



**Agricultural University of Athens**  
**Dept. Food Science and Human Nutrition**  
**Laboratory of Food Process Engineering**

# GreLand

## Using Greek wheat landraces for bread and pasta development

### Team members

- Karatasos Thomas
- Katsika Eleni
- Polychronopoulou Angeliki
- Sarros Thomas

Faculty mentor : Dr Styliani Protonotariou

**ATHENS 2020**

## Our idea

- ❑ Contribution to improved sustainability in the cereal chain
- ❑ Cultivation of landraces and specifically an ancient Greek landrace of emmer wheat (*Triticum dicoccum*)
- ❑ Production of bread and pasta
- ❑ Evaluation (technologically and nutritionally) of that bread





## How we reached that idea

- Increase in demand for food globally due to overpopulation
- Requirement of high-input farming system in modern wheat varieties
- Products with less nutritional value compared to ancient wheat varieties
- Consumer demand towards environmental-friendly production and more nutritious food
- Ability of emmer to adapt in mountainous areas
- Need for preserving plant biodiversity
- Limited research on emmer wheat



## Environmental Impact

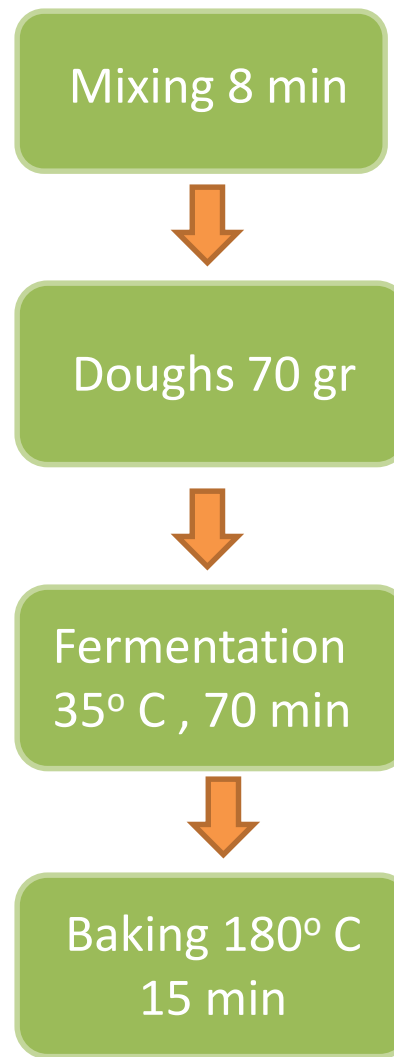
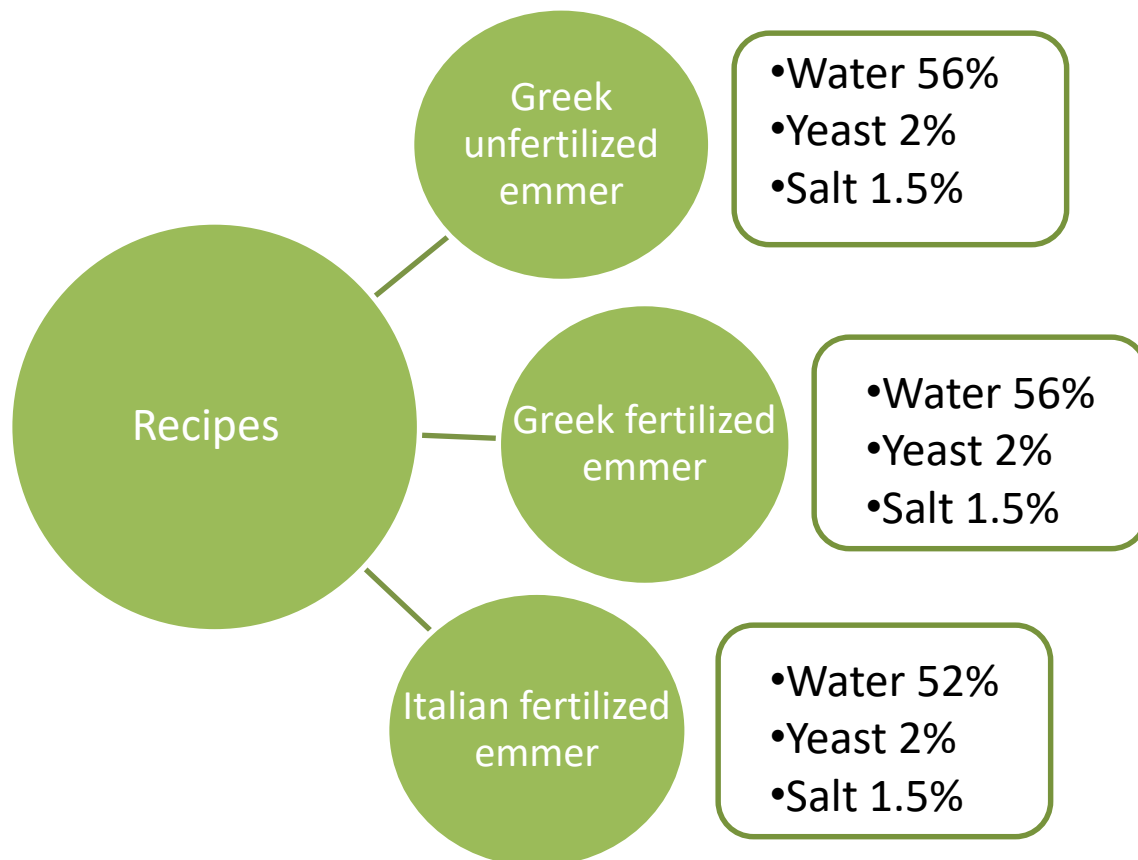
- Low input farming systems
- Decreased need for fertilizers, pesticides and herbicides
- Organic cultivation



## Social Impact

- Growth of country's farming in marginal regions
- New opportunities for farmers
- Decentralization, especially for younger generations
- Contract farming

# Production process

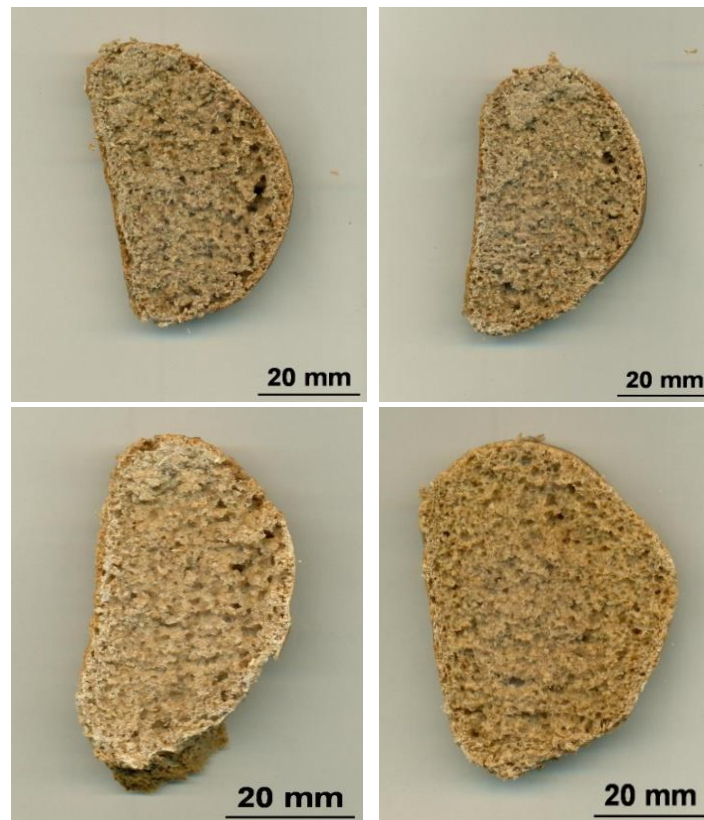


## Technological characteristics

Bread	Greek unfertilized	Greek fertilized	Italian
Moisture (%wet base)	12.57 <sup>b</sup> ±0.01	10.97% <sup>a</sup> ±0.01	12.39 <sup>b</sup> ±0.01
aw	0.60 <sup>c</sup> ±0.01	0.50 <sup>a</sup> ±0.01	0.54 <sup>b</sup> ±0.01
Dry gluten (% wet base)	12.87 <sup>a</sup> ±0.60	11.09 <sup>b</sup> ±0.36	5.96 <sup>c</sup> ±0.28
WHC (%)	93.24 <sup>a</sup> ±0.10	92.13 <sup>a</sup> ±0.21	67.30 <sup>b</sup> ±0.35
Protein (% wet base)	17.16 <sup>a</sup> ±0.11	17.82 <sup>a</sup> ±0.13	9.84 <sup>b</sup> ±0.29
Ash (% , σε wet base)	2.73 <sup>b</sup> ±0.14	3.05 <sup>a</sup> ±0.05	2.08 <sup>c</sup> ±0.01

## Technological characteristics

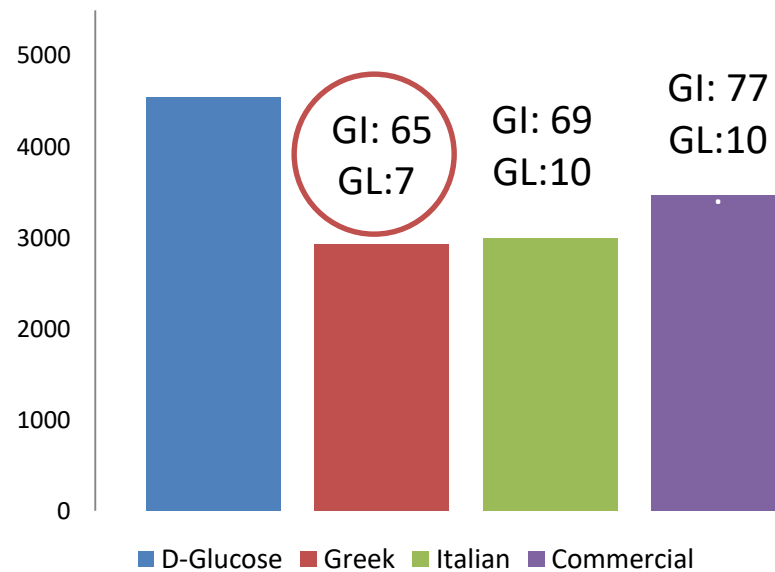
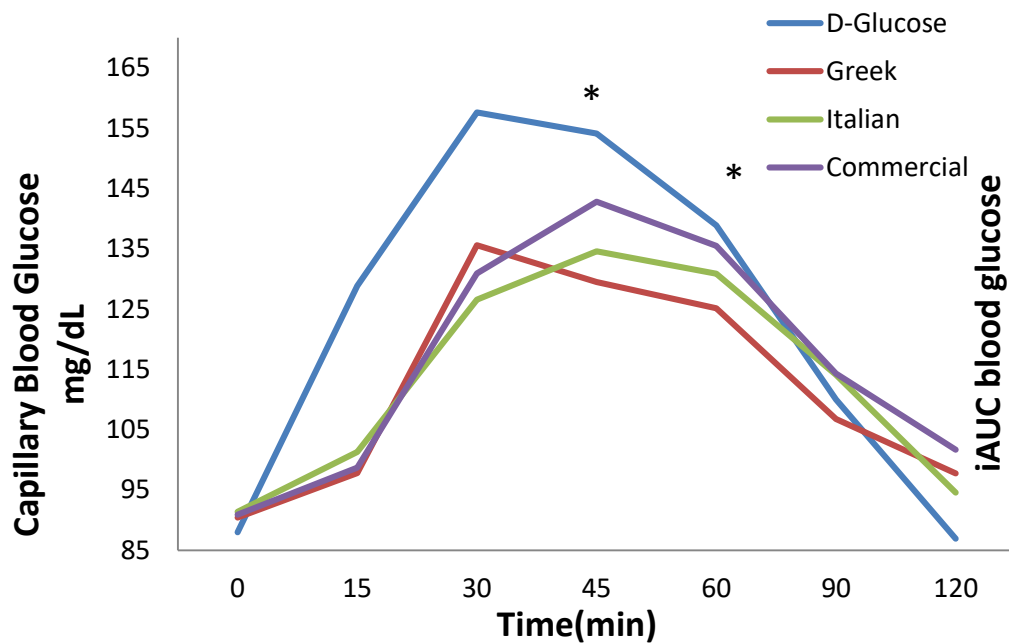
Bread	Greek unfertilized	Greek fertilized	Italian
Moisture (% wet base)	33.56 <sup>a</sup> ±0.01	34.45 <sup>a</sup> ±0.01	30.22 <sup>b</sup> ±0.01
aw	0.91 <sup>a</sup> ±0.01	0.94 <sup>a</sup> ±0.05	0.90 <sup>a</sup> ±0.01
Volume (ml)	2.01 <sup>a</sup> ±0.01	2.00 <sup>a</sup> ±0.02	2.03 <sup>a</sup> ±0.02
Hardness (N)	14.33 <sup>a</sup> ±0.89	13.65 <sup>a</sup> ±0.79	12.44 <sup>a</sup> ±0.60
Pore diameter (max) (mm)	0.96 <sup>a</sup> ±0.09	0.96 <sup>a</sup> ±0.01	0.86 <sup>a</sup> ±0.31
Pore diameter (mean) (mm)	0.68 <sup>a</sup> ±0.06	0.69 <sup>a</sup> ±0.01	0.61 <sup>a</sup> ±0.21
Density (mm)	9.05 <sup>a</sup> ±0.44	9.18 <sup>a</sup> ±0.33	9.59 <sup>a</sup> ±0.50
ACH (% wet base)	37.75±1.76	36.90±1.59	49.61±0.81
Fiber (% wet base)	8.34±0.01	8.59±0.01	7.45±0.01



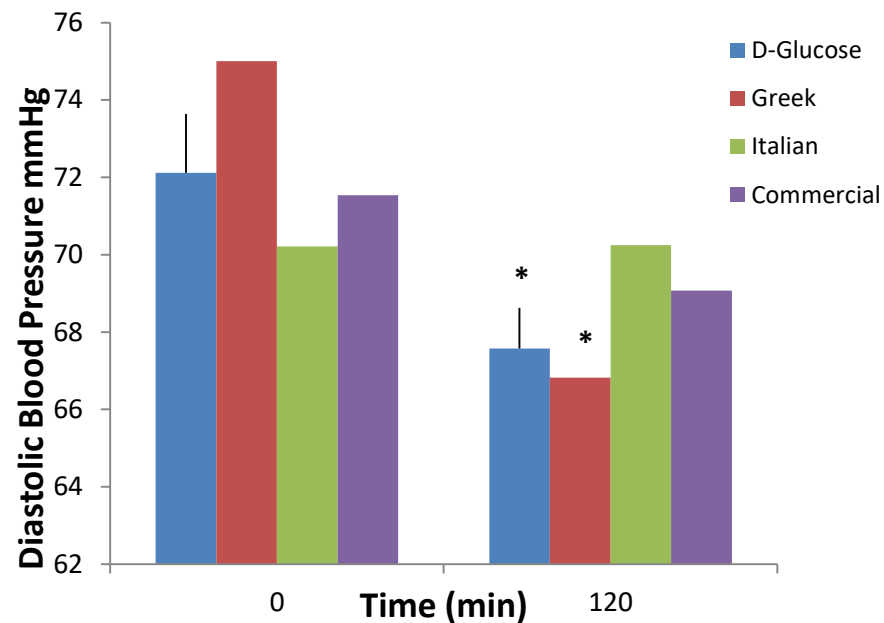
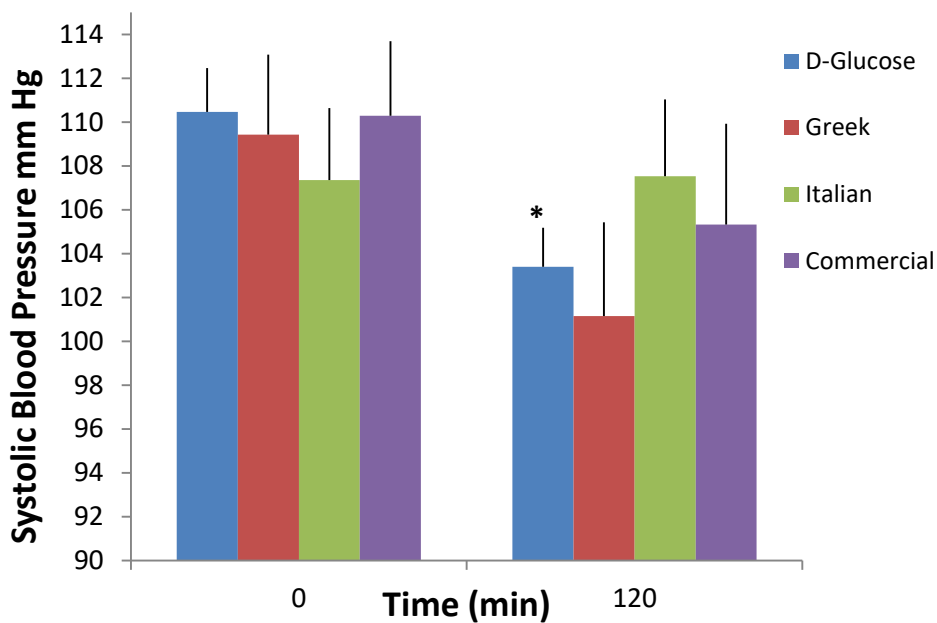
*From left to right: Bread from unfertilized whole wheat Greek emmer, bread from fertilized whole wheat Greek emmer (up), bread from fertilized Italian whole wheat emmer, bread from commercial whole wheat flour (down).*



# Clinical Study



# Clinical Study



## Economic information

- Increased cost for dehulling
- Reduced cost for cultivation
- Seeds have at least twice the price compared to bread wheat
- Flour price: 4 euro/kg
- Pasta price: 3.5/0.5 kg





## Innovativeness

Greek emmer wheat could be introduced as a:

- Sustainable wheat crop
- Landrace to contribute to biodiversity
- Nutritious food (protein, fiber, micronutrient)
- Healthier food choice compared to bread wheat

## Future work

- ❑ Upgrade of existing products
- ❑ High quality traditional products (e.g. trachanas, chilopites) maintaining their distinct local identity
- ❑ Innovative products closer to the original recipes created years ago
- ❑ Evaluation of the final products is needed

Trachanas



Chilopites



# Thank you for your attention!

## Team GreLand

