

In the course of European H2020 project NoAW (No Agricultural Waste), a waste-based and biodegradable polymer has been developed from various agricultural residues: a Poly (3- hydroxybutyrate-co-3-hydroxyvalerate) (PHBV). Agricultural applications have been identified as interesting application and Ecozept has conducted a 2-stage expert survey to assess in-depth the market acceptance of the PHBV in three agricultural applications (coated fertilizer, mulch film and horticultural pot) and thus verify the value of directing strategic efforts towards this sector. The present presents the synthesis of the core results and conclusions based on the assessment of the experts on horticultural pot application.

## Current market of biodegradable and bio-based horticultural pot

According to the experts interviewed, biodegradable and bio-based pot is a growing market, notably in UK and Germany. Customers are looking for these material and for pot producer it is important to be ready when regulation will evolve. None of the experts currently produced marketable biodegradable pot, despite the growing interest for these products.

### Obstacle to biodegradable or/and bio-based material use in pot sector

- Technical issues for the moment, especially regarding mechanized handling
- Processability into horticultural pot
- Biodegradation can be too slow and can have negative impact in recycling machines if thrown away by consumer
- Price remains main criteria for the sector, especially retailers who are the key decider
- Recycling is more and more used in pot sector and interest retailers
- Supply of material in constant quality and sufficient quantity
- Adaption of the sector to these limitations and changes
- Few regulatory constraints
- No existing certification for biodegradable or bio-based pots

## Strengths and weaknesses of PHBV for pot from experts' point of view

Market actors were interested by the NoAW PHBV, notably because of the technology used, its biodegradation capacity and the fact that the raw material allows to lower the price compared to other bio-based/biodegradable material.

### Strengths and weaknesses of PHBV for horticultural pot application

	Compared to fossil based material	Compared to other bio-based and biodegradable material
Strengths	<ul style="list-style-type: none"> <li>Biodegradable</li> <li>Bio-based raw material</li> </ul>	<ul style="list-style-type: none"> <li>Raw material not in competition with other uses</li> <li>Lower cost Higher cost (contradictory)</li> <li>Better biodegradation capacity</li> <li>PHBV in general is more stable and has better gaz permeability</li> </ul>
Weaknesses	<ul style="list-style-type: none"> <li>Higher cost</li> <li>Limited technical properties: resistance to storage and transport, processability, adaption of the producers</li> <li>Few legal constraints on material for horticultural pot</li> </ul>	<ul style="list-style-type: none"> <li>Higher cost (contradictory)</li> <li>Limited properties of the PHBV in general: potentially its sensitivity to external conditions</li> </ul>

## Success factors and obstacles for market acceptance

Key success factors for market acceptance	Obstacles
<ul style="list-style-type: none"> <li>• Cost</li> <li>• Certification on bio-based composition</li> <li>• Esthetical properties</li> <li>• Biodegradation duration, notably adapted to home compost</li> <li>• Resistance to use, to mechanized handling, heat, light and water</li> <li>• Same properties than fossil based material.</li> <li>• No negative impact on soil or plant by releasing molecules</li> <li>• Adapted to pot production</li> </ul>	<ul style="list-style-type: none"> <li>• Resistance</li> <li>• Higher cost</li> <li>• Convincing key actors: retailers and garden centers</li> <li>• Recycling is a current trend in the sector</li> <li>• No certification</li> <li>• Potential supply issues</li> <li>• Potential negative effect on process machines and production speed</li> </ul>

## Points of clarification

Given the limited information available on NoAW PHBV, it is necessary to refine several elements to assess more precisely its market potential:

- A better picture of its characteristics and price
- Its processability into pot and the ability of this pot to fulfil its role
- Biodegradation properties of the pot, potentially composed of a mixture of materials
- Final composition of the pot
- Capacity to supply material in sufficient quantity and quality

This characterization will enable to:

- better segment and confirm/refine the potential markets identified (non professional users or professional growers, short cycle duration crop such as aromatic plants or vegetable seedlings);
- to differentiate the interest between PHBV and PHBV composite;
- precise the need of mixtures with other materials.

Even if technical suitability remains central, general retailers and garden centers seems to be key actors in this sector and price appear to be the main characteristic for material decision. Moreover recycling is a growing solution for this sector. Several pot producers have shown interest in working with NoAW material. The formation of this partnership appears to be the entry point into the sector.

## Activities to enter on the market

- Provide reliable data (properties and price) to pot producers
- Provide samples for testing (e.g. biodegradation, effect on soil, etc.)
- Conducting trials on pure material powder and mixes

Characterize material

- Assess the lifetime in different condition, the potential effect on plant growth.
- Work in collaboration with professional growers

Field trials

Assess processability of the material

Marketing and communication

- Pot producers conduct trials on the material
- Adaption to injection moulding and current machines

- Promote through various channels, e.g. industry events
- Demonstrate pot interesting characteristics
- Convince retailers and garden centers
- Get a biodegradation or raw material certification