

# SpectroFood: Information Agrifood quality estimation using hyperspectral techniques

SpectroFood.

## Summary

- Digital technology solutions for nondestructive, reliable, real-time and cost-efficient food quality assessment
- Pre- and post-harvest stages

## Four original use cases

- Apple (Germany)
- Broccoli (Greece)
- Leek (Belgium)
- Mushroom (Ireland)

## Plus 6 additional ones

- Pineapple
- Onion
- Tomato
- Potato
- Chicory
- Banana



Broccoli glasshouse experiment

## Main objective/ research question

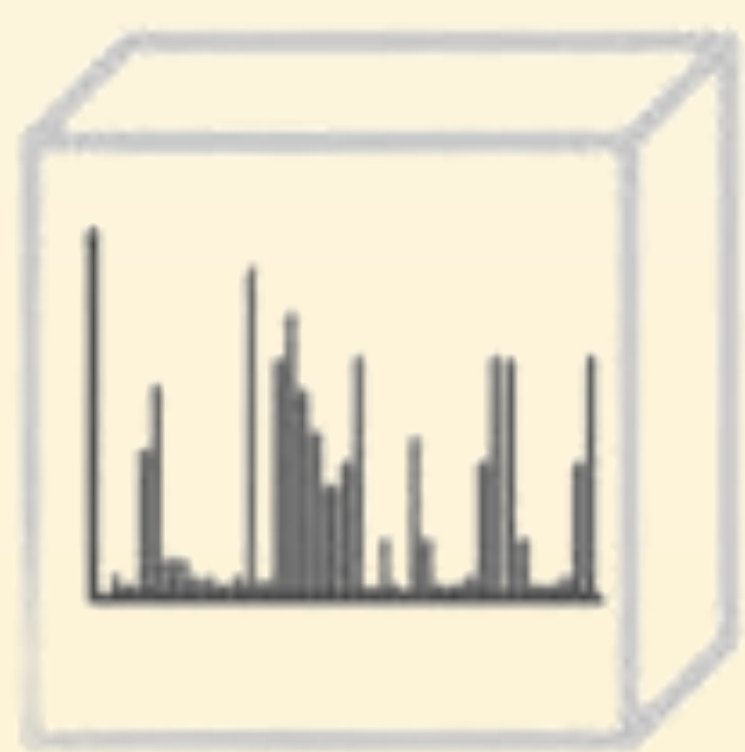
- ↓ food insecurity & food waste
- ↑ Input use efficiency (Water & Fertilizer)
- Nondestructive quality assessment research limited
- Focused on both pre- and post-harvest

## Results

### >20 Publications

- **Apple:** Dry matter, chlorophyll
- **Leak:** Dry matter, Post-harvest quality
- **Mushroom:** Dry matter, Browning
- **Broccoli:** Dry matter, Water stress, Fertilization
- **Pineapple:** Moisture, soluble solids, carotenoids
- **Banana:** Chlorophyll
- 3 review papers
- **Hyperspectral Dataset** for dry matter estimation (Apple, Leak, Mushroom, Broccoli)

### 1. Data cube (Hyperspectral Image)

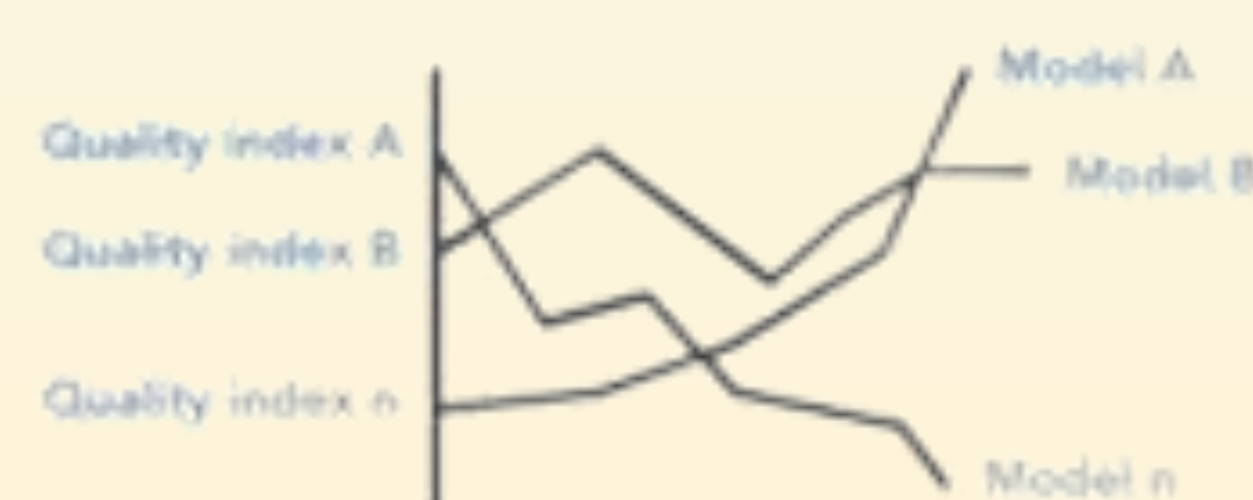
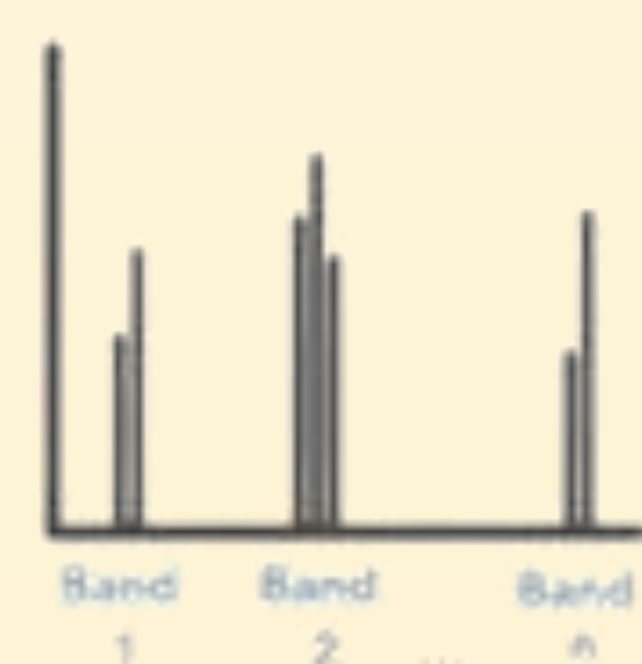


### 2. Lab and organoleptic measurements

Selection of most relevant bands

Dimensionality reduction

Reflectance values



Modeling of spectral information and quality characteristics



Automatic quality assessment per Use Case

<b>Broccoli</b>	- Colour - Head shape - Head size - Firmness
<b>Mushrooms</b>	- Colour - Cap size - Water content - Firmness
<b>Apples</b>	- Colour - Soluble solids - Firmness - Coulter counter
<b>Leek</b>	- Colour - Shape - Dry matter - Water content



HSI acquisition setup

## Conclusions

- Limited data availability
- No data standards
- Limited generalization capabilities
- No of the shelf solutions
- Hyperspectral imaging can improve production systems

## Future research activities

- Explore AI model generalization capabilities using larger hyperspectral datasets (e.g. SpectroFood dataset)
- Explore more complex AI algorithms (e.g. Transformers)
- Investigation of additional crops and quality parameters



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Topic 1: Data-driven ICT platforms and solutions to improve the sustainability of agri-food Systems

