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The effect of cooking practices on charred seeds fragmentation

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Protocol status: In development
We are still developing and optimizing this protocol

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Disclaimer

Abstract

Since the dawn of mankind, human beings have used a variety of plant-based economies, including culinary practices. Very often found charred in archaeological contexts, the aim of this protocol is to understand the impact, if any, of cooking treatments on certain seeds: einkorn (*Triticum monoccocum*), lentils (*Lens culinaris*) and white beans (*Phaseolus vulgaris*). Each taxon was divided into three groups: one in which the seeds were soaked, another in which they were boiled, and a control group ; in which all were then carbonised. After studying the data collected, it turns out that the appearance of the seeds changes depending on whether or not the specimens have undergone culinary treatments, particularly if they have been boiled, which creates a lot of distortion, among other things.

Materials

- approx. 16g (300 seeds) of lentils (Lens culinaris, Medik. 1797)
- approx. 270g (300 seeds) of white beans (Phaseolus vulgaris L. 1753)
- approx. 6g (300 seeds) of einkorn (Tritium monococcum L. 1753)

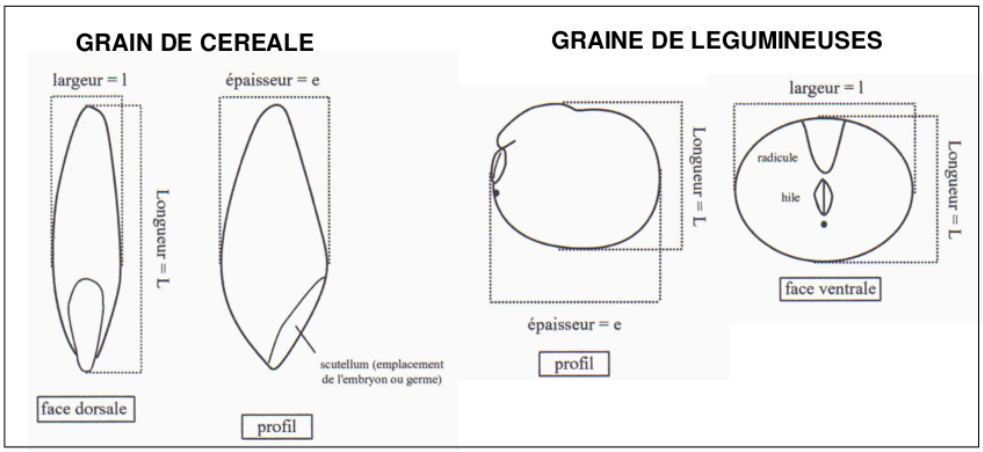
- water thermometer
- balance (precision: 0.1g)
- metallic sieve
- heating plate
- pot
- fire place or barbecue

- numeric microscope
- tweezers
- 9 minizips

Troubleshooting

Measurement and documentation of the material before the experiment

1 Measurement of biometric data:
For each taxa, choose randomly 20 whole seeds, and for each seed, measure the width, length and thickness (mm) with a numeric microscope.



Measurement of seeds

You can complete the following table with the biometric data collected:
https://docs.google.com/spreadsheets/d/1rBLJoiNIdGM0REKnHpaqAieFt0D5rdznWn2VUjExxus/edit?userstoinvite=leonardbotton@gmail.com&sharingaction=manageaccess&role=writer#gid=0

2 Photographic data:
Take one picture of ventral, dorsal and lateral view for each taxa of a random seed among the 30 chosen, with a numeric microscope.

2.1

STEP CASE

Cooking preparation n°1: Raw seeds 10 steps

3 Select 100 whole seeds of each taxa. Put them in a different box each.

4 Carbonization (you must repeat this step 3 times, one for each taxa)

4.1 Set a fire

4.2 Put a metallic sieve with the seeds of one taxa in it among the burning charcoals. Set a timer

4.3 Wait until every seeds are charred and measure the time.

4.4 Put the charred seeds in a pot away from the fire to cool down

5 Store the seeds in an hermetic plastic bag with the following information:
- taxa in English and latin (lentils / white beans or einkorn)
- cooking preparation (raw seeds/ soaked seeds or boiled seeds)
- time of carbonization (in min)
- time of soaking or boiling if relevant (in min)
- date of experiment
- place of the experiment
- Brand comercializing the seeds
- Country of production of the seeds

Post-experiment analysis

6 Measurements of biometric data: take the same measurement (lenght, width and thickness in mm) as before the experiment, choosing randomly 20 whole seeds for each taxa and cooking preparation.

7 Using a binocular magnifier if possible, sort the entire and fragmented seeds for each taxa and cooking preparation to calculate the fragmentation rate:

We can quantify the fragmentation by counting the seeds depending on the size of each fragment:
- entire seed: the seed is not fragmented
- half seed: the fragment is the size of half of an entire seed (of the same taxa)
- quarter of a seed: the fragment is the size of a quarter of an entire seed

Fragmentation rate = number of fragments (half and quarter) / total number of rests

8 Photographs: using a numeric microscope, take pictures of whole and fragmented seeds of each taxa and cooking preparation, if possible with a ventral, dorsal and lateral view. Also document any specific anatomic aspect that appears on the seeds surface during the experiment.