Cowdung based biobased composites for sustainable products (SMP 2105)

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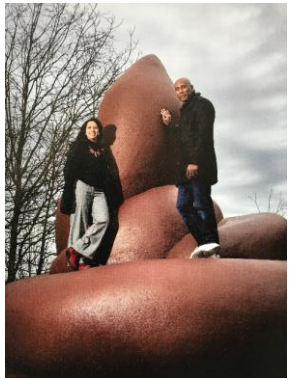
WAGENINGEN
UNIVERSITY & RESEARCH

DUNGse

Background Challenge



Dungse is a material innovation using cow dung by Studio Carbon and Studio Lindey Cafsia, to tackle the problem of surplus cow dung in the Netherlands and India. The team is now working together with WUR for further development of DUNGse, to take it to the market.

Challenge

- Netherlands: 1.6 Mio cows >> 55,000 kton/a dung = 1.8 Mio trucks
  - Intensive livestock farming: 'More manure than land'
  - Alternative use of cow dung → Creating space for pig manure
- India: 300 Mio cows >> 300,000 kton/a dung = 9 Mio trucks
  - Material used as fuel and fiber resource but now is dying out
  - Energy use comes with smoke (respiratory & heart diseases, etc.)

Goals and Targets

Goals

- Understand composition-processing-properties relationships of composites
- Build network of interested industries in NL and India for future cooperation

Target Results

- Quantified performance of dung-based sample products
- Insight in possibilities/limitations of cow dung in wide range of products, using wide range of technologies
- Plan for further development of business case

Realized Workplan

Working Plan	Timeline
Overview of materials produced, organoleptic evaluation	March – May ‘21
Experimental analysis of key properties on different cow dung composites	May – Sept ‘21
Properties **compared to products** currently used for application (Benchmarking)	June – Nov ‘21
Evaluate potential of **additional technologies**	June – Nov ‘21
Online **engagement with stakeholders** as Covid-19 did not allow travelling	Nov ‘21
Presentation	9 Dec ‘21

Results on Materials

Analysis & Benchmarking

Lime
Based
Birdhouse

Ceramic
Tiles

Fiber based panel Indoor Panels

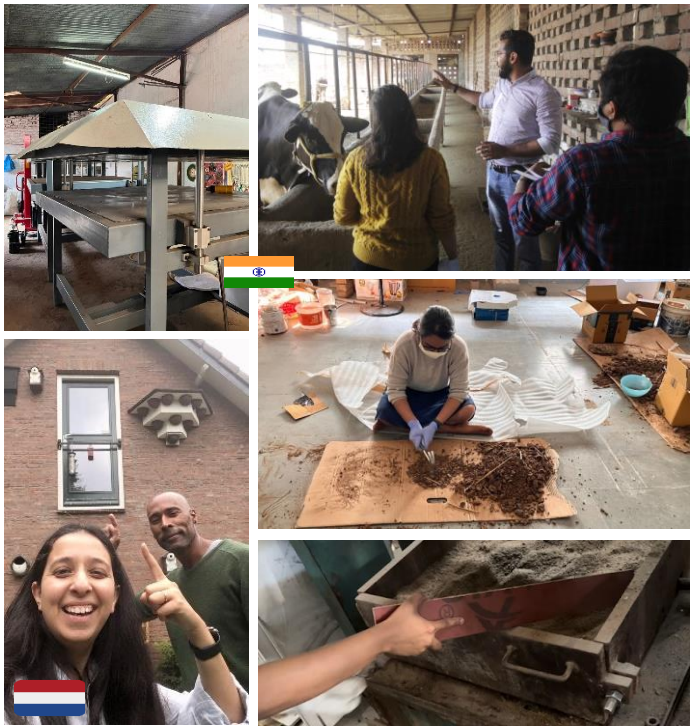
Additional Techniques

Binder less
Flat/Formed

Thermoplastic binder based
Plant Pots

Results on Partnerships

- 13 Dutch parties across value chain engaged
  (potential consumers, manufacturers, hygienised dung suppliers, machine suppliers)
- TKI proposal submitted 14 Sept, 2021; not granted
- Collaboration with Europe's Birdhouse manufacturer Vivara, for manufacturing first batch of products.
- 12 Indian parties across value chain engaged
  (potential consumers, manufacturers, ministry, dung supplier, machine suppliers, particle board manufacturers)
- Other India activities and the schools
  (collaboration with design students)



Communication and Dissemination

- Research insight dissemination on social media @Linkedin
  (customer feedback, gauging market interest, research collaborations)
- Featured in the a leading newspaper, business magazine, architecture magazine

Business Case Development for follow up

Biorefinery

Utilising different components in dung for relevant applications.

*Focus on Carbon fraction

- Building products: Water repellent character → damp spaces.
  P may be intrinsic flame retardant
- Horticulture: Readily biodegradable polymer bonded dung fibre products sensitive to unintended littering

Challenges

- Dung as feedstock for materials requires ‘mental adaptation time’
- In essence, dung competes with any kind of lignocellulosic residue fibre

Further business case development

Follow-up consortium:

- MIT Proposal submitted by SMEs with birdhouse manufacturer to viable produce binderless panels (Feedback in December 2021)

Netherlands-India collaboration

- Dung provider: Hygienized dung supplier with all raw material compliances
- Client: Government agency placed an order for a batch of products to promote the philosophy
- Grant: Creative grant to explore the process and market for 3D printed products with Dungse
- Dairy farmer/Dung provider: Interest from a 5000 cows organic dairy farm to setup Dungse production
- Manufacturing: Machine builder to build affordable custom machines for Dungse production
- Government: Interest from President of Karnataka Goshala Mahasangh
- Investor: Investment and collaboration interest from concrete 3D printing manufacturer

Thank you for your attention

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