



**Compostable and biodegradable plastic:**  
An efficient and sustainable solution for agriculture



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# Plastic mulch use

**The mulch market** in Europe amounts to about 80,000 tonnes, 95% of which are still, non-biodegradable polyethylene (PE) films. In Spain, it is estimated 15.000 tonnes. It is difficult to quantify the amount because it increases the covered area, but at the same time it reduces film thickness.

Under normal conditions, the films remain in the field at an average of 3 to 12 months. At the end of cultivation, non-biodegradable must be removed and properly treated soil. This operation is hard due to labor time, transportation and final treatment.

## Mulch,

is the word we use in agriculture to call the protective cover extending over the floor. Mainly facilitates weed control, reduction in use of irrigation water (keeps the ground damp), increase soil temperature (improved root growth and enhancing early production), and reduce soil erosion.

Although technically possible, there is a lot of mulch that is not viable to recover due to the high degree of contamination (mixed with stones and crop or harvest residues). After collection, it has levels between 30 % - 70%<sup>1</sup> of pollution, which they force to manage three or even five times the material to get a ton of recycled film (Figure 1).

## By 1000 tonnes of new films



1. Plan Estatal Marco de Gestión de Residuos (PEMAR 2016 - 2022), plastic mulch film could have a 70% of pollution rate.

**Figure 1.** Pollutant rate and trucks that we need to move agricultural plastics. *Plasticulture n° 135*



It is difficult to remove non-biodegradable mulch films at the end of their lives and most of them are not recovered. Occasionally, in some areas where plastic films are not properly collected and recycled, it may happen that they are disposed by burning them directly on the field or in uncontrolled landfills. Obviously both practices cause environmental concerns<sup>2</sup>.

In addition, PE very thin films are not sustainable because when they recover, they break and remain in the soil. *Agriculture Plastics Environment (APE)* Europe estimates more than 30% remain on the field and in the soil. Assessed conservatively, this generates about 15.000 tonnes of microplastics each year that remain in fields across Europe.

The accumulation of plastic particles in the soil in some regions of Europe, such as southern Spain, is already showing negative effects on plant growth and crop yields<sup>3</sup>.

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2. J.W. Garthe, B.G. Miller, 2006, Burning High-Grade, Clean Fuel Made.

3. European Bioplastics: <http://www.european-bioplastics.org/the-upcoming-revision-of-the-eu-fertilisers-regulation-and-the-benefits-of-biodegradable-plastic-mulch-films/>



## What are biodegradable plastics?

**Compostable Biodegradable Plastics** are easy to shred in the soil leaving no residues, because it starts degrading and composting. They can be fossil-based or biobased (derived from biomass). As a function of their chemical structure, they are biodegradable under different environments: soil, water, marine water, home composting and industrial composting. Each certification is the provision by an independent body of written assurance (a certificate) that the product in question meets specific requirements. At the moment, the most important biodegradable product is mulch film in the agricultural sector. At the beginning of 2018, CEN published the first European standard about biodegradable mulch film properties: biodegradation in soil, ecotoxicity and mechanical and optical properties of the film «*EN 17033:2018 - Plastics - biodegradable mulch for use in agriculture and horticulture - requirements and test methods*». This standard supersedes others standards (from Italy and France) and it is a guarantee of «ok Biodegradable Soil» label from TÜV.

In Spain, the biodegradable mulch film had been subjected to "Real Decreto" 533/2017, 26th May, funds for vegetable and fruit sector, from this to National guidelines for environmental actions (action 7.28 and action 7.29). "Real Decreto" subsidizes 50% price of biodegradable mulch.



## Biodegradable plastic mulch: use and advantages

**The biodegradable plastic** is a sustainable solution for reduction of plastics waste. Thanks to its certified capacity to biodegrade when incorporated into the soil, it transforms into organic substances. Also, thanks to lack of residues and toxic effects, the biodegradable mulch film does not have to get it off. This fact is ideal to biodegradable mulch film at the end of the crop cycle through mineralization of microorganism.

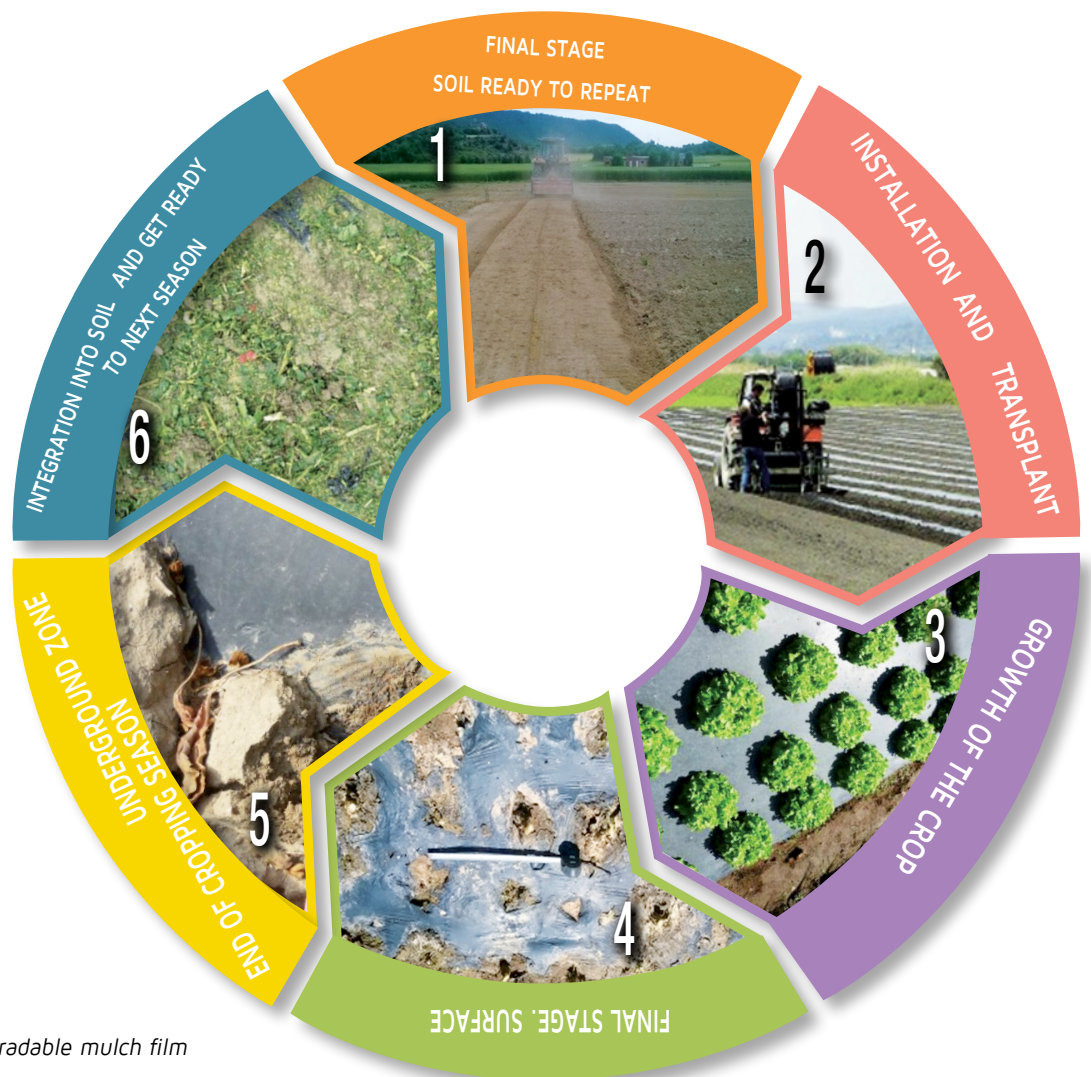


Figure 2. Biodegradable mulch film cycle.

### Agronomic advantages of biodegradable mulches:

- Is it based entirely on organic (biomass based or fossil based). This fact allows its incorporation and degradation in soil.
- Soil microorganisms are able to completely degrade it within 3 to 12 months (depending on the environmental conditions and the type of soil).
- They can be placed in the field with the same type of machines used for conventional plastic mulches.

Application of biodegradable mulch film uses the same equipment as traditional plastic mulch and both tractor-pulled mechanical layers and hand-pulled layers are available.

Asobiocom wrote about application of biodegradable mulch and how it does not have to be removed at the end of the season, but must be tilled into the soil. If you wish, you can read or download [here](#).

### Others compostable products: bindings (thread), clips and raffia



Nowadays, the clips and bindings used in crops of greenhouse are made from conventional plastic and it is impossible to remove them. Therefore, they generate a lot of plastic residue.

Compostable bindings and clips avoid taking them away and treated in composting plants to produce quality compost. The compost improves soil structure and properties. Other important applications are plant pots, root ball mesh and nets.

# 4

## Which is the cheapest plastic?

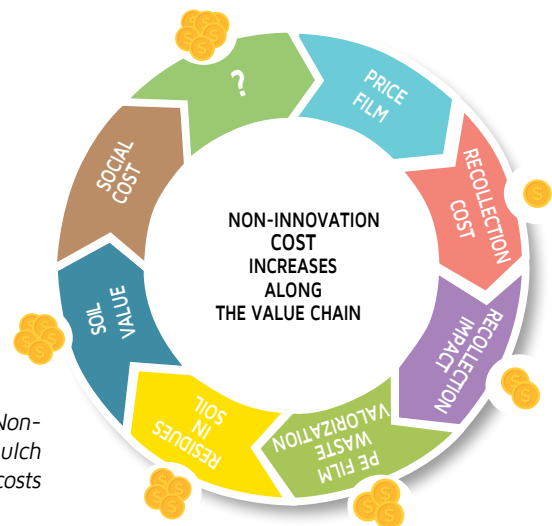
**The biggest barrier** to the use of biodegradable plastics in Spanish soils is the belief that they are more expensive. Certainly, if we only compare the price of the material, it could be an important handicap. It is essential to apply a **broader vision** to be able to analyze **all the costs associated** with the use of one material or another.

If you think about the cost of a traditional non-biodegradable plastic, and add to the price all the other costs: recollection cost and the impact on the soil; plastic waste management cost; clean and recycle cost; emissions; etc. And finally, you add the most difficult cost to measure but in the long term it will be the one that generates the most negative impact on our soil: what it will cost to keep the soil clean and with the same productive capacity that it initially offered.

If you think about the total non-biodegradable plastics cost, the biodegradable plastics price will not be important (Figure 3).



Depends on the «relevance» of any one of those factors



**Figure 3.** Non-biodegradable mulch film waste costs

The biodegradable mulch film had been subjected to “Real Decreto” 533/2017, 26th May, funds for vegetable and fruit sector, from this to National guidelines for environmental actions. “Real Decreto” subsidizes 50% price of biodegradable mulch film. Please read the document (in Spanish) [here](#).





## Difference between biodegradable plastics and oxo-plastics

**In Spain, it is a confusing situation** because oxo-fragmentable materials (so-called «oxo-biodegradable” or «oxo-degradable”) are made from conventional plastics and supplemented with specific additives in order to mimic biodegradation. In truth, however, these additives only facilitate a fragmentation of the materials, which do not fully degrade but break down into very small fragments that remain in the environment. For this reason the use of oxo-fragmentable plastic is one of the root causes of microplastics.

**Oxo-fragmentable material** (so called “oxo-biodegradables” or “oxo-degradables”) **are non-biodegradable traditional plastic** with additives (“oxo”). These additives accelerate the fragmentation process.

Finally, fragments or microplastics remain for a long time.

To compound the problem, the manufacturers of these plastics explain that their products are «biodegradables», «oxo-degradables» or «oxo-biodegradables» which favors confusion.

The statements of the «oxo-degradable» may sound good, but it confuses because it cannot be verified due to the absence of standards<sup>4</sup>.

Recently, there are new films for conventional plastic mulch containing a compostable enzyme and are distributed as biodegradable plastic. These films have been analyzed and they question their biodegradability<sup>5</sup>.

Also, there is a specific European regulation to define when a film is really biodegradable. This is the EN 17033. Therefore, any film that is promoted as biodegradable has to be certified according to this standard. The standard ensures that products are biodegradable. And it avoids environmental impacts as harmful as oxo-fragmentable additives.

Oxo-fragmentable materials are going to be banned in the European Union.

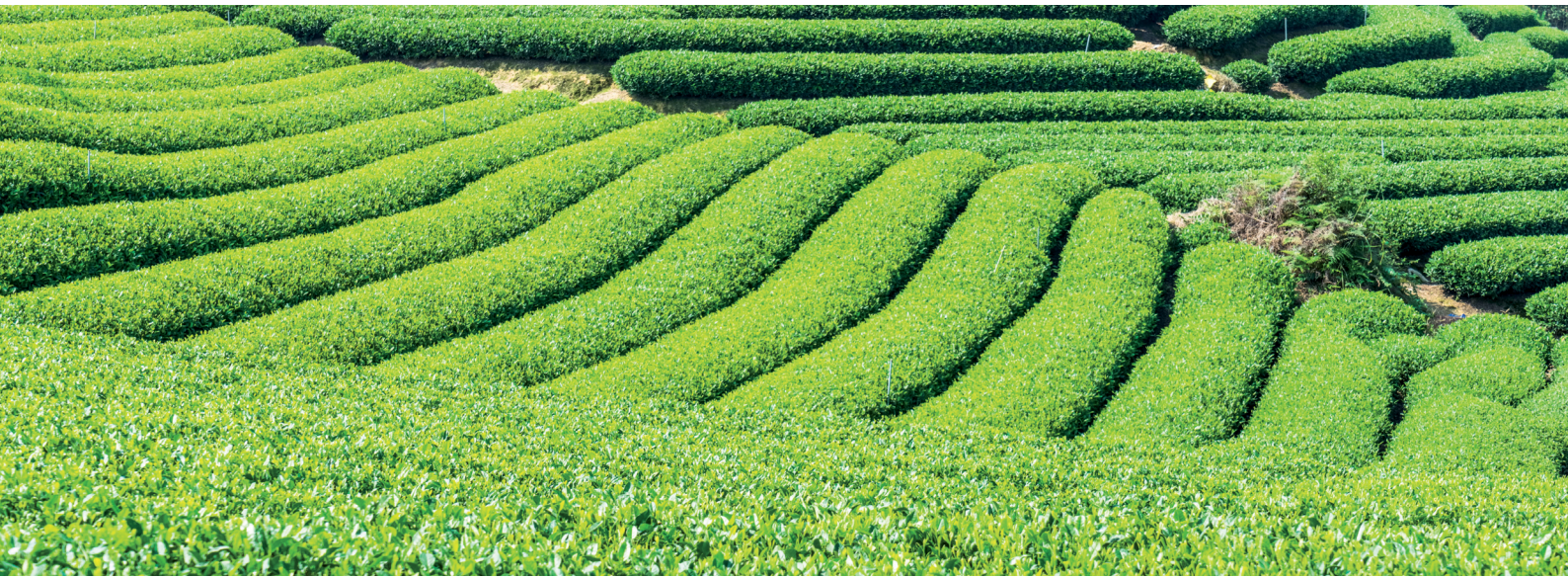
4. European Bioplastics: [http://docs.european-bioplastics.org/2016/publications/bp/EUBP\\_bp\\_additive-mediated\\_plastics.pdf](http://docs.european-bioplastics.org/2016/publications/bp/EUBP_bp_additive-mediated_plastics.pdf).

5. [https://docs.european-bioplastics.org/publications/EUBP\\_QA\\_enzyme-mediated\\_degradable\\_plastics.pdf](https://docs.european-bioplastics.org/publications/EUBP_QA_enzyme-mediated_degradable_plastics.pdf)



## Where can you find compostable biodegradable plastic?

**Asobiocom's web** Spanish Association of Compostable Biodegradable Plastics, ([www.asobiocom.es](http://www.asobiocom.es)) here you will find information and documents about compostable biodegradable plastics.



**ASOBIOCOM**, is a non-profit association, was born in 2012. It will promote, defend and investigate compostable biodegradable plastics.

**ASOBIOCOM** was born out of compostable biodegradable plastic manufacturers and converters need to be represented and to offer an interlocutor, both to authorities and users and consumers for the development of this sector.

**ASOBIOCOM** is seeking to promote compostable biodegradable plastics in Spain and protect this industrial sector from unethical practice and unfair competition.

We will be glad to give you more information about compostable biodegradable plastics and can put you in touch manufacturers and converters who can give you this product, which is efficient and sustainable.



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