Exploitation of food processing by-products and wastes: a common EU-India opportunity. The NAMASTE project.

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Biowastes in EU

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Homogeneous streams, rich of highly valuable compounds;

If properly handled, can be converted into food ingredients and other high-value natural products.

They are adversely affecting the environmental sustainability of the food industry (the first industrial sector in EU (turnover: 600bil €/y);

Annual organic waste streams in the EU

IEA Bioenergy Task 37
Food byproducts/waste in EU

Production in EU: ~ 250 Million/year

India is one of the major food producers in the world (its food sector contributes to about 28% of its national GDP);

- Ranks 1st in the production of cereals (230 mil tons/y), milk, livestock population;

- Ranks 2nd in the production of fruits (68 mil ton/y) and vegetables (120 mil ton/y);

- 2-3 w/w % of produced fruits and vegetables is processed, but 30 % of them goes waste with remarkable problems associated with greenhouse gas emissions and microbial pollution.

www.thehindubusinessline.com/industry-and-economy/agri-biz/article2429493.ece
www.dsir.gov.in/reports/ittp_tedo/agro/AF_Farm_Fruits_Vegetables_Intro.pdf
Food waste biorefinery

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Agro-Food Wastes

- Sugars
- Lipids, Proteins
- other chemicals

Physical & (bio)chemical treatment

Enzymes/microbes or chemical catalysts in suitable processes

Cosmetics

- Fatty acids,
  - aminoacids, phenols
  - antioxidants, fibers, pigments, water

Chemical

Base Chemicals

- Organic acids

Fine chemicals

- Biospecialties
  - Fine chemicals

- Biomaterials
  - Biopolymers
  - Lubricants, Fibers, Pigments, Proteins

Biofuels

- Ethanol,
  - Methane,
  - Hydrogen

Energy Fuels

Textile

Chemical

Cosmetics

Biospecialties

Fine chemicals

Biomaterials

Biopolymers

Lubricants, Fibers, Pigments, Proteins

Base Chemicals

Organic acids

Biofuels

Ethanol, Methane, Hydrogen

Energy Fuels

Textile

Chemical
NAMASTE – EU & INDIA

New Advances in the integrated Management of food processing waste in India and Europe: use of Sustainable Technologies for the Exploitation of by-products into new foods and feeds

KBBE-2009-2-7-02 “Valorization of by-products in food processing” Collaborative project (small/medium scale) in coordination with DBT (India)
## NAMASTE Consortiums

### NAMASTE-EU

**Alma Mater Studiorum-Università di Bologna**, Italy. Coordination (F. Fava)

Institute of Food Research, England

AZTI Tecnalia, Spain

Campden & Chorleywood Food Industry Development Institute, Hungary

Wageningen, Food & Biobased Research, Netherlands

Grupo Leche Pascual, Spain

J. Rettenmaier & Söhne GmbH + CO. KG, Germany

### NAMASTE-INDIA

**North East Institute of Science & Technology**, Assam. Coordination (P. K. Goswami)

Euro India Research Centre, Bangalore

University of Agriculture, Bangalore

Nature Fresh Logistics Ltd, Maharashtra

**Vaighai Agro Products Ltd, Madurai**

**University R&D Public Center SME or Company**
NAMASTE projects: rationale

Aim: To develop the scientific/industrial background for producing new food products and a fish feed from fruit and cereal processing by-products.

- Citrus byproducts and Wheat bran are extensively produced in Europe (~1 and 10 MT/y, resp.); Mango and Pomegranate byproducts and Rice bran are remarkably accumulated in India (~5, 0.3 and 20 MT/y, resp.). They are only partially and poorly valorized (e.g., pectins, feeds, biogas, etc) and largely disposed in landfills (with relevant costs and environmental problems).
- They are good sources of compounds useful for the human health (i.e., fibers, prebiotics, vitamins, antioxidants, etc.) exploitable in new food/feed formulation.
- The modern lifestyle requires “ready to eat” foods based on ingredients with health-promoting properties. The aquaculture requires feeds with plant-deriving ingredients.

To improve the sustainability of the fruit/cereal processing industry and create new competitiveness and market opportunities for the EU/India food Industry.
NAMASTE Approach

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RAW MATERIAL → FOOD PROCESSING → MARKET

Characterization & Preservation
Pre-treatment & Ingredient recovery

BY-PRODUCTS

Knowledge transfer & exploitation
Assessment of products & processes/technologies
Identification of new market opportunities

New food products (innovative and sustainable processes/technologies)
New feeds (for aquaculture)
NAMASTE-EU and MAMASTE-India are exchanging the main knowledge and protocols as well as their young scientists, to integrate their RTD and strategies for the transfer of the knowledge.
**Positive factors:**

Highly motivated and experienced/qualified EU and Indian RTD performers and Industries are genuinely interested in cooperating and sharing expertise, IP and market opportunities.

**Bottlenecks/Obstacles:**

1. Limited availability of funds for short and medium term young scientist exchange (some Indian funds are restricted to staff scientists only);

2. Limited budgets are (apparently) allocated by Indian funding institutions to industries joining the consortia;

3. Limited interest of the funding institutions for integrated/joint assessment of the ongoing twin EU/India projects;

4. Often none alignment of the funding institutions in terms starting dates, assessment deadlines, etc for twin projects.
Thank you

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The Indo-European Research and Innovation Partnership

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NAMASTE: www.namaste-eu-india.org/