

Biodegradable bio-plastics on soil

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**Final Conference LIFE Multibiosol, 29th May
2019, Zaragoza, Spain.**

AGENDA

- *Agricultural film – problem and solution*
- *Certification scheme(s)*
- *Experimental steps and results*
- *Results and Discussion*
- *Conclusions*



Every year farmers around the world use 1.4 million tons of plastic mulch.

Why is it a problem?

Accumulation indefinitely in landfills

Burning with releasing toxins into the air.



What is the solution?

1. Design and develop sustainable products alternative to traditional plastic mulch
2. Test the performance and biodegradability of bioplastic products
3. Validation in field of plastic products for vegetables (with mulching) and for fruits (with biobags and clips)
4. Validation of quality on soil, crop production in the field and commercial quality post-harvest

Plan de actuación - Action Plan

El siguiente diagrama resume las actuaciones comprendidas en el Proyecto.

The following diagram summarizes the activities implemented in the project.



PROBLEMS OF BIODEGRADABLE FILM DEVELOPMENT

1. Mechanical strength is generally insufficient and it is difficult to operate on a large scale. This is one of the important reasons for limiting the wide application of biodegradable mulch film (till now)

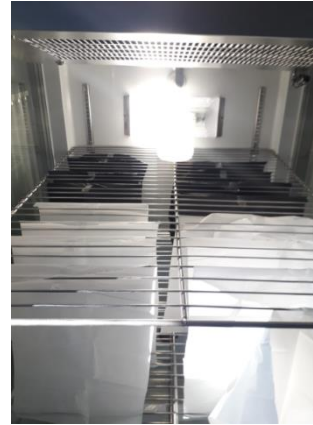
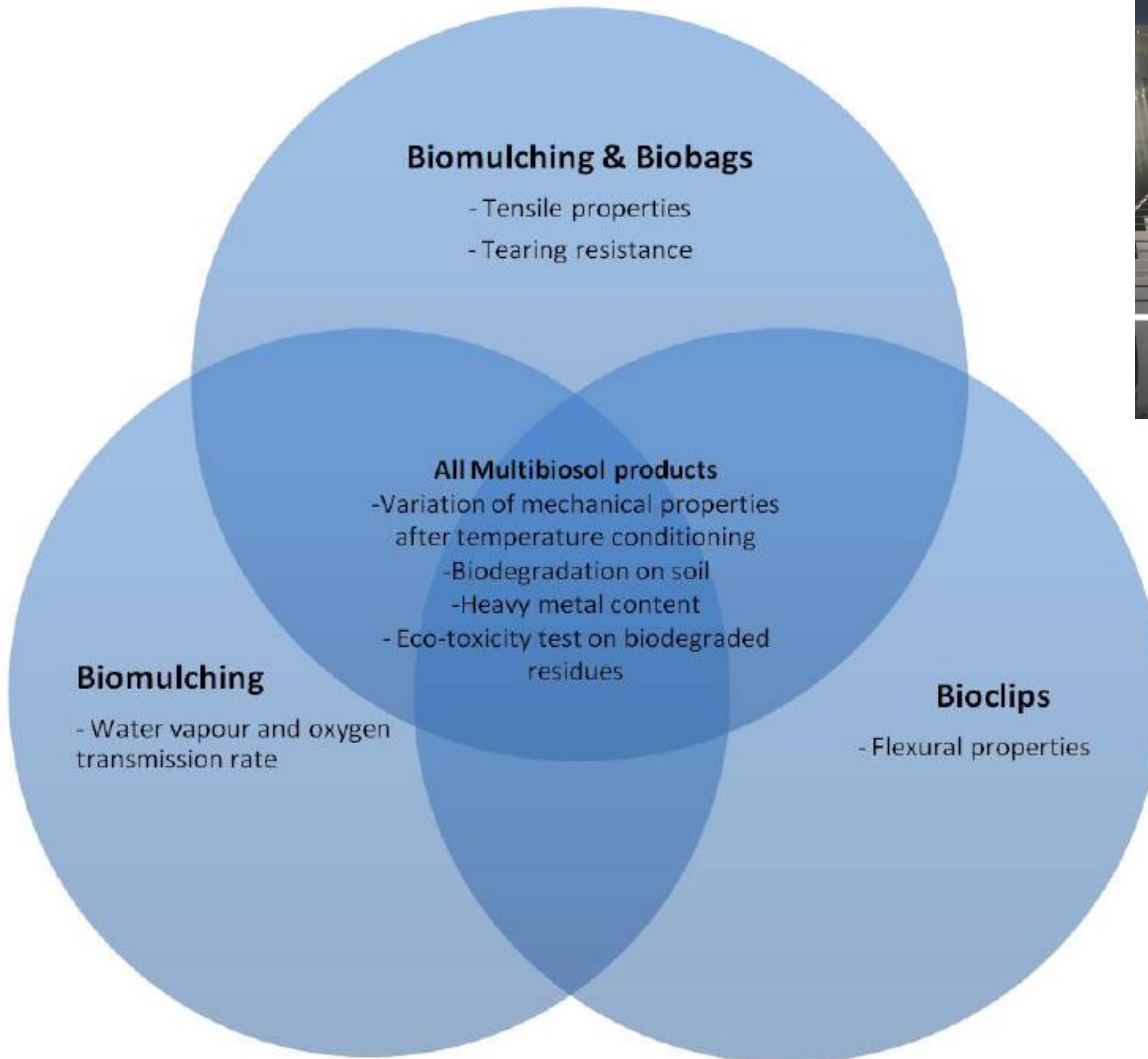


2. Degradation time of biodegradable plastic film and the monitoring of degradation are poor
3. Requirements of different climatic conditions and crop growth are difficult to be met

4. Compared with ordinary PE plastic film, high cost is an important limiting factor for the large-scale application of biodegradable plastic film.



TEST THE PERFORMANCE



Mechanical Properties:

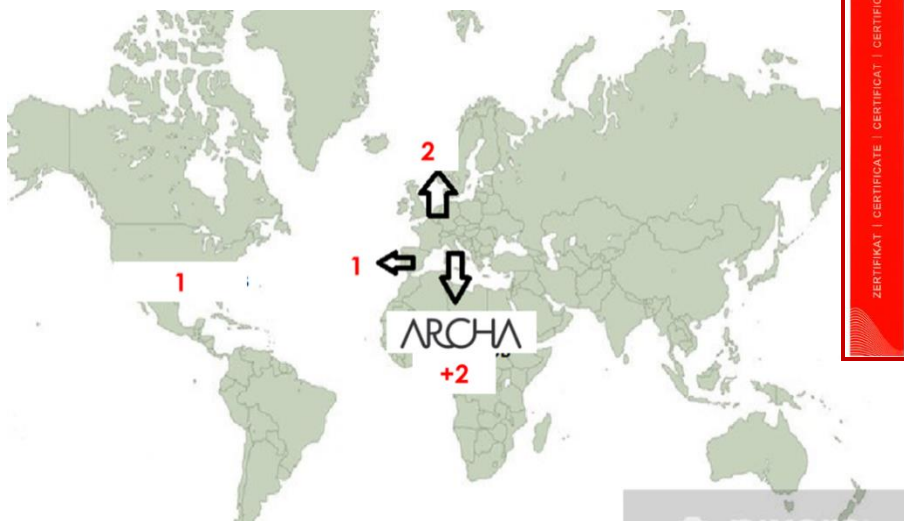
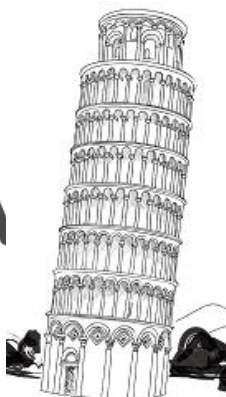
- Tensile and tear tests on film (ASTM D 882 – 12 and ASTM D 1938)
- Oxygen and water vapour permeability for mulching film (ASTM D3985 – 10 and ASTM F1249 – 13)
- Standard flexural tests on bioclips (ASTM D 790 – 15)
- Ageing of plastic film (EN ISO 4892-3)

Biodegradation and certification scheme:

- Biodegradation on soil (ASTM D5988-12)
- Heavy metals and fluorine content plastic materials and final soil (EN 13657 + EN ISO 17294-2 and EN 14852:2016)
- Ecotoxicity test on final composted residues (OECD 208)

LABORATORY RECOGNITION FOR CERTIFICATION SCHEMES ON PACKAGING AND PLASTIC MATERIALS (TÜV Austria – DIN CERTCO)

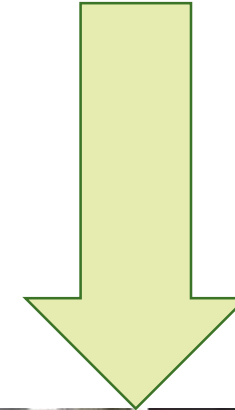
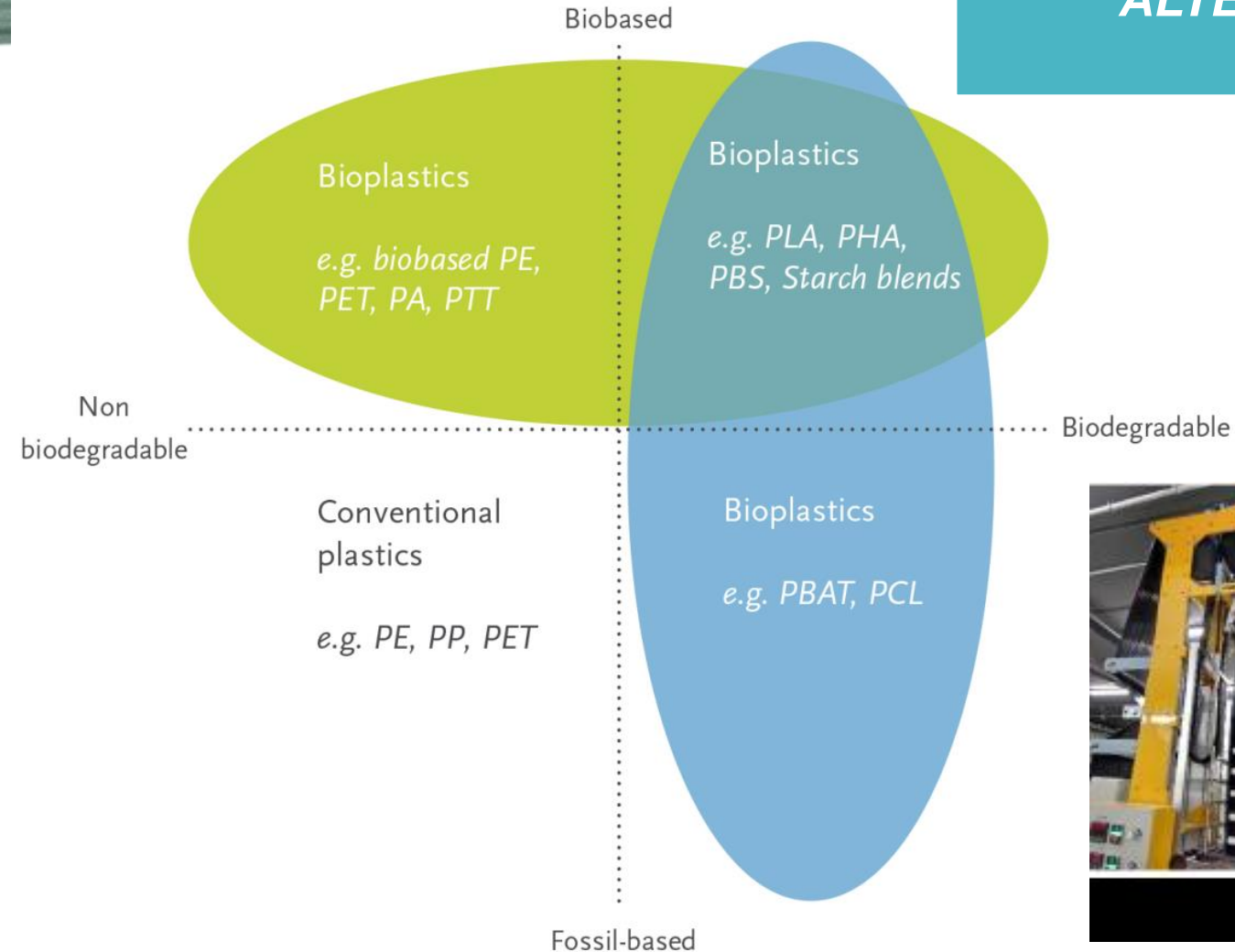
ARCHA



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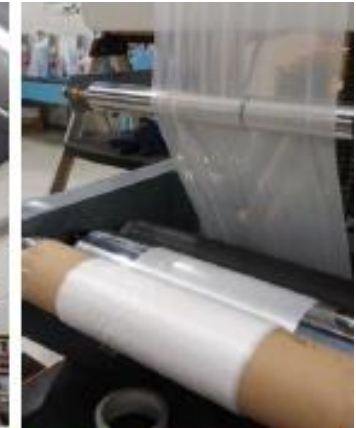
DESIGN AND DEVELOP SUSTAINABLE PRODUCTS ALTERNATIVE TO TRADITIONAL PLASTIC (MADE BY AITIIP)



Mulching



Film for fruit bags



BIODEGRADABILITY OF BIOPLASTIC PRODUCTS

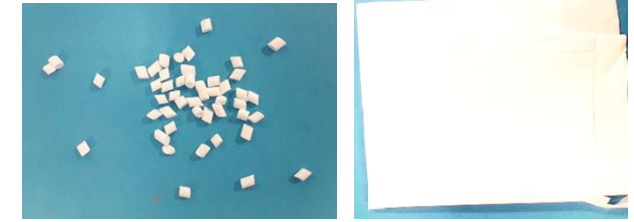
The conformity to the EN 13432 Regulation for the **OK biodegradable SOIL label**

The experimental steps for the assessment of the conformity:

- Identification and characterization of the products
- Biodegradability in soil condition
- (Qualitative) disintegration and effects on the biological treatment process
- Effect on the final substrate quality



MbBio 1901



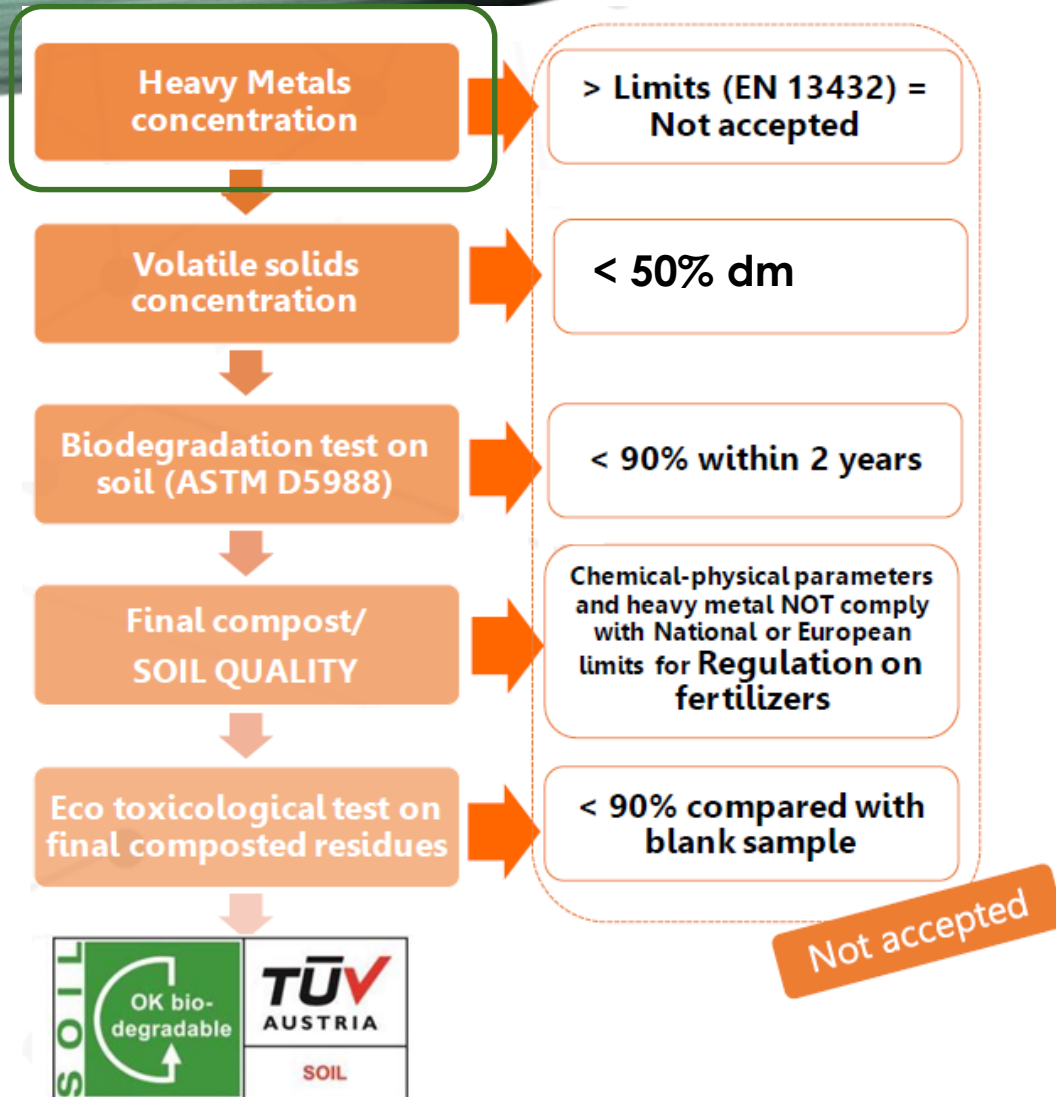
MbBio 1902



MmBio 191



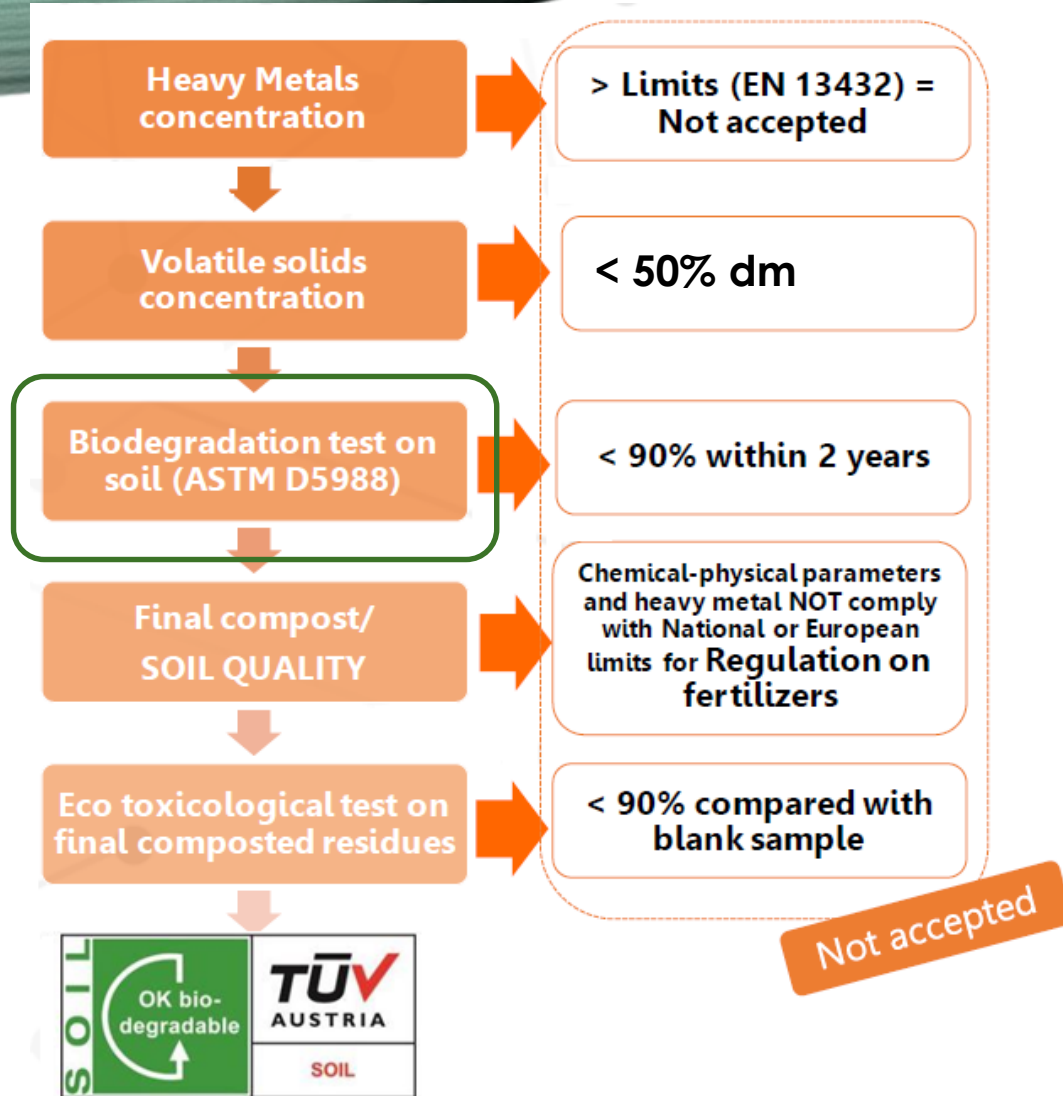
CERTIFICATION SCHEME AND RESULTS



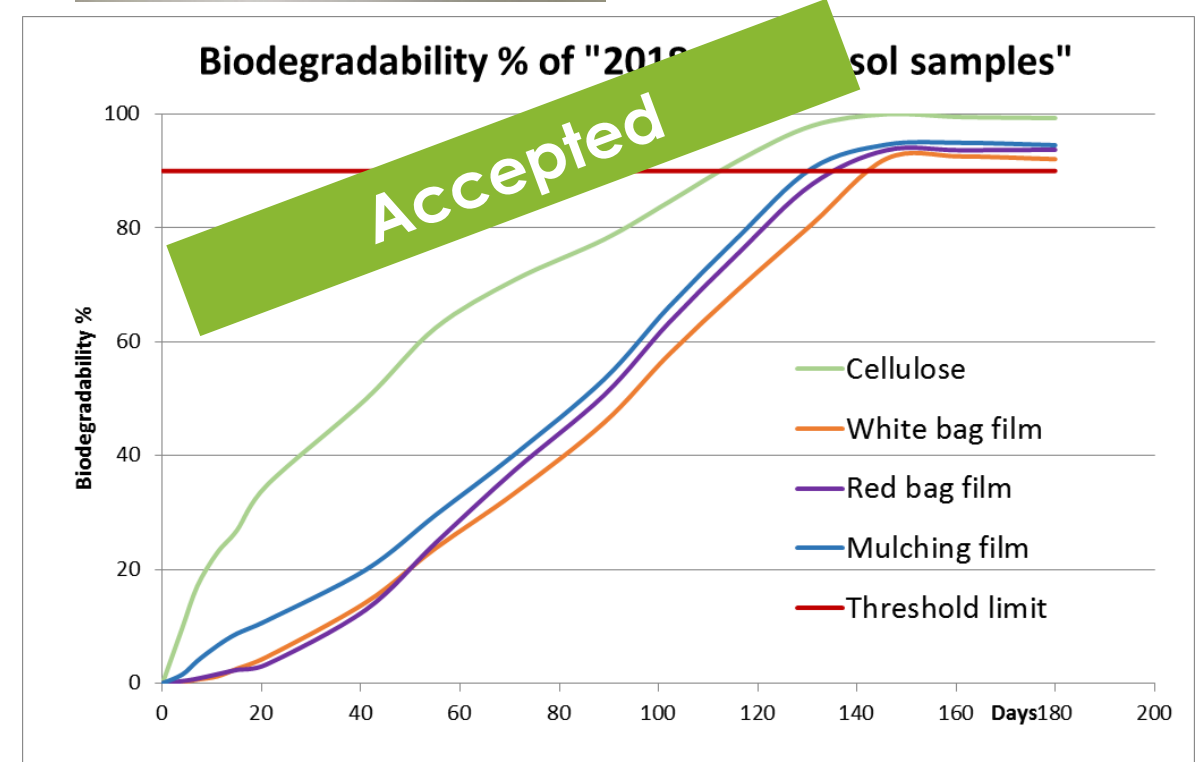
Identification and characterization of the products

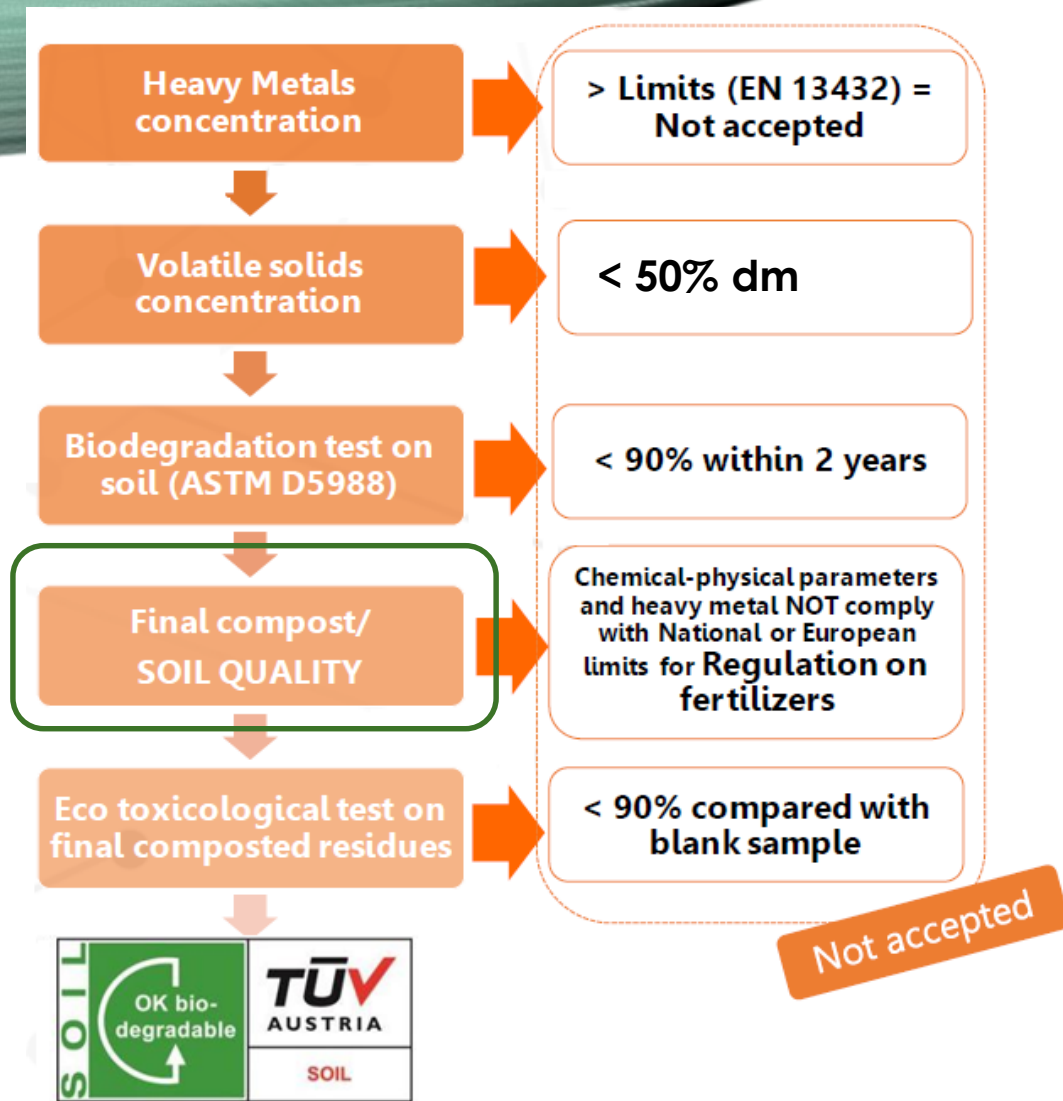
	Units	DL	White bag film	Red bag film	Mulching film	EN 13432: 2000 Limits
As	mg/kg dm	0,1	< DL	0,74	< DL	5
Cd	mg/kg dm	0,1	< DL	< DL	< DL	0,5
Co	mg/kg dm	0,1	< DL	< DL	< DL	-
Cr tot	mg/kg dm	0,1	0,358	0,227	< DL	50
Hg	mg/kg dm	0,1	< DL	< DL	< DL	0,5
Mo	mg/kg dm	0,1	< DL	< DL	< DL	1
Ni	mg/kg dm	0,1	< DL	0,81	0,86	25
Pb	mg/kg dm	0,1	< DL	0,572	0,437	50
Cu	mg/kg dm	0,1	< DL	2,51	1,72	50
Se	mg/kg dm	0,1	< DL	< DL	< DL	0,75
Zn	mg/kg dm	0,1	5,33	4,04	5,16	150
F	mg/kg dm	0,05	< DL	< DL	< DL	100

CERTIFICATION SCHEME AND RESULTS



Biodegradability in soil condition





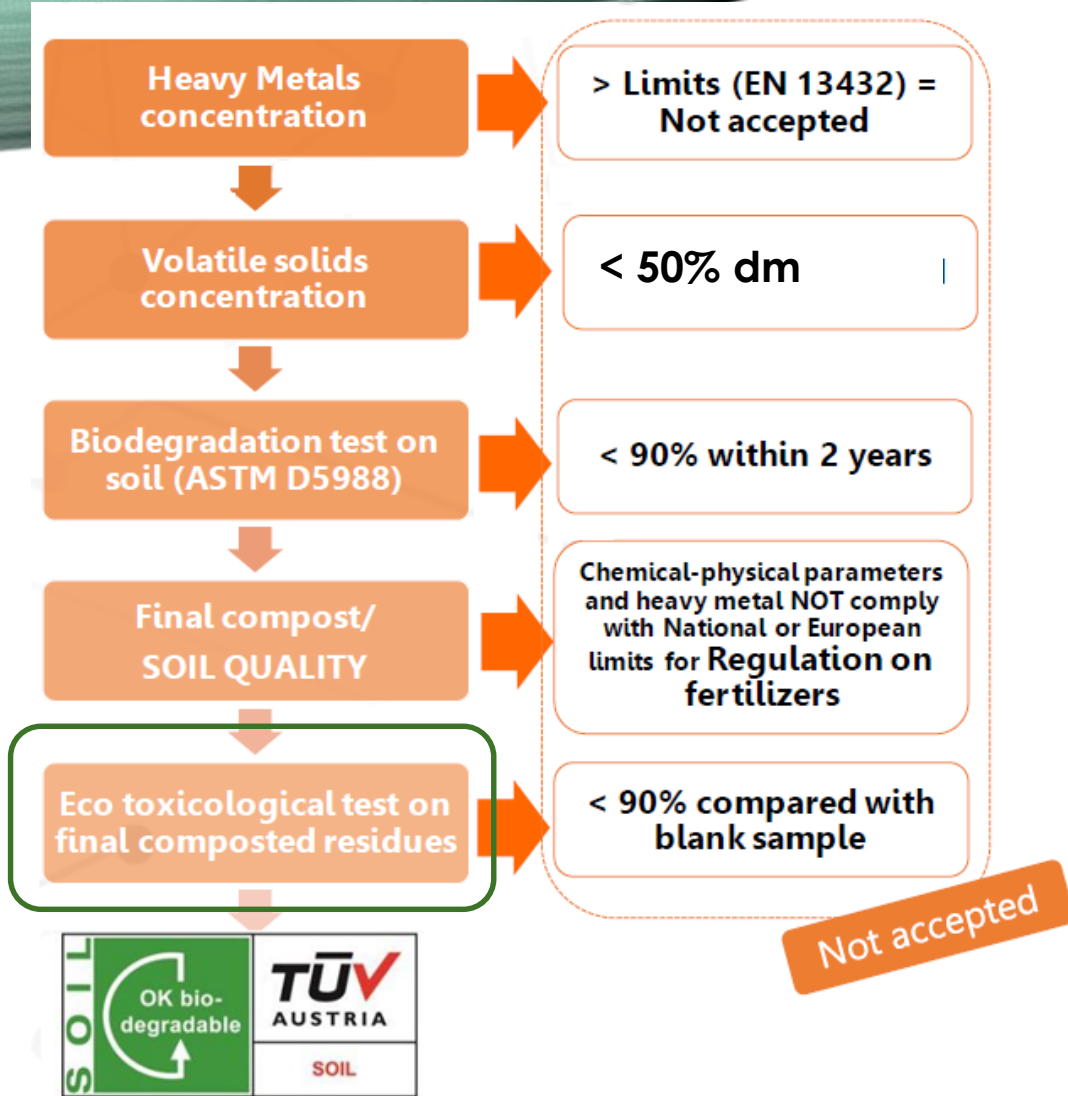
CERTIFICATION SCHEME AND RESULTS



(Qualitative) disintegration and effects on the biological treatment process



CERTIFICATION SCHEME AND RESULTS



Effect on the final substrate quality

	Sample dilution	Germination rate (%)	Fresh Weight (%)
White bag film	25%	98.32	98.29
	50%	100.68	100.30
Red bag film	25%	100.3	103.0
	50%	101.0	101.5
Mulching film	25%	98.32	101.16
	50%	101.02	100.13



	Sample dilution	Germination rate (%)	Fresh Weight (%)
White bag film	25%	97.59	98.96
	50%	98.37	97.40
Red bag film	25%	100	102.8
	50%	97.55	95.46
Mulching film	25%	96.39	101.97
	50%	100.0	96.54



LABELS OK BIODEGRADABLE SOIL



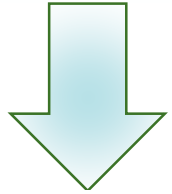
  	
CERTIFICATE FOR AWARDING AND USE OF THE 'OK BIODEGRADABLE SOIL' CONFORMITY MARK TA8031903462	
Issued by TÜV AUSTRIA CERT GMBH	
Product(s): Domain Group Family Type Trade mark Description / Particularities	Products Biodegradable in SOIL Finished Products Garden, horticultural & agricultural products Films (Mulching) MmBio 191 Colour: black No printing
Licensee:	FUNDACIÓN AITIIP, MOSES productos y otras filiales C/ Romero 12, Poligono Industrial Empresarium 50720 Zaragoza Spain
Criteria:	<ul style="list-style-type: none"> Test Program with ref OK 10 edition C 'Bio-products – degradation in soil'
Validity:	From 07 May 2019 till 07 May 2024
Conclusions of the examination:	The products comply with the above mentioned certification criteria, as confirmed by the report no 65001755 / 2019-AG-463p.
Applicable certification system:	Type examination followed by supervision through verification tests on samples from the distributor's stocks or of the market. The conformity of the product is guaranteed by the procedures for awarding and use of the 'OK biodegradable SOIL' conformity mark. This only applies for specimen bearing the 'OK biodegradable SOIL' mark.
Brussels, 07 May 2019  For the Certification Committee Ph. DEWOLFS President of the Committee	
Annex : /	
<small>TML-TO-YADL-CERT-200-OKS-002_cen(Ecode)_EN Rev 1902</small>	
<small>This certification was carried out according to the TÜV AUSTRIA CERT procedures for certification and is regularly monitored. TÜV AUSTRIA CERT GMBH Deutschstraße 10 A-1230 Vienna</small>	
<small>051026-18-4</small>	

Development direction of biodegradable mulch film

- ✓ Intensive research on degradation mechanism and regulation technology
- ✓ Price reduction by reducing the production cost through:
 - ✓ large-scale production of raw materials and complete formulas,
 - ✓ improvement of processing techniques
 - ✓ promotion of large-scale application
- ✓ Increase policy support, adopt subsidies or preferential policies for the application of biodegradable mulch film products

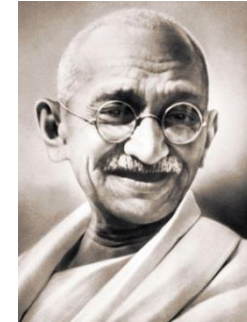
MAIN CONCLUSIONS

Identified (at least) n. 3 formulations of mulching and fruit bags for the **OK biodegradable SOIL certification** with mechanical properties comparable with benchmarks



MAIN GOALS

1. Reduction of waste landfilling with complete biodegradable plastics and packaging (assuring soil protection)
2. Zero waste programs starting from the design of production processes and innovative products



“The world has enough for everyone’s need but not for everyone’s greed”

Mahatma Gandhi



“God always forgives, man sometimes forgives, Nature never forgives”

Pope Francis

Never forget : biodegradability is not an excuse for littering !

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