

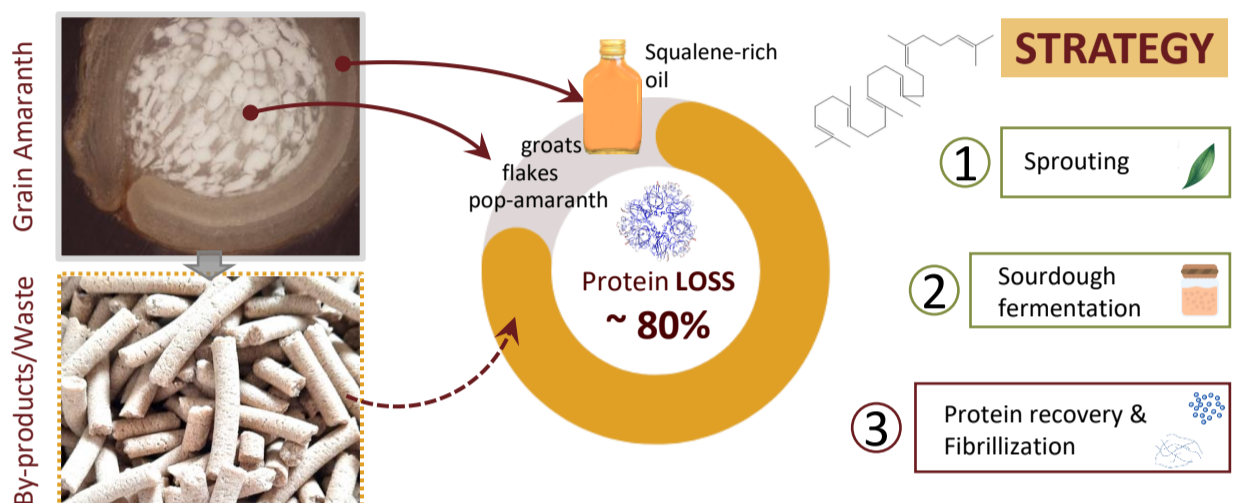
Amaranth revival: from waste to functional foods & nanomaterials



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MOTIVATION & METHOD

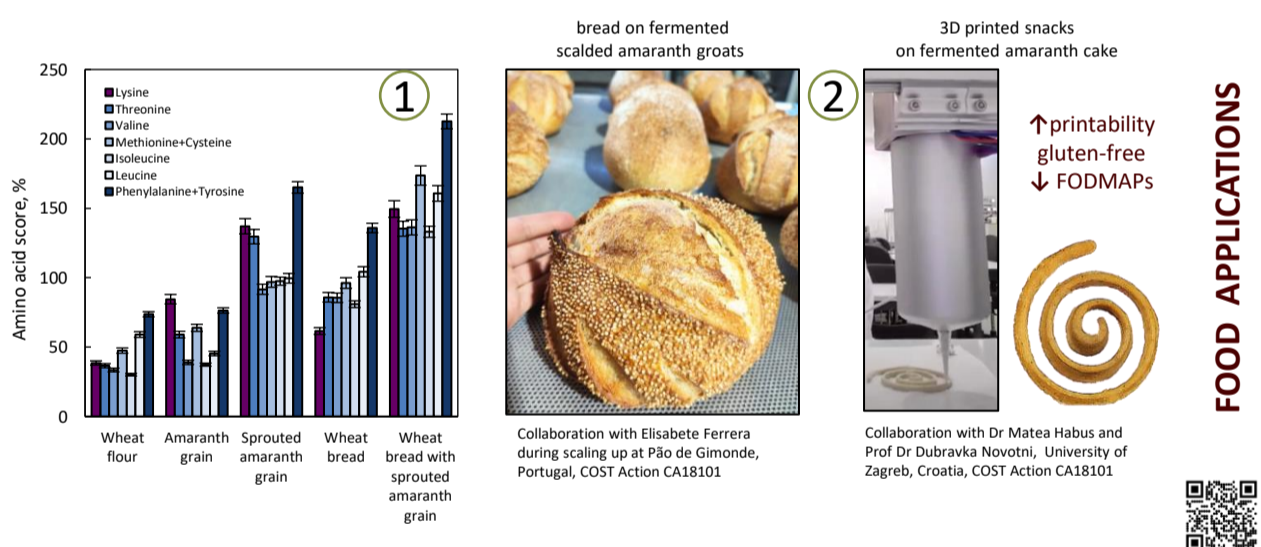
Amaranth, the ancient “golden grain of the Gods” for the Aztecs, could save the planet with high-quality **lysine-rich protein**. However, this **resilient** heat-, drought-, pest-resistant **pseudocereal** is **lost** in global food value chains and its protein-rich side streams are still massively generated and **unutilized**. To unlock the functional and nutritional value of amaranth, we employed a dual strategy to valorize the protein-rich source into **functional foods** and **nanomaterials** by **bioprocessing**, **protein extraction**, and **fibrillization**.



RESULTS

Through **sprouting** and **sourdough fermentation**, we enabled the nutritional potential of grain amaranth in **breadmaking** and **3D printing**. The bioprocessing improved the **amino acid** and micronutrient (**Ca, Fe, Mg, Zn**) profiles of **low FODMAPs** and **gluten-free** foods. To **revalue** rancid protein-rich **waste** from amaranth processing, we applied salt **extraction** and produced highly **soluble 11s globulins**. Tuning the proteins' secondary structure through heat-induced acidic hydrolysis promoted the formation of **twisted** and well-ordered **amaranth amyloid fibrils** to template biodegradable and biocompatible **protein-based materials**.

GRAIN/BY-PRODUCTS



CONCLUSION

The results of this research are rediscovering the **potential** of amaranth as a valuable plant for developing **resilient** and **sustainable food systems**. The **valorization** of amaranth industrial protein-rich waste benefits the multifaceted **high-tech applications** of amaranth within and beyond food value chains.

CONTRIBUTION TO SUSTAINABLE FOOD SYSTEMS

Our research advances global food systems by

- promoting **Amaranthus L.**, a **climate-smart** pseudocereal crop, for better **nutrition** (SDGs 2, 13)
- **valorizing** food waste of amaranth grain processing for **foods, nutraceuticals** and **sustainable materials** (SDGs 3, 6, 12).

WASTE

