A MAGYAR TUDOMÁNY ÜNNEPE

www.emu.ee

Eesti Maaülikool

Estonian University of Life Sciences

EXAMINATION OF THE LIFE CYCLE OF PACKAGING MATERIALS FOR BERRIES

LIINA LAUMETS *MSC STUDENT, ESTONIAN UNIVERSITY OF LIFE SCIENCES*

DR. ULVI MOOR *ASSOCIATE PROFESSOR, ESTONIAN UNIVERSITY OF LIFE SCIENCES*

PROF. DR. KLÁRA TÓTHNÉ SZITA *PRESIDENT, LCA CENTER ASSOCIATION*

DR. VIKTORIA MANNHEIM *VICE PRESIDENT, LCA CENTER ASSOCIATION*

MTA MAGYAR TUDOMÁNYOS AKADÉMIA

Introduction

- EU is focusing on limiting the use of Single-Use Plastics (SUP).
- Fresh berries are mostly packed into SUP punnets.

What could be sustainable alternatives?

https://www.euronews.com/green/2022/12/15/amazons-annual-plastic-packaging-waste-could-circle-the-world-800-times-report-alleges

https://thelatch.com.au/berry-packets-reuse/

The strawberry industry in the Netherlands is using cardboard punnets.

Other countries are following suit…

(Photo: Ulvi Moor)

mulgimari.ee

- How do different packaging materials affect the quality and safety of fruits?

- What is the environmental impact of various packaging materials?

Research goals:

- Assessing the environmental impact of four different packaging options.

- Determining the effect of different packaging on the quality of blueberry fruit.

Photo: A. Koort

http://www.sofrupak.com/

PLASTIC FREE **100% ecological packaging**

Note: The cardboard and cellulose film can be recycled together and are 100% biodegradable after 24 weeks!

PAPER

BRONZE
FRUIT LOGISTICA
Innovation Award
2020

A MAGYAR TUDOMÁNY ÜNNEPE

MTA

The tested materials

Blueberries *(Vaccinium* x *atlanticum* 'Northblue') stored 7 days at 4±2°C followed by 24 hours shelf life at +22°C.

Packaging name	Weight without lid [g]	Weight with lid [g]	The number of aeration holes
CB - cardboard packaging (SoFruPak)		23.61	18 
CBC –cardboard packaging with a cellulose lid (SoFruPak)	22.36		10 
PP – polypropylene packaging, control	6.26	11.71	22 
RPLA - rice straw punnet with PLA lid (Bio4Pack)	11.46	18.37	10 

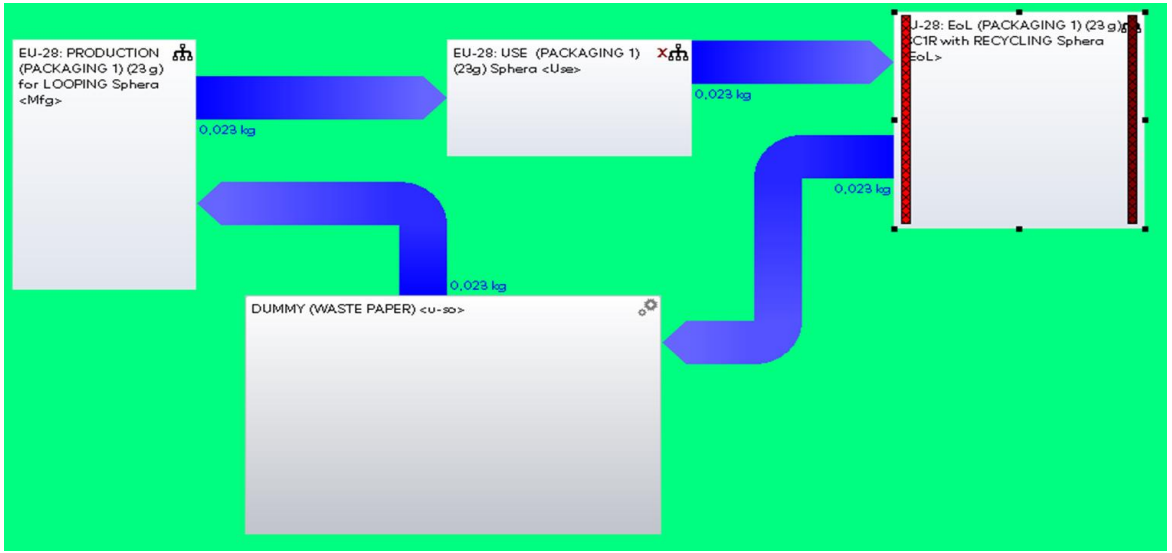
Photos: A. Koort

LCA methodology

- Sphera/GaBi 8.0 LCA software
- Functional unit (FU): 1000 kg.
- Application of the looping method in the case of the Recycling scenario.
- Cradle-to-grave LCA.

Transports:

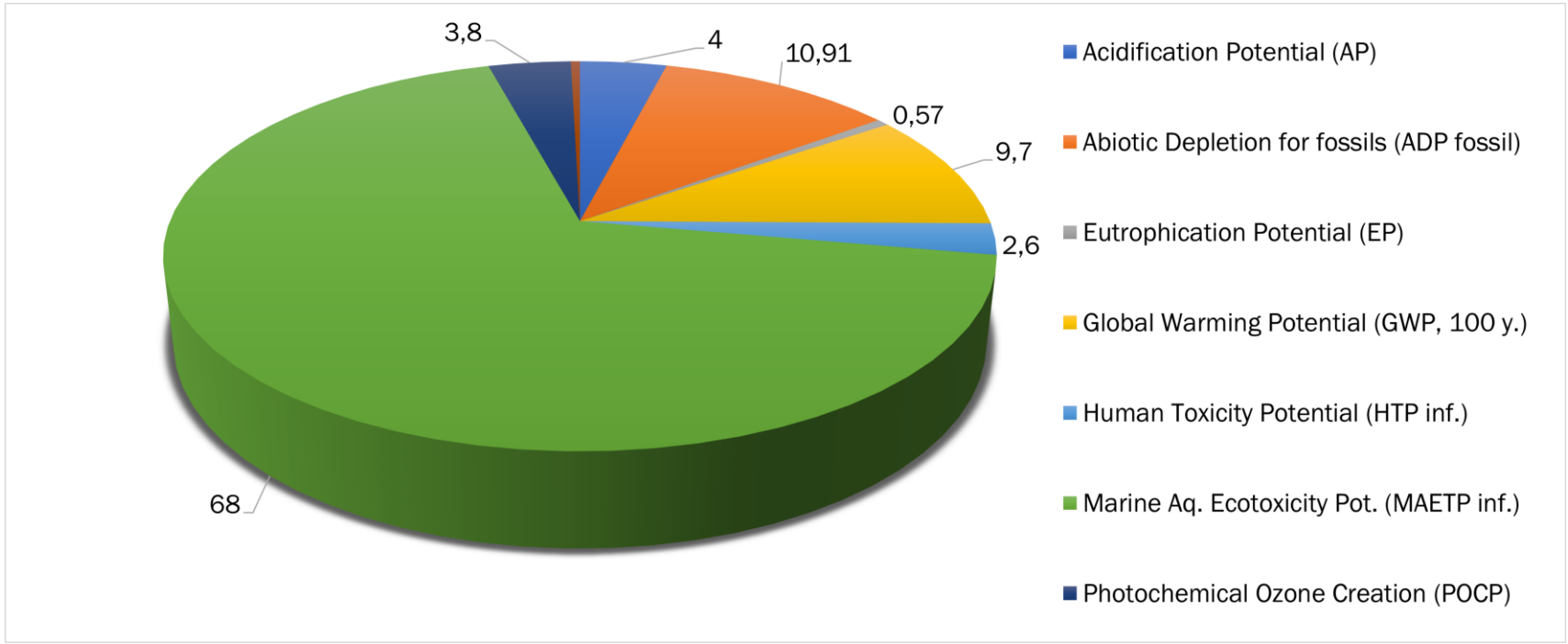
- Transportation of raw materials to the production stage (by truck, Euro 6, with a gross weight of 26-28 tons).
- Transport between the production stage and the use stage (truck trailer, Euro 6).
- Transport between the Use and End-of-Life stages using a truck trailer with Euro 6 emissions standards.



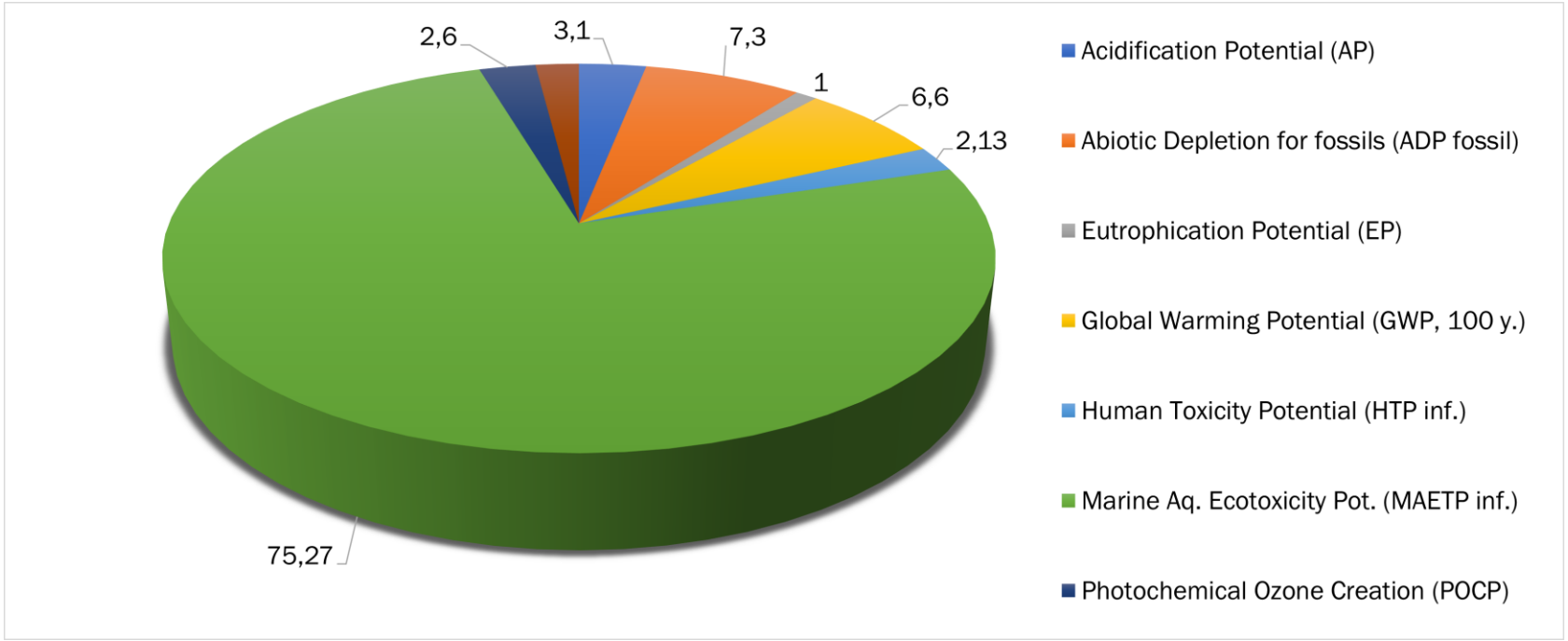
Examined scenarios:

1. Recycling
2. Composting
3. Disposal/Landfilling
4. Conventional incineration

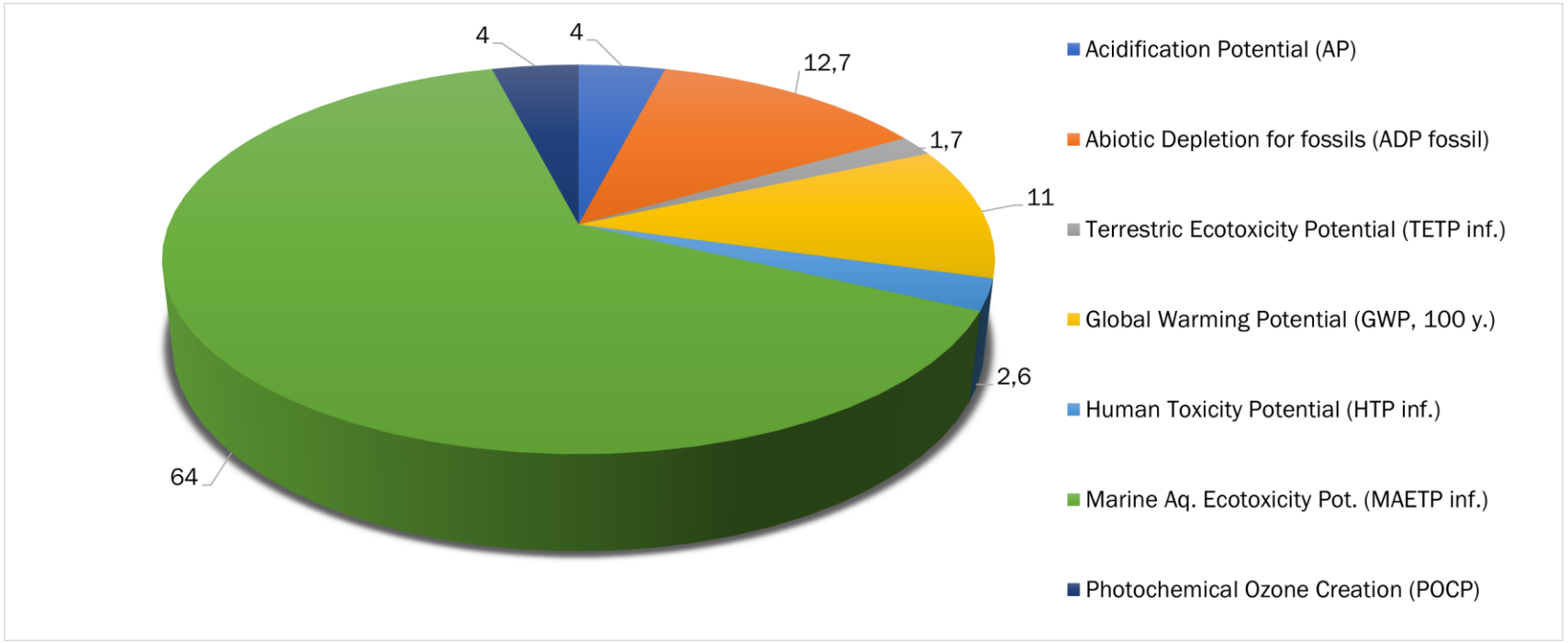
Results of recycling for the CB packaging, %



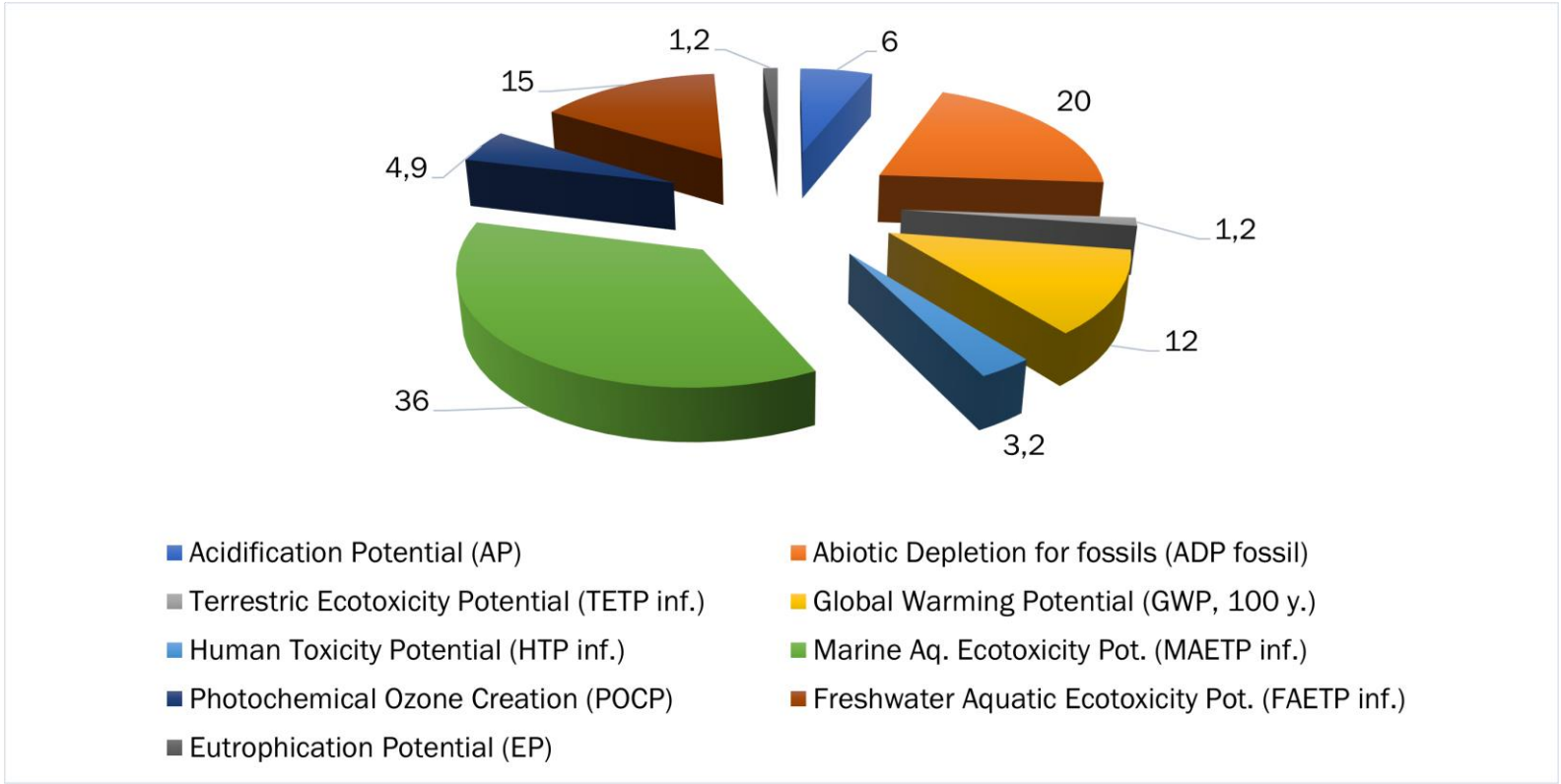
Results of recycling for the CBC packaging, %



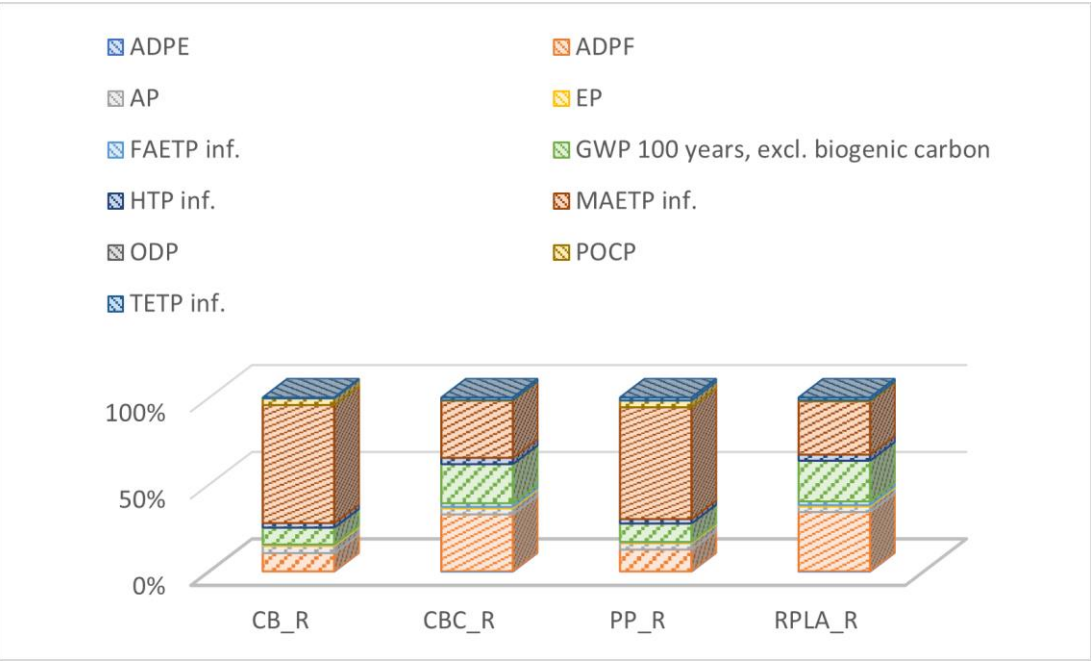
Results of recycling for the PP packaging, % TETP!!

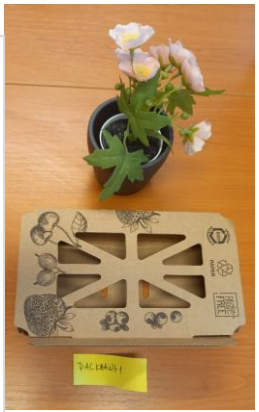


Results of recycling for the RPLA packaging, kg TETP + FAETP!!



Results of recycling for the four types of packaging, kg





P1
CB

P2
CBC

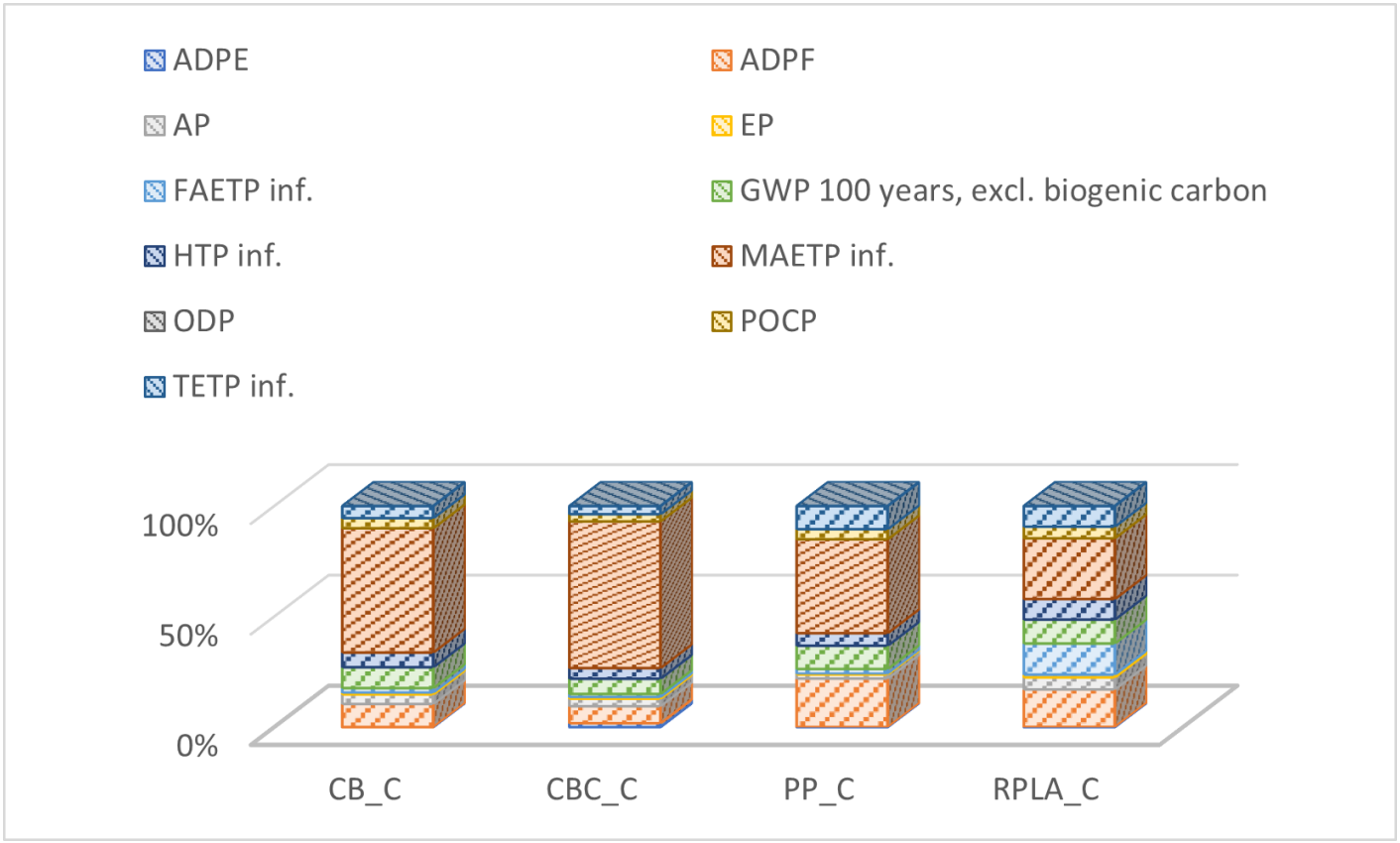
P3
PP

P4
RPLA

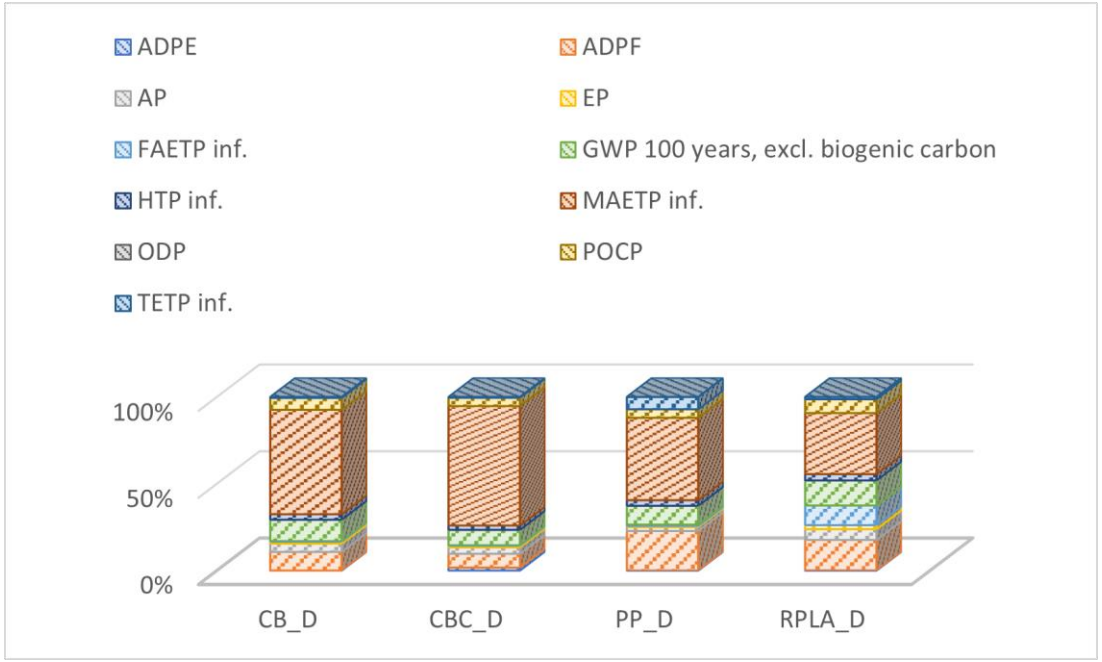
(Photos: V. Mannheim)

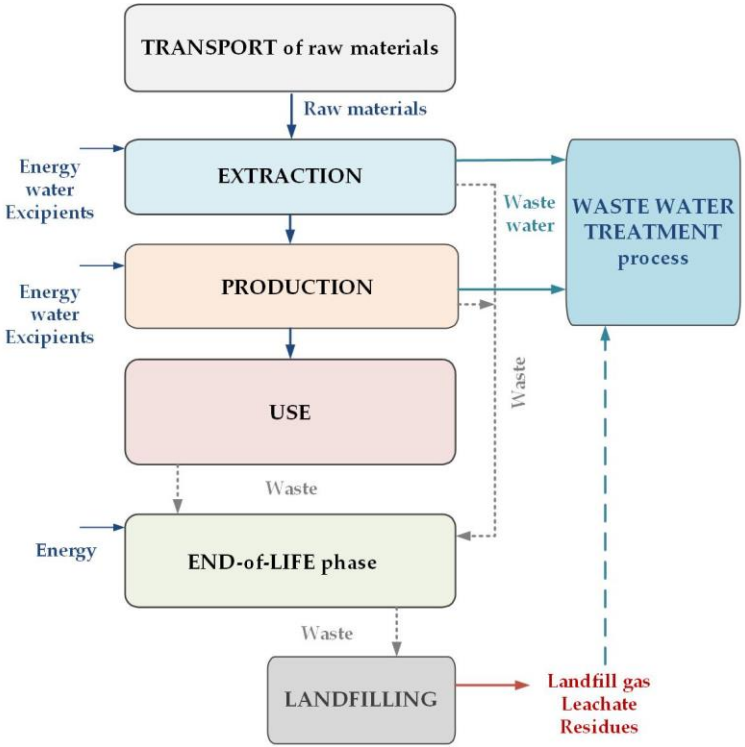
Normalization method: CML 2001 - Jan. 2016, EU25+3, year 2000, excl. biogenic carbon (region equivalents).
Weighting method: Sphera LCIA Survey 2012, Europe, CML 2016, excl. biogenic carbon (region equivalents weighted).

Results of composting for the four types of packaging, kg

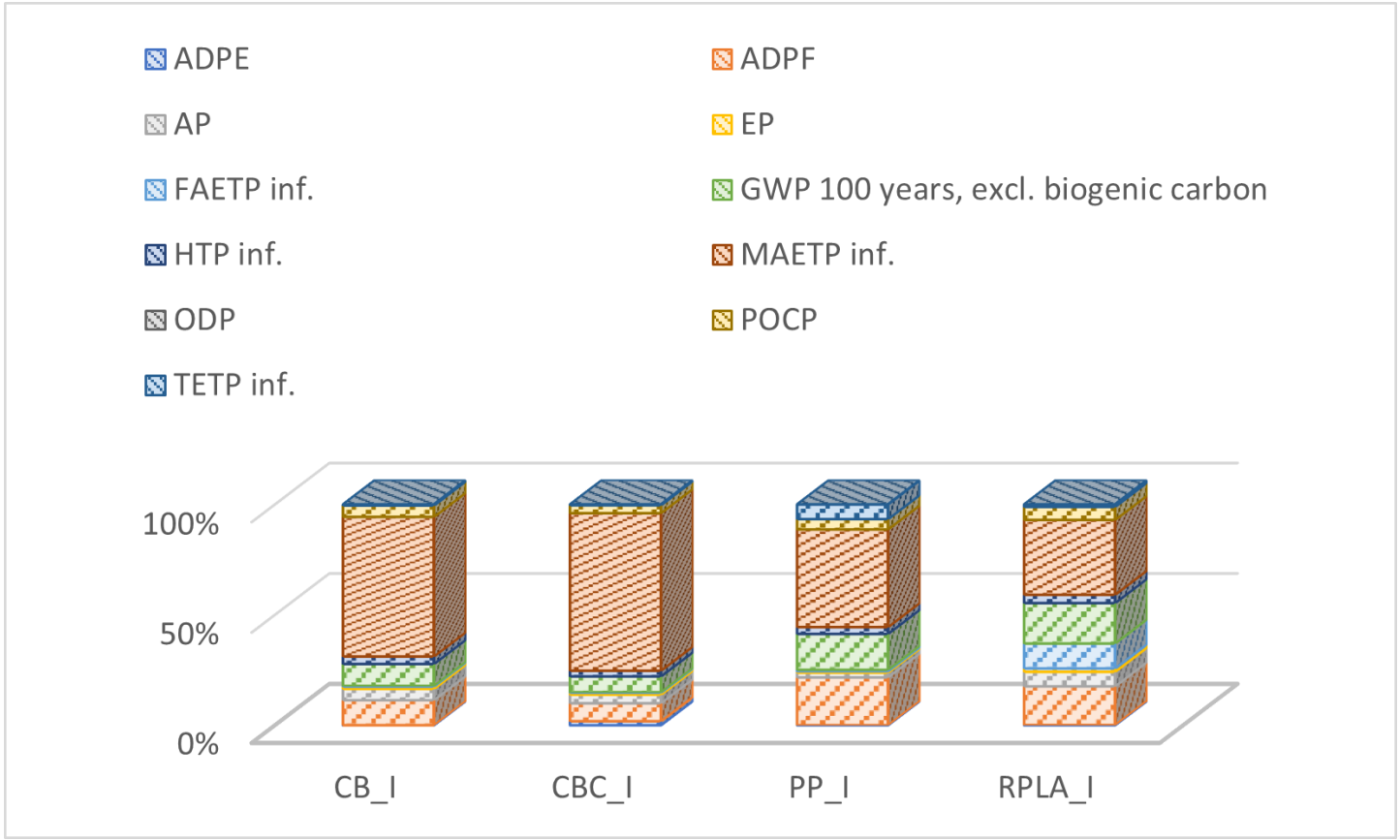


Results of landfilling for the four types of packaging, kg





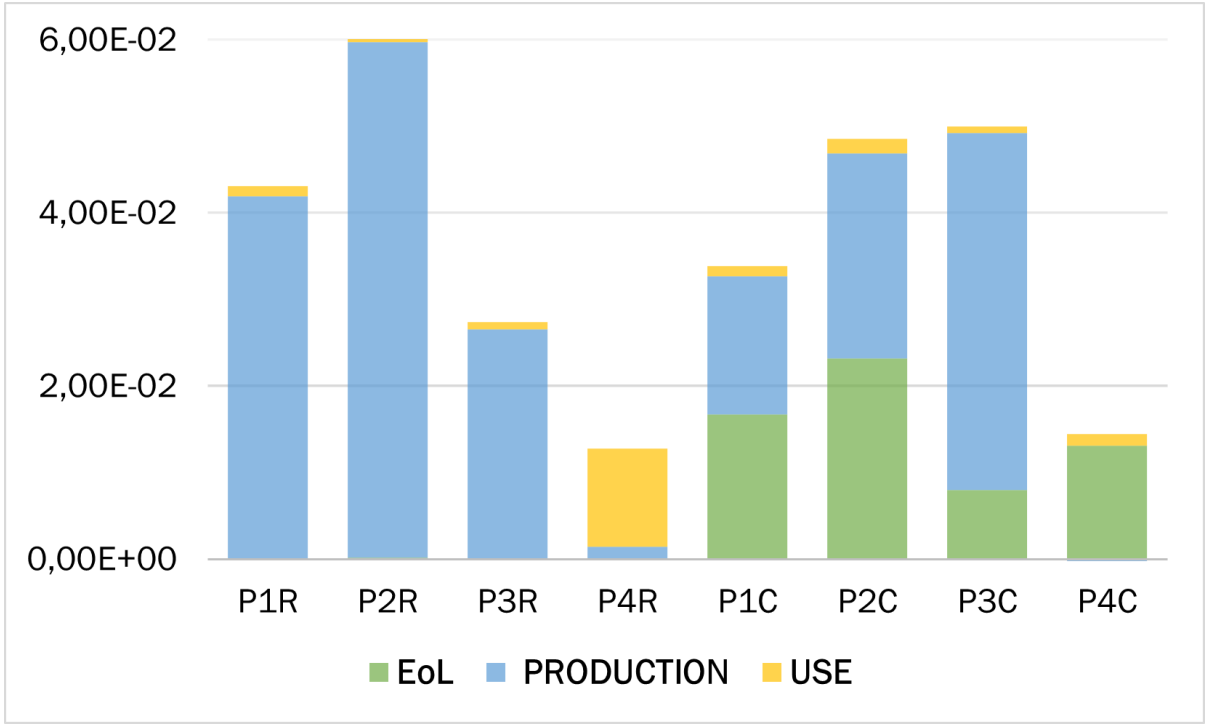
Results of incineration for the four types of packaging, kg



LCA Results

Comparison of GWP values [kg CO_2 – eq.]

Comparison between Recycling (R) and Composting (C)



- Production stage: blue
- Use stage: yellow
- End-of-Life stage: green


P1


P2


P3


P4

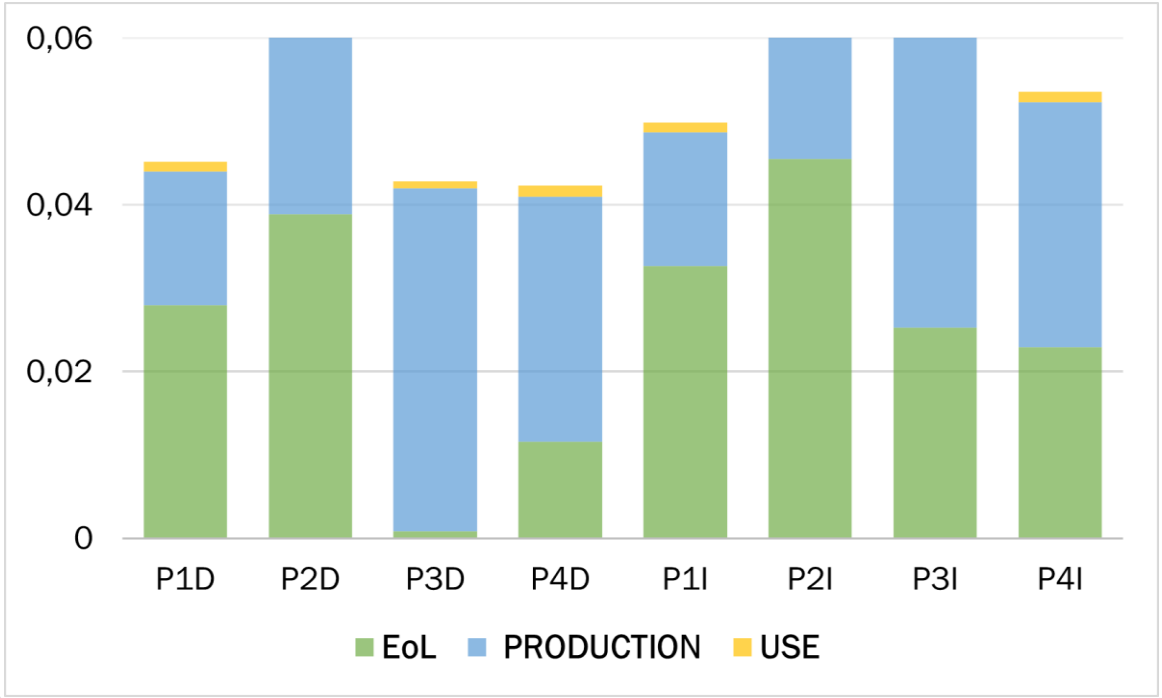
A MAGYAR TUDOMÁNY ÜNNEPE

MTA

LCA Results

Comparison of GWP values [kg CO_2 – eq.]

Comparison between Landfilling (D) and Incineration (I)



- Production stage: blue
- Use stage: yellow
- End-of-Life stage: green


P1


P2


P3


P4

A MAGYAR TUDOMÁNY ÜNNEPE

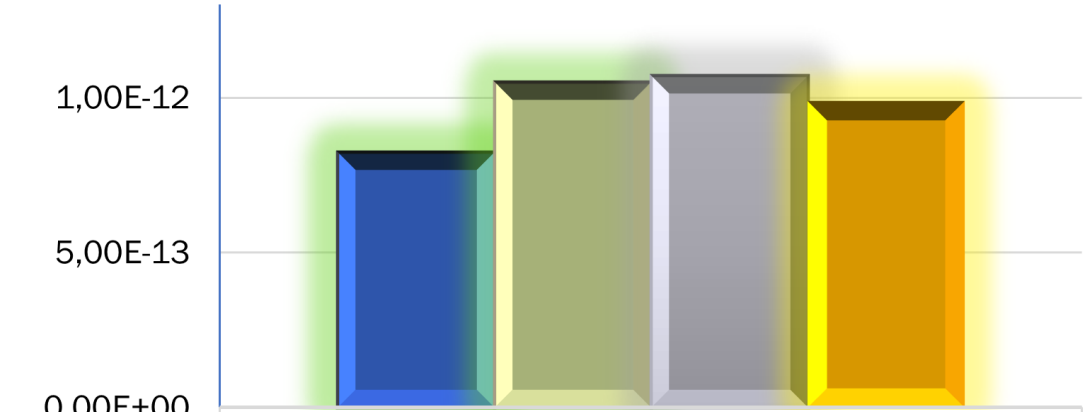
MTA

Conclusions

- Blueberries stored in CB and CBC packaging had higher soluble solids than the control.
- Instrumentally measured colour intensity was higher in RPLA compared to other packages.
- The CB packaging has openings too wide for blueberries, making it unsafe for transportation and leading to higher weight loss due to transpiration.
- The cellulose lid of CBC packaging had some deformations after storage.

(Photos: U. Moor and A. Koort)

Comparison of total environmental impacts [kg]
Packaging type: CB (P1)



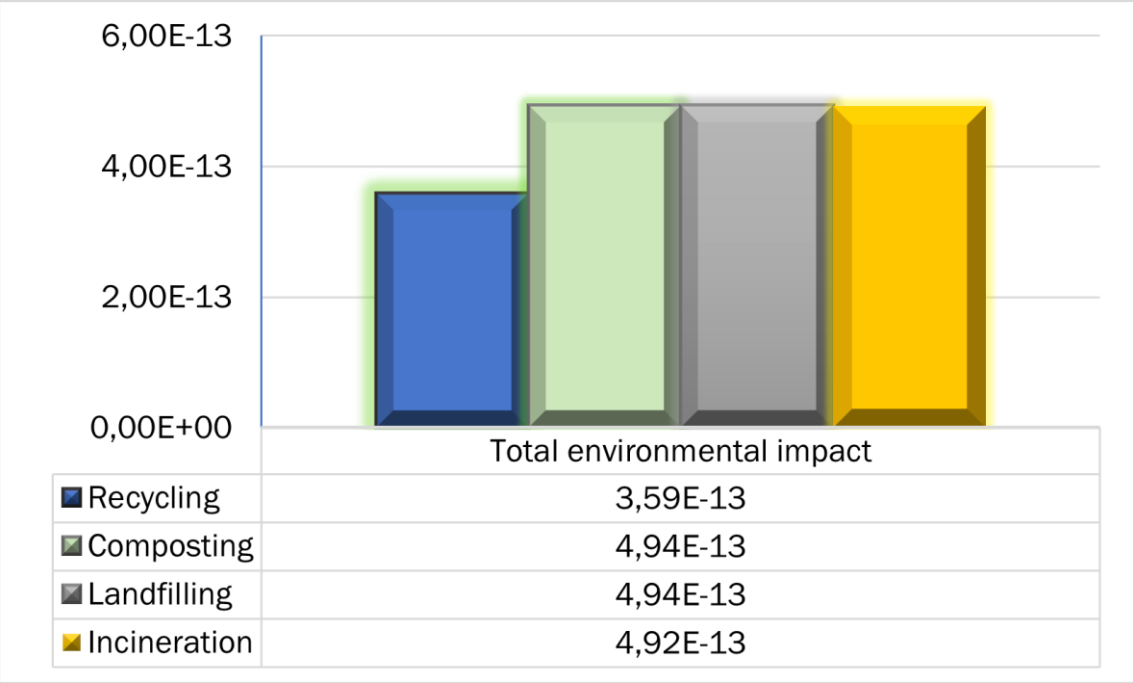
	Total environmental impact
Recycling	8,23E-13
Composting	1,05E-12
Landfilling	1,07E-12
Incineration	9,88E-13

Conclusions

P1

Normalization method: CML 2001 - Jan. 2016, EU25+3, year 2000, excl. biogenic carbon (region equivalents).
Weighting method: Sphera LCIA Survey 2012, Europe, CML 2016, excl. biogenic carbon (region equivalents weighted).

Comparison of total environmental impacts [kg] Packaging type: RPLA (P4)



	Total environmental impact
Recycling	3,59E-13
Composting	4,94E-13
Landfilling	4,94E-13
Incineration	4,92E-13

Conclusions

P4

Normalization method: CML 2001 - Jan. 2016, EU25+3, year 2000, excl. biogenic carbon (region equivalents).
Weighting method: Sphera LCIA Survey 2012, Europe, CML 2016, excl. biogenic carbon (region equivalents weighted).

KÖSZÖNÖM A FIGYELMET!

mta.hu

A MAGYAR TUDOMÁNY ÜNNEPE

MTA MAGYAR TUDOMÁNYOS AKADÉMIA