



MEMBER OF  
BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE

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[www.azti.es](http://www.azti.es)

**Do you think that sustainability in  
the food industry is not profitable?  
YOU DON'T KNOW ABOUT UPCYCLING**

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Transform the biomass you would normally throw  
away into food-grade ingredients and foods.

# Advantages of Upcycling

Healthier ingredients and food products are obtained from biomass which would normally be thrown away

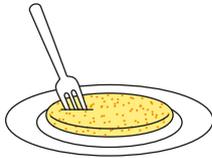


Greater profitability



Better for the environment

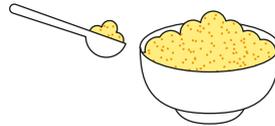
## Examples of upcycled food design



Meat products with modified texture for the elderly



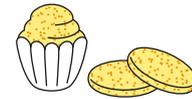
Special diets



Purees and sauces with fibre instead of fat: a filling sensation with fewer calories



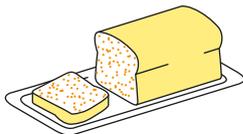
Better for health



Gluten-free, fibre-enriched muffins and biscuits



Better for health



Alternative proteins for sponge cakes, with no added milk or egg



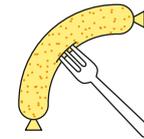
Special diets



Orange juice as a source of fibre



Better for health



Alternative proteins for sausages with less meat



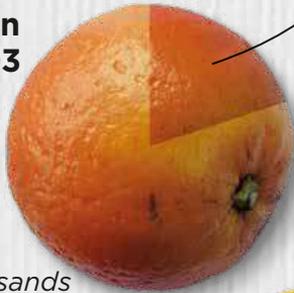
Better for the environment

# Upcycling example: orange peel

## Orange production

Spain is the country that produces the most oranges in the European Union.

**Spain**  
**3,503**



20%  
is used  
for juice

Thousands  
of tons per  
year (2021)

Italy  
1,956



Turkey  
1,742



Portugal  
320



Greece  
851



Cyprus  
20



Albania  
13



France  
8



## Juice manufacture



The peel, which is very rich in fibre, is thrown away. **At AZTI, we have shown it can be used for human consumption.**

Waste destination

**+ value**



Human food  
**(upcycling)**



Better for  
the environment



Animal  
food



Non-food use  
(e.g. compost)



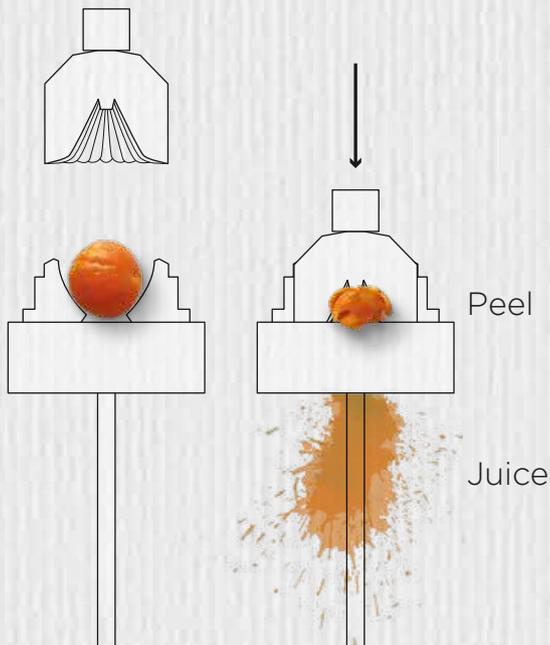
Waste

**- value**

Sources:  
Eurostat, EU Citrus  
Annual Report.

## 1 Orange juice

Oranges are squeezed mechanically to obtain the juice.

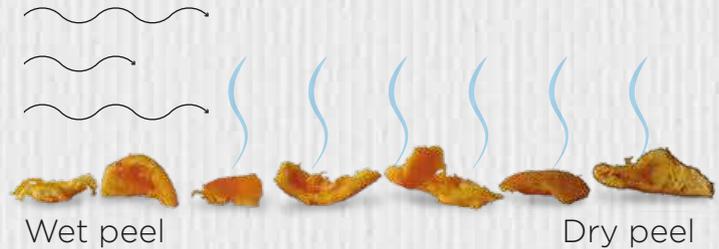


## 2 Drying the peel

Moisture is efficiently removed so the biomass does not deteriorate.

*2 drying techniques:*

### Hot air



### Hot air + microwave

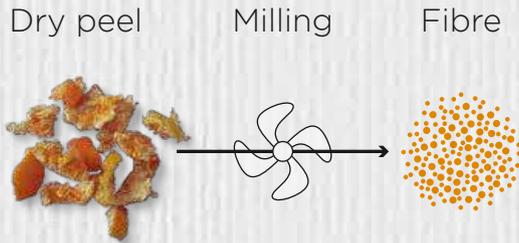


This technology developed by **AZTI** is more time-efficient and creates a fibre with higher water retention capacity



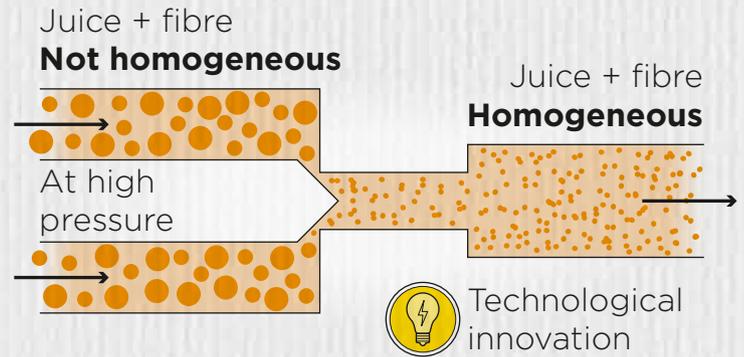
### 3 Milling

An easy-to-handle powdered fibre with a citrus aroma is obtained.



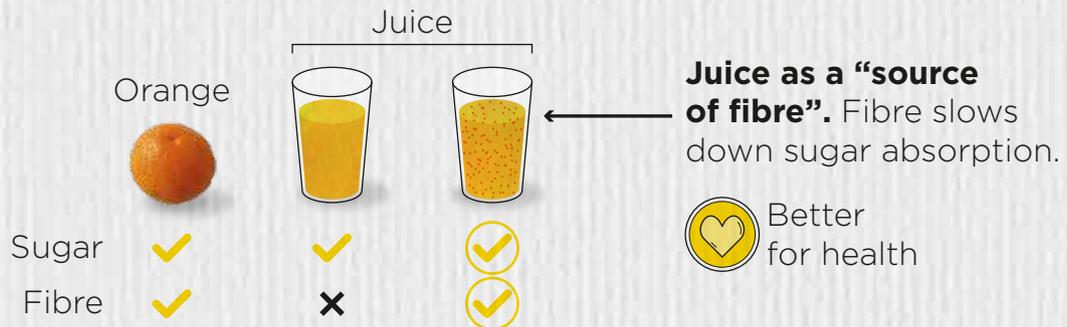
### 4 Adding the fibre

A juice with fibre is obtained via ultra high pressure homogenisation (UHPH).



## ORANGE JUICE WITH FIBRE

Once the fibre is added, the nutritional properties of the juice are similar to oranges.



# Are you ready to join the Upcycling movement?

Let us transform your biomass into high  
value-added ingredients and foods.

**CONTACT US**

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