BIOTREM

Compostable tableware from wheat bran – development and LCA

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ActInPak

COST Action FP1405
Active and intelligent fibre-based packaging – innovation and market introduction (ActInPak)

ActInPak

ActInPak is a pan European (COST) network of the leading experts in active and Intelligent packaging of over 50 institutes and universities of 28 different countries.

The main objective is to develop a knowledge-based network on sustainable, active and intelligent fibre-based packaging in order to overcome current technological, industrial, and social limitations that hinder the wide deployment of existing and newly developed solutions in market applications.

http://www.cost.eu/COST_Actions/fps/Actions/FP1405

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COST is supported by the EU Framework Programme Horizon 2020

COBRO – PACKAGING RESEARCH INSTITUTE

State, self-supporting research institution
subordinated to the Ministry of Economy,
founded in 1973.

Member of:

- World Packaging Organisation,
- International Association of Packaging Research Institutes,
- Polish Chamber of Packaging,
- European Bioplastics.

- Packaging R&D Department:
  - ✓ Packaging and Environment Department
  - ✓ Laboratory for Packaging Materials and Consumer Packaging Testing
- Laboratory for Transport Packaging Testing
- Certification Centre
- Standardization Department
- *Packaging Spectrum* Magazine

BIOTREM

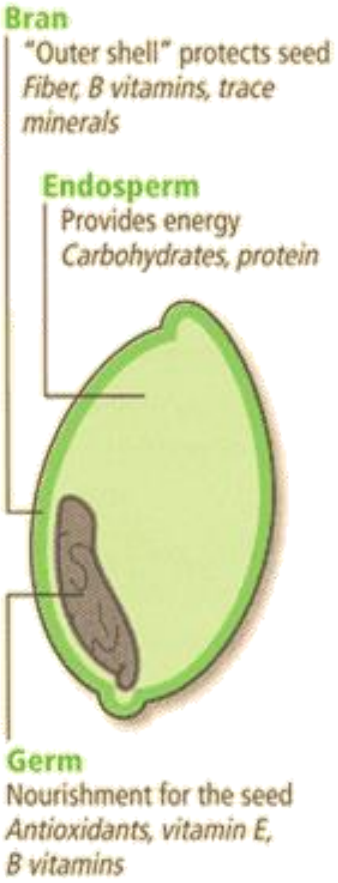
Biotrem technology – wheat bran-based tableware

wheat bran – by-product of the milling industry

Majority of wheat bran is considered to be waste

BIOTREM - LIFE CYCLE

WHEAT BRAN



Wheat bran – seed husk from the remnants of the endosperm, is a by-product of the milling industry.

Only 20% of total mass of wheat bran is used for livestock feed, remaining 80% is waste.

Long-term storage of bran is expensive as appropriate conditions and measures are required.

WHEAT BRAN

- Biotrem is made from 90%-100% wheat bran
- Bran will always be available
- Global bran production is estimated at 87 million tonnes annualy

- In LCA bran is an allocated by-product of wheat

- Bran based packaging reduce the demand for traditional packaging materials

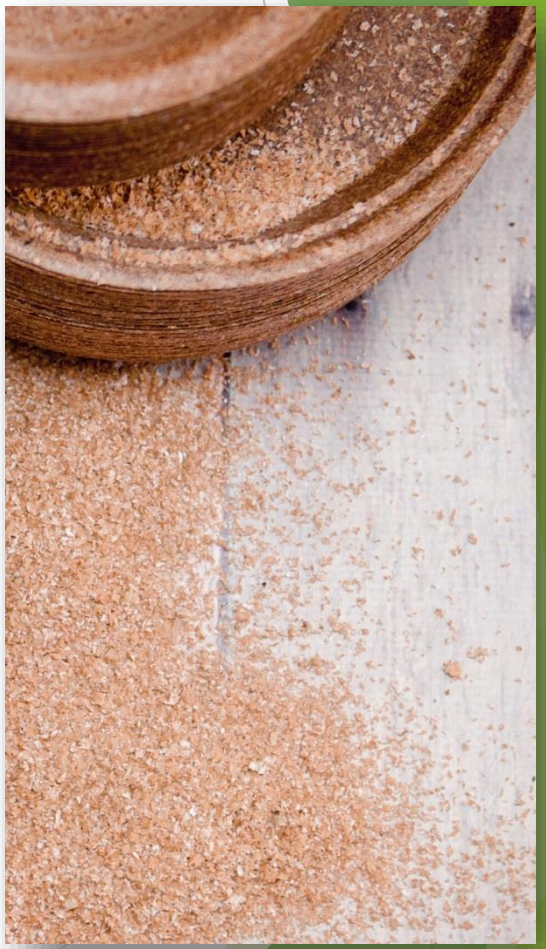
WHEAT BRAN AS A PACKAGING MATERIAL

By-product as feedstock:

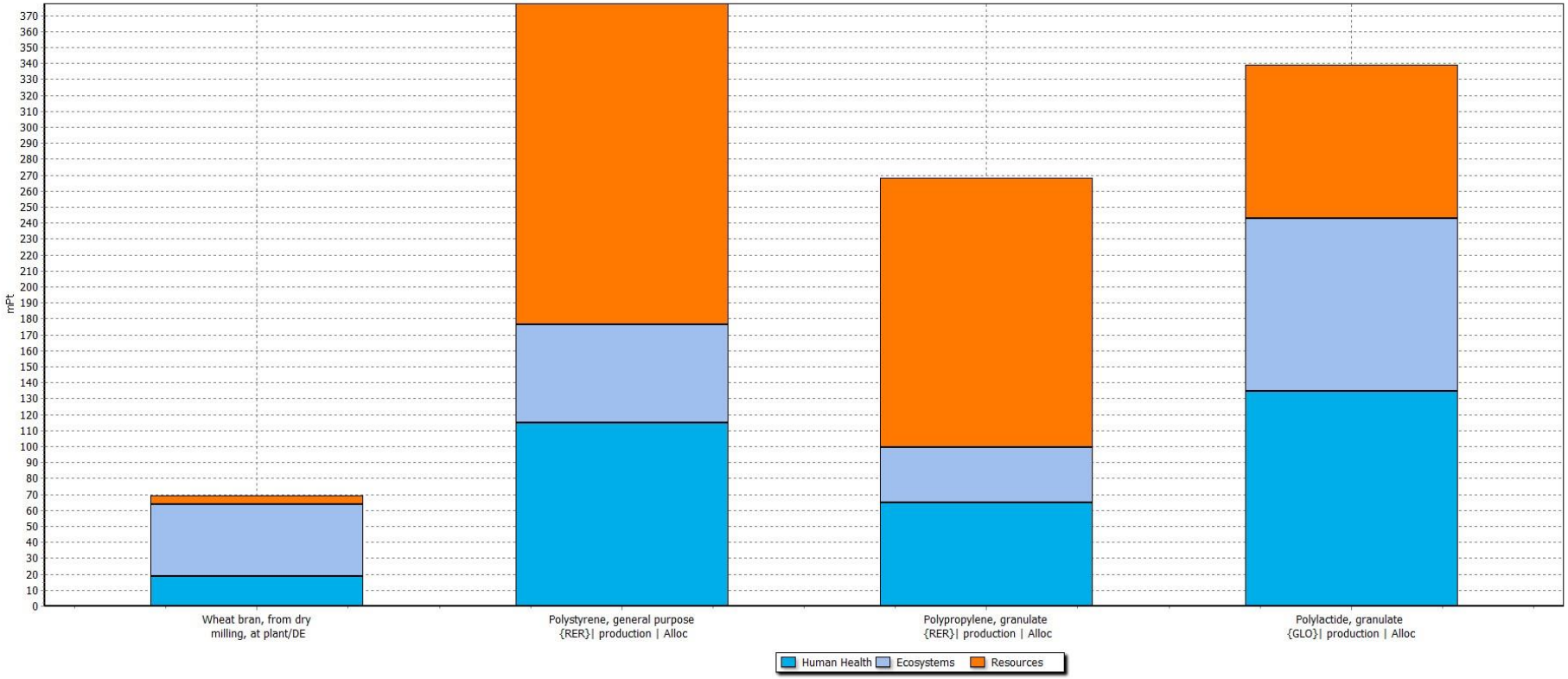
- Reduces the need for petrochemical and pulping industry,
- has very low production impact.

Bran-based packaging can be easily composted, and the compost can be used to fertilize new wheat - closing the loop.

BIOTREM's concept of packaging fits well into the concept of modern and sustainable society.



WHEAT BRAN AS A PACKAGING MATERIAL



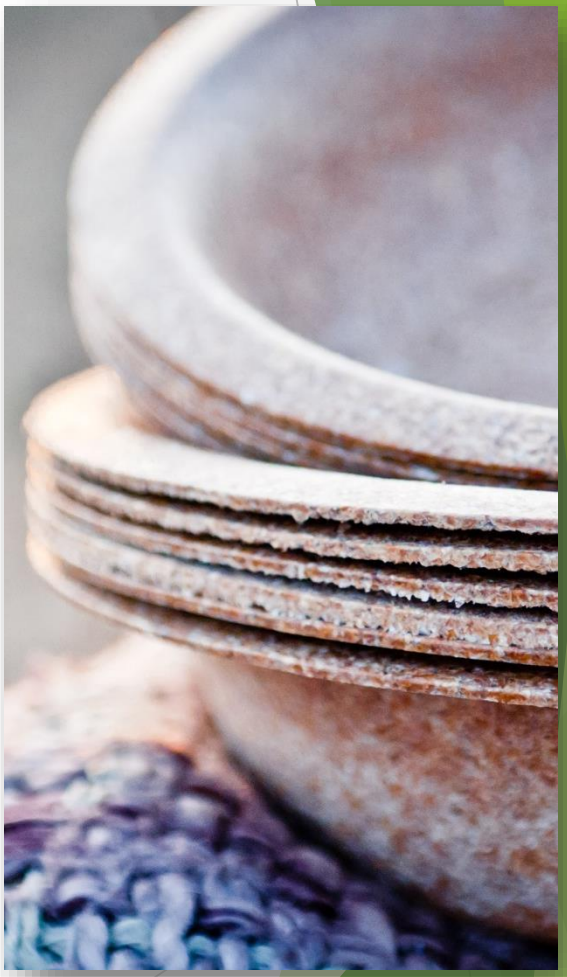
LCA comparison of typical packaging materials with wheat bran *(single score result method: ReCiPe v1.12)*

BIOTREM – production

Processing of BIOTREM is similar to conventional products from plastics or paper & board.

The production of bran-based products comprises of three steps:

1. PRE-TREATMENT OF BRAN,
2. COMPRESSION MOULDING,
3. COATING.



BIOTREM – production

1. PRE-TREATMENT OF BRAN

The bran is moistened, mixed and homogenised.

Inputs: water – 80 liters per tonne

Option: Food grade fats and compostable polyesters can be added to change final product physical properties. (mechanical properties, water retention etc.)

LCA is comparable with standard pre-treatment procedures.

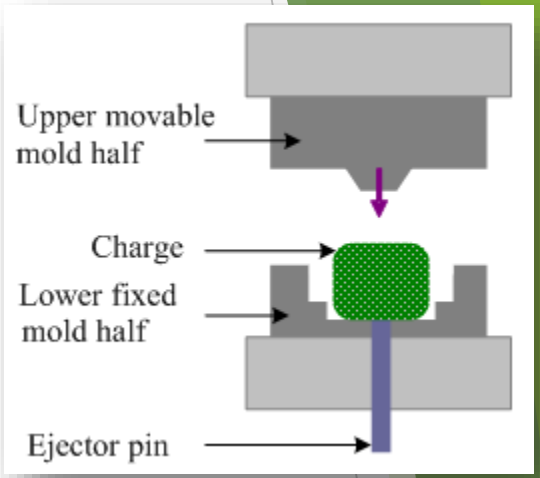
BIOTREM – production

2. COMPRESSION MOULDING

Forming of wheat bran material.

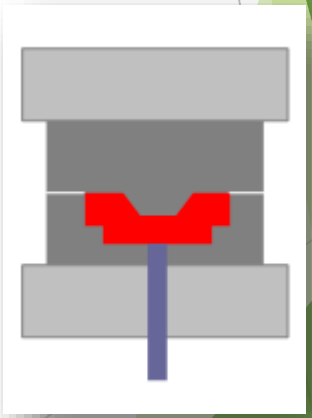
Inputs: 0,03 kWh/product or 108 KJ/product

Most significant impact, but still low in comparison to 550 KJ / product for PP tray



3. COATING (Optional)

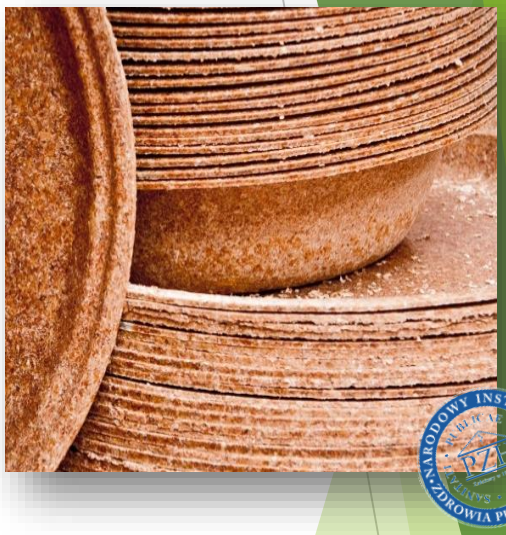
Coating with composition of biodegradable polymers from renawable resources enhancing humidity resistance.



WHEAT BRAN AS A PACKAGING MATERIAL

Biotrem packaging has been positively evaluated by the National Institute of Public Health – National Institute of Hygiene.

Research of physical and mechanical properties and as well as heavy metals concentration (chromium, cadmium, mercury and lead) were carried out in COBRO. Total content of those metals has been assessed as very low.



no	TESTED MATERIAL	Cr	Cd	Hg	Pb	$\sum$ Pb, Cd, Hg, Cr
1	BIOTREM	-	0.4	-	0.1	0,45 ±0,01

WHEAT BRAN AS A PACKAGING MATERIAL

Determination of biobased content of BIOTREM was carried out by Polish Poznan Radiocarbon Laboratory, using radiocarbon (radioactive isotope ^{14}C) dating methodology and accelerator mass spectrometry (AMS) technique.

MODERN CARBON: PMC > 100

Result „PMC > 100" signifies that contained organic carbon was assimilated from the atmosphere in the last decades of the 20th century or recent years.

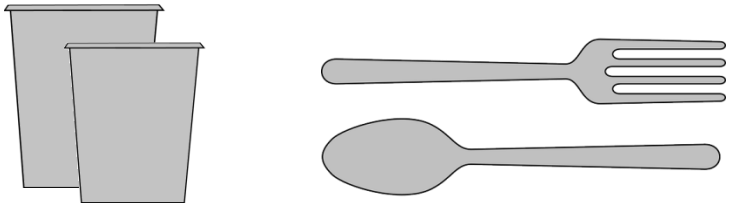
SAMPLE DESCRIPTION	CARBON ^{14}C CONTENT (AMS) [pMC]*
Cellulose film - Natureflex	108.33 ± 0.43
PE-LD film	<0.22
EPS	0.27 ±0.07
Polyolefin film with calcium carbonate	0.82 ±0.08
BIOTREM	109.65 ±0.35
PLA	105.73 ±0.35

*pMC - *percent modern carbon*

BIOTREM – application

Currently Available: Assortment of disposable tableware

Planned: Coated surface plates, bowls and cups,cutlery.



BIOTREM – usage and disposal

Usage:

- LCA usage phase identical to traditional products – no additional process or steps have to be taken to use biotrem tableware

Disposal:

4 types of disposal are considered:

- Incineration
- Recycling (organic)
- Landfilling
- Littering

BIOTREM – disposal

Incineration:

- Concept of biogenic carbon in biobased biotrem applies – emmisions of GHG balanced by the uptake of those gases during growth of the feed stock

Organic recycling - composting:

- Closes the loop – most efficient, but most undeveloped

Landfilling:

- Degradation with natural non-toxic degradation intermidiates

Littering:

- Quick natural degradation
- Help of microbial, insect and rodent activity

BIOTREM – impacts

Feedstock:

- Bran is plentiful and seasonal economic fluctuation is observed (up to 40% change in price)
- Brans' steady demand will help in stabilising prices
- In turn this will positevely affect the milling industry

Production:

- Bran based production will create jobs around mills and rural areas with good infrastrucutre
- Risk of bran packaging production relocation to cheaper labour countries is small due to increased weight of bran – economically unfeasible

BIOTREM – impacts

Usage:

- Losses in the food products – unsold past due date can be disposed with their packaging
- Creation of new suistainable livestyle

Disposal:

- Legislative aspects
- Promotion of compostable and biobased packaging

BIOTREM –benefits

- Limited depletion of fossil oil resources and saving of natural resources such as forests.
- Reducing greenhouse gas emissions and meeting Kyoto agreement targets.
- Reducing the volume of municipal waste that is disposed of via landfill sites or incineration plants and the concomitant pollution.
- Reducing the volume of non-degradable and persistent roadside litter.
- Supporting and strengthening of the currently financial weak position of the wheat milling industry and of the wheat growers.

THANK YOU

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biotrem
naczynia z otrąb