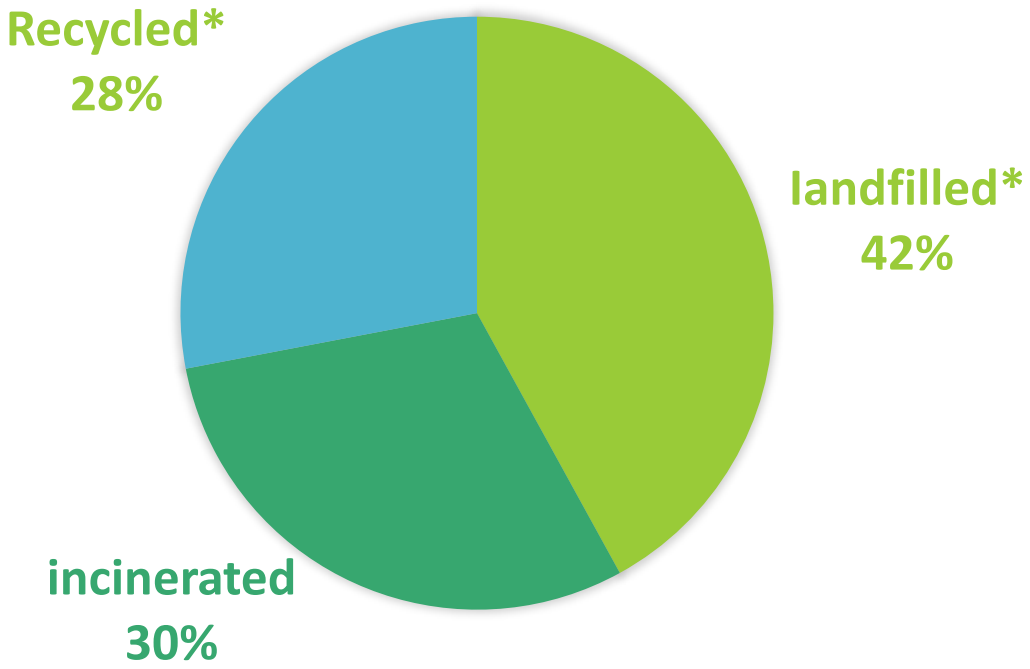
END-OF-LIFE MANAGEMENT OF *COLLECTED* AGRICULTURAL PLASTICS



**No incentives*
Cost´s farmer €€€

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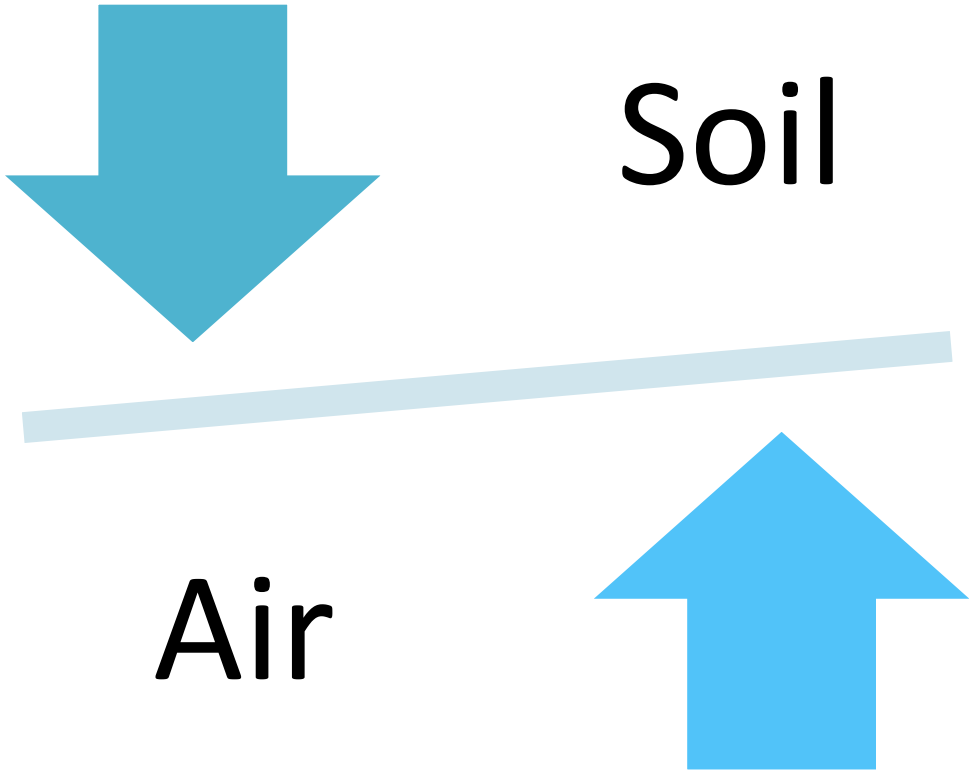
Pollution & GHG Emissions



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Life

A BIODEGRADABLE SOLUTION TO AGRICULTURE'S PLASTIC WASTE PROBLEM

Objectives

Eliminate Waste Management	Develop new biodegradable plastic films	Improve soil and product quality
No removal or transport	Renewable raw materials	Oligoelements
OK bio-degradable TÜV AUSTRIA SOIL	Low carbon footprint	Commercially viable

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Action Plan

Raw materials
-100% biodegradable
-Polymers based on natural sources

1 Production processes
- -Materials extrusion
  -Film blowing
  -Injection moulding

2 Validation of plastics in laboratory
- -Mechanical tests of materials
  -Tests for certification OK BIODEGRADABLE SOIL

3 Validation of plastics products in fields
- -Tomato (Spain and France), pepper and cucumber in Spain and sweet potato in Belgium
  -Bags for apple and peach (Spain)

4 Validation of quality:
- - Soil
  -Crop (Pre-harvest)
  - Product (Post-harvest)

Expected results
- Reduction of plastic waste
- Less CO_2 emitted during the production of plastics/Non-emissions from disposal
- Improvement of soil quality
- Improvement in crop quality
- Certification OK BIODEGRADABLE SOIL

1. Production Process







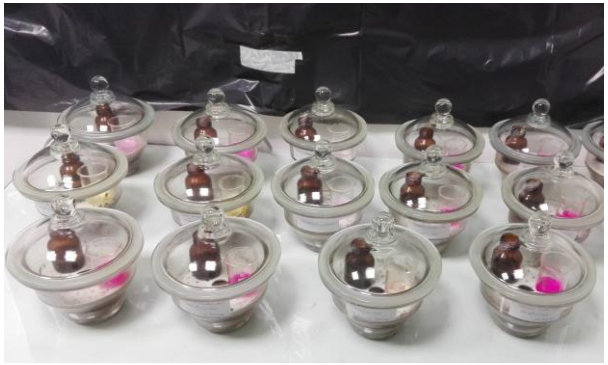


2. Validation in Laboratory

Thickness

Strength & resistance to tearing

UV Ray testing



Biodegradability

Heavy Metal Presence

Phytotoxicity

3. Validation in the Field

Application of mulching films

Application of mulching films and planting

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Crop Analyses

Clorophyll

Nutritional State

Soil Analyses

Weed growth

Monitoring of plastics

Conductivity
Organic Material
C/N balance
Composition

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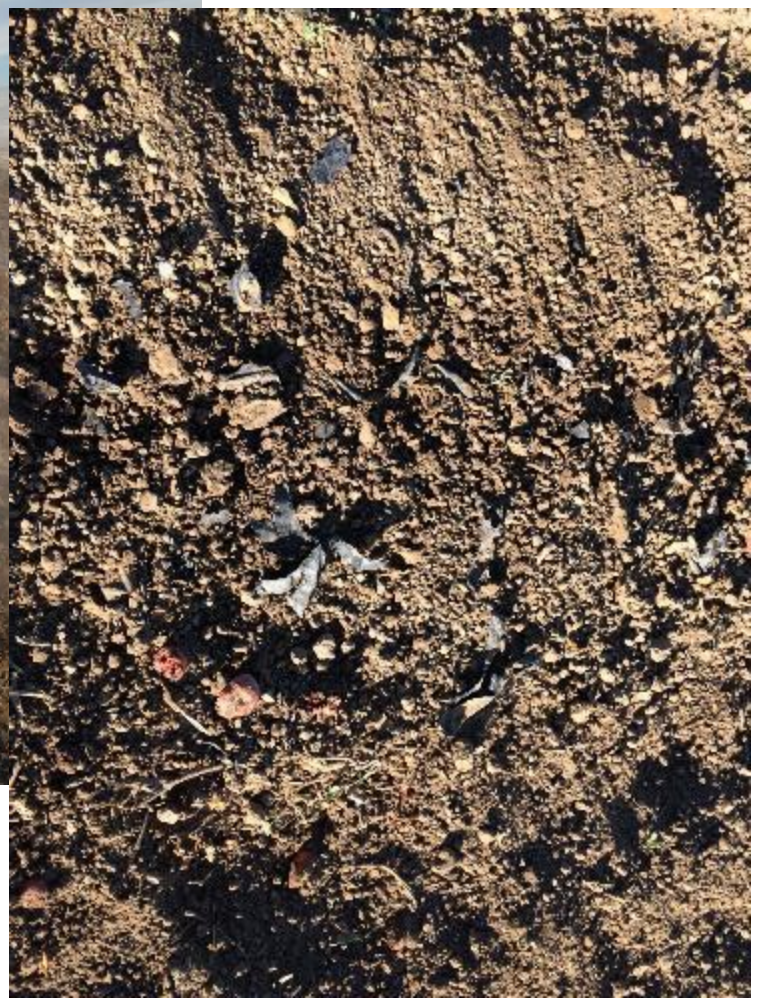

Incorporation of mulching films into the soil post-harvest

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CSIC Consejo Superior de Investigaciones Científicas

cooperativas agro-alimentarias Aragón

Application biobags on fruit trees

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Application bioclips

4. Post Harvest Tests

Weight

Caliber

ºBrix

Non-destructive Texture

Nutritional compounds and Mineral Composition

Disease Presence

Favourable commercial characteristics

small

Correct degree of maturity

big

control

Varying degrees of bag coloration

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PROJECT RESULTS

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Pepper

2016 trials

9 + 1 control

Tomate

2017 trials

6 + 1 control

Control

M21 a

N04 a

P91 a

M21 b

N04 b

P91 b

2018 trials

1 + 1 control

17 de mayo

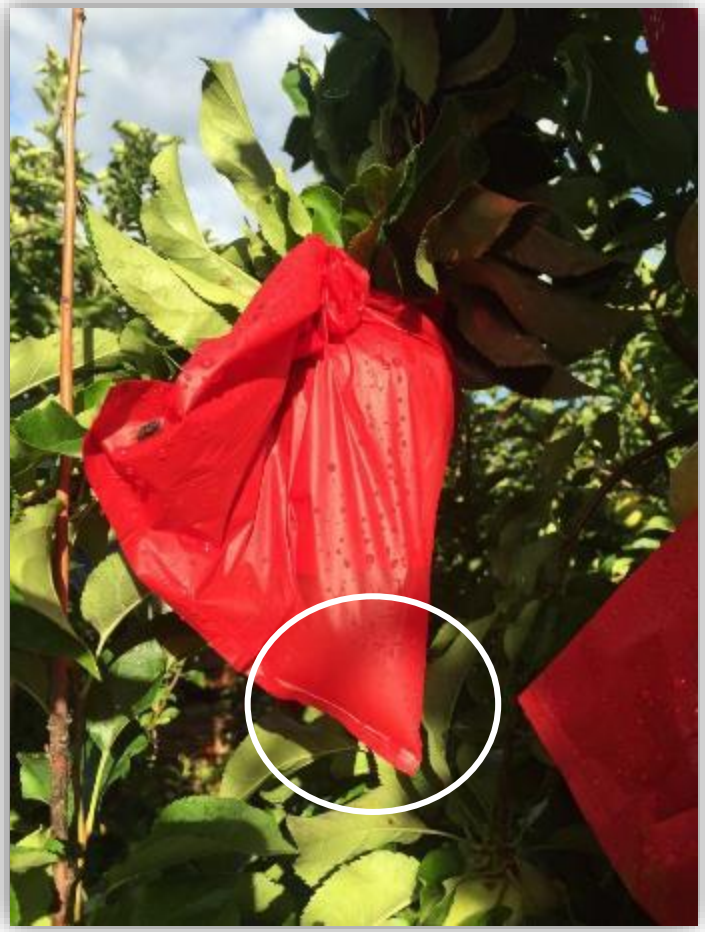
28 de Junio

8 de Junio

Control plastic (left)

Multibiosol plastic (right)

15 days after rain



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Biodegradable

Control

Color necessary to qualify for “Calanda peach” label

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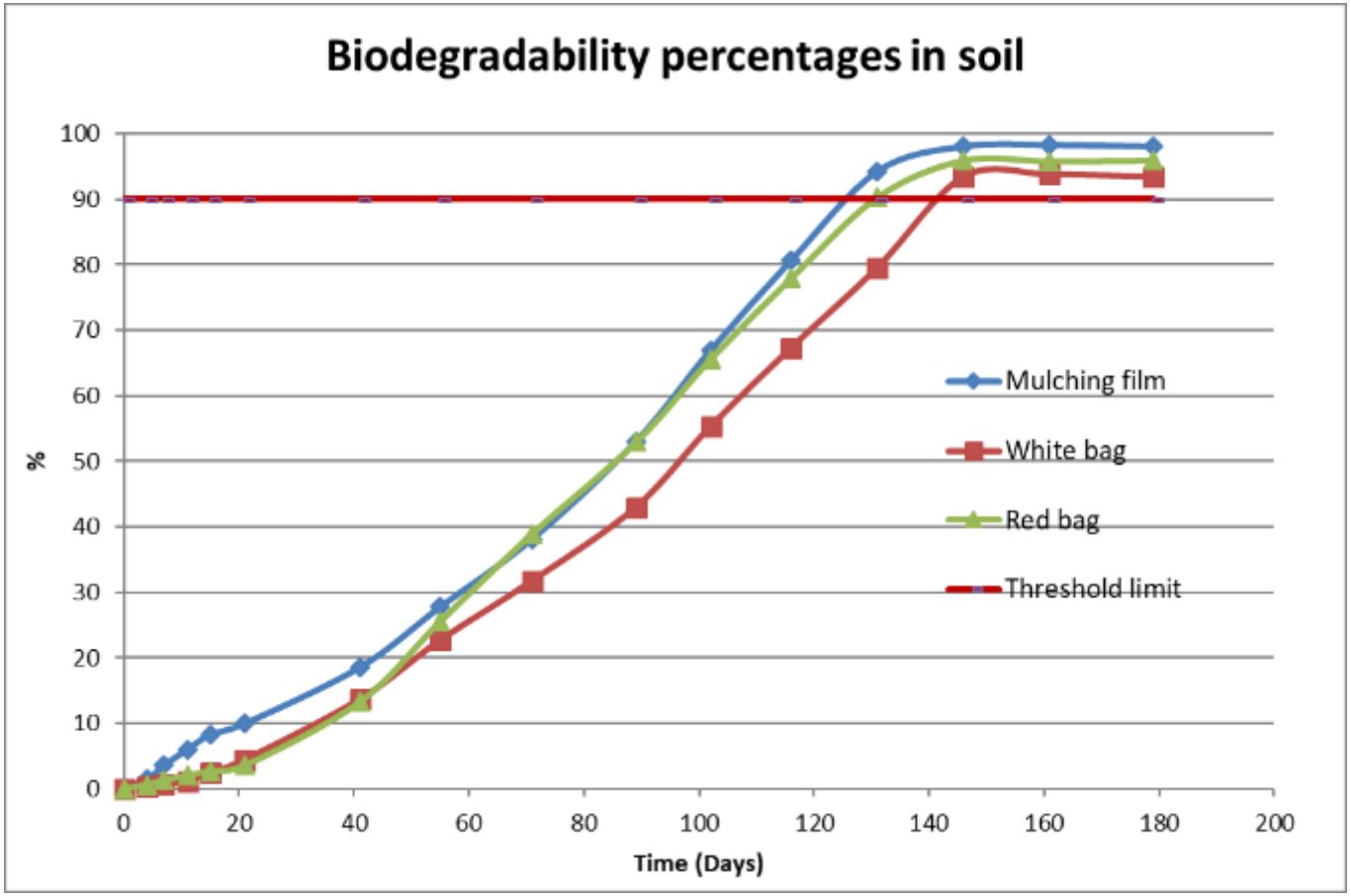
Biodegradability



90% threshold has been reached within time limit (2 years)

OK bio-degradable

TÜV AUSTRIA SOIL

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Conclusions

	Mulching Film	Fruit Bags	Clips	Conclusion
Function	Replaces LDPE	Replaces Parrafin lined paper	Replaces metal staples	**Reduction of non-renewable waste**
Application / Collection	Easy to apply Incorporate into soil after harvest			**Fully biodegradable, no collection necessary.** **Savings (time, money, GHG emissions)**
Resistance	No tearing in final composition	Microperforations added to avoid water buildup	Size reduced	**Products last the whole growth cycle of the plant and are intact at the time of harvest**
Quality of crops	Adequate nutritional state of the crops throughout growing cycle. Disease reduction. Improved commercial quality. Reduced pesticide use.			**Improve crop quality**
Quality of soil	Prevents weeds Provides important elements to the soil upon incorporation			**Improve soil quality** **Reduce soil pollution**

Looking to the future

TECHNICAL

- Replace certain % of virgin feedstock for food waste feedstock so as to….

  - increase renewability of the product

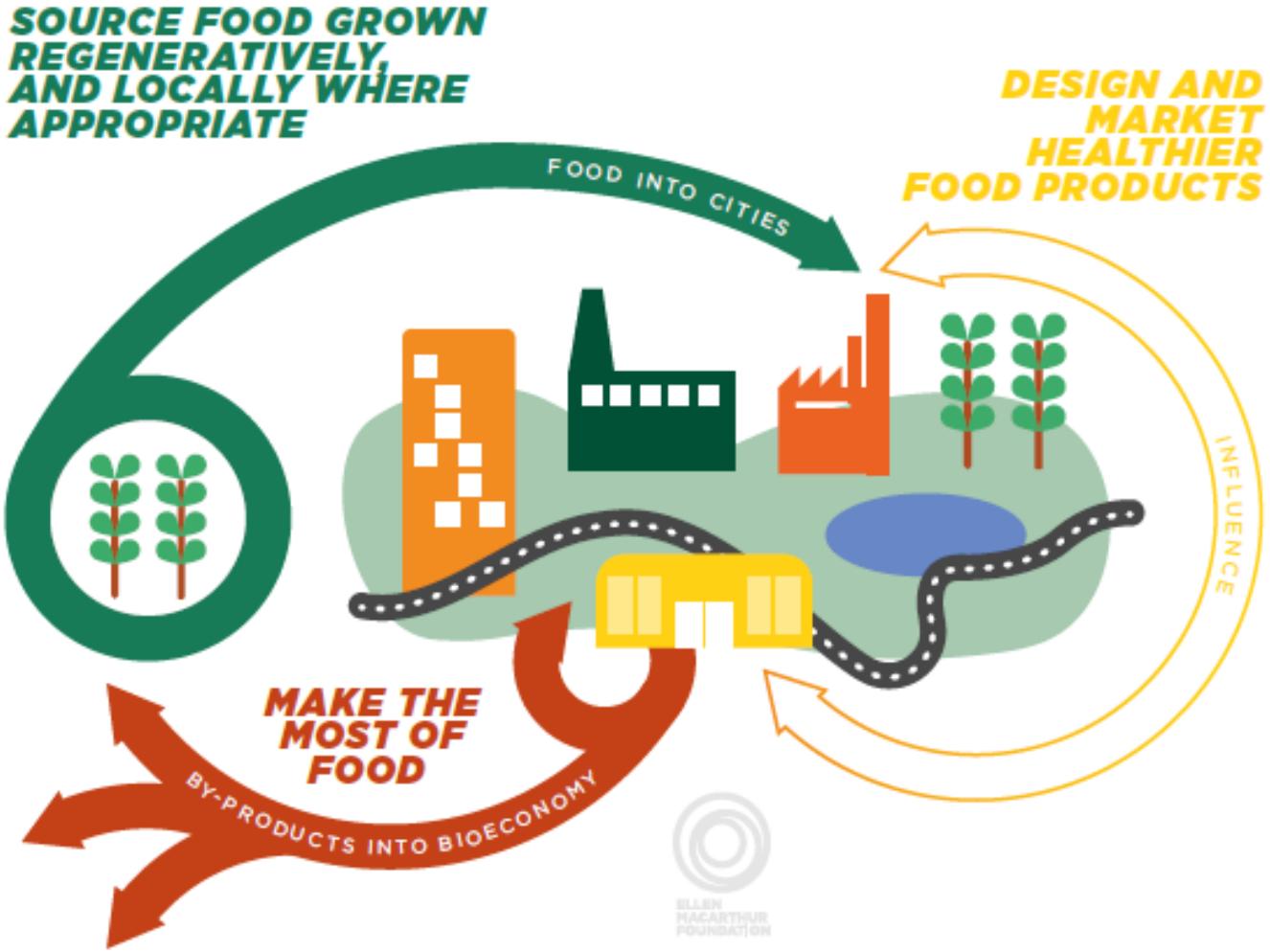
  - decrease land & resource use associated with the raw materials *(LCA results pending)*

PRICE

- Achieve a market price equivalent to or cheaper than fossil fuel based plastic options so as to….

  - make the solution economically feasible for all farmers (small scale, large scale, organic, conventional)

Source: Ellen Macarthur Foundation, Report "Cities and Circular Economy for Food"



What's holding the market back?

TECHNICALLY

- Extraction of raw materials from waste has been proven at a lab scale, no commercial (industrial scale) application readily available.
- Continuity of supply (quantity, quality of feed stock).

SOLUTIONS NEEDED

Investment in technologies to scale the circular economy

What's holding the market back?

ECONOMICALLY

- Prices of biodegradable solutions are still significantly higher than conventional plastic solutions
- No incentive for farmer to change

SOLUTIONS NEEDED

Policy

A tax on single use agricultural plastics

And / Or

Subsidy for biodegradable ones

Base price of materials

Material	LDPE	BIO VAL	Multibiosol
Width (m)	0,9	0,9	0,8
Lenght (m)	750	2800	750
Thickness (m)	0,00005	0,000015	0,00003
Calculated volumen (cm3)	33750	37800	18000
Weight (Kg)	37	50	22,96
Calculated weight (g)	37000	50000	22962,6
Density (g/cm3)	1,096	1,323	1,2757
Price (€/Kg)	**2,664**	**5,916**	**5,5632**
Calculated Price (€/cm3)	0,003	0,008	0,007
Calculated Price	98,57 €	295,80 €	127,75 €

For the calculation, the following conditions have been taken into account:

- Differences in thickness: 50 micron polyethylene mulching
- Differences in density of biomaterials is important.
- Difference in price of biobased polymer depending on the quantity:
  - **For a complete truck (22 tns) DAP Zaragoza: 2,9 €/Kg**
  - For less than 1 tn DAP Zaragoza: 3,6 €/Kg

Actual cost of using material for farmer / ha

- ✓ To cover an area of 1 hectare (100 mx100 m) we would need around 50 lines or rows of 100 m of length which is 5.000 m of film (5.000/750 = 6,6 aprox. 7 rolls of 750 m).

Material	LDPE	BIO VAL	Multibiosol
Width (m)	1	1	1
Length (m)	5000	5000	5000
Thickness (m)	0,000015	0,000015	0,000015
Calculated Price for 1 Ha	**219,04 €**	**586,90 €**	**532,27 €**
Cost of removal (per Ha)	**200 €**	**0 €**	**0 €**
Discount 30% cost	**0 €**	**176,07 €**	**159,68 €**
TOTAL (€/Ha)	**419,04 €**	**410,83 €**	**372,59 €**

- Lowest cost (€ 200/ha) for mulching and treatment. Costs of removal and disposal are included (between 200 and 400 €/ha according to the country legal requirements). The cost in Belgium of mechanical cleaning (120 €) and removal and disposal (55 €) in total 175 €.
- Discount of 30% applied for the use of biodegradable according to RD 533/2017, of May 26, which regulates the funds and operational programs of the organizations of producers of fruits and vegetables.

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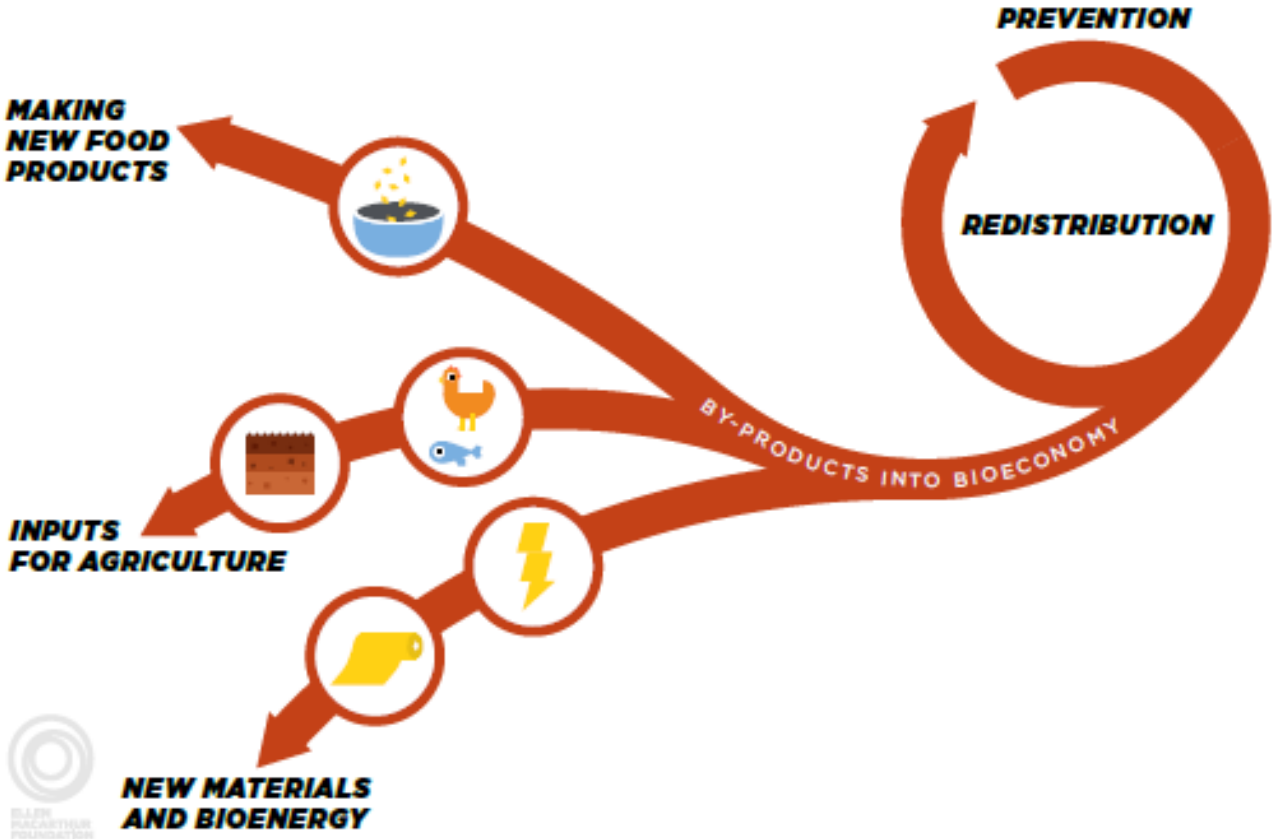
Source: Ellen Macarthur Foundation, Report “Cities and Circular Economy for Food”



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You're invited!

To the **Final Conference** for LIFE Multibiosol

Where: Zaragoza, Spain
When: May 29th 2019

Activities: Visits to the field & production lines, **round table discussion with industry experts**, Spanish food & wine

To RSVP please
talk to me afterwards
Or
write me an email at
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